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The Determinant of Lung Function Disorders of The Textile Industry Spinning Section

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Abstract

Many factors affect lung function capacity in textile industry workers. This research aims to determine the factors that affect the vital role of pulmonary spinning workers in the textile industry. This research used an analytic observational research design with a cross-sectional approach. The sampling technique used total sampling and getting the sample was 96 people, and measurement of lung vital capacity used spirometry. The Low Volume Sampler was applied to measure dust concentration, and the questionnaire was used to assess the individual characteristics. Bivariate analysis of the variables is the working environment dust, exercise habits, smoking behavior, and gender are significant. The result of multivariate analysis of dust is the most affecting to the lung vital capacity. In conclusion, dust concentrations are classified above the Threshold Limit Value (TLV), so the company should control the source of dust exposure.

Introduction

Occupational respiratory disease is a major global public health problem that accounts for up to 30% of all occupational diseases. Besides, 10-20% of deaths are caused by respiratory disorders (Gizaw et al., 2016). Exposure to dust in textile industry workers can be at risk of causing lung function disorders. Health effects, in the form of impaired lung function, have been documented in workers exposed to dust in both small, medium, and large industries (Subbarao et al., 2009). Occupational Lung Disease (OLD) is a pulmonary disease arising from prolonged or repeated exposure that causes toxic effects, both acute and chronic (Stobnicka and Górny, 2015). Occupational diseases are caused by pathological responses from patients to their working environment (Qian et al., 2016). There is a growing consensus on the adverse impact of organic dust on the symptoms and respiratory function of industrial workers, one of which is impaired lung function (Khodadadi et al., 2011).

ILO shows that annually there are more than 250 million accidents at workplaces. While 160 million workers become sick due to hazards in the workplace. Also, around 1.2 million workers die due to accidents and occupational diseases. New materials for the production process are distributed annually in the workplaces, and many of them cause lung disease (ILO, 2013). Indonesia is one of the developing countries with many companies producing dust from the production process. OLD is a group of occupational diseases in which the target organ of the disease in the lung (Sumakmur, 2014).

The textile industry is one of the many vital sectors in Indonesia, especially in the Surakarta Raya region. Workers can be exposed to a variety of different environmental factors,

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especially from the spinning and weaving processes (Wami et al., 2018). Those processes in the textile industry produce large amounts of cotton dust (Tagiyeva et al., 2017). The dust consists of various sizes and types of particles, such as plant materials, fibers, bacteria, fungi, soil, pesticides, non-cotton materials, and other contaminants (Wu et al., 2019). Research on respiratory disturbances and impaired lung function in cotton spinning in Egypt shows a significant relationship in the group exposed to dust (Tageldin, et al., 2017;Wami et al., 2018).

The initial survey conducted at 3 points in the production area of the spinning/spinning industry of the textile industry showed the highest levels of work environment dust of 0.24 mg / m3 and the lowest 0.19 mg / m3 with an average of 0.21 mg / m3. This figure is included above the Threshold Value (NAV) of working environment dust with the type of cotton at work equal to 0.2 mg / m3. The purpose of this study is to determine the determinants of the vital capacity of the lung of spinning textile industry workers.

Methods

This study uses an observational analytic design with a cross-sectional study design. It explains the differences between the variables through testing previously formulated hypotheses. This research approach uses a cross-sectional approach in which cause/risk and causal/causal variables are measured or collected at the same time and carried out at the same time. The study was conducted from November 2017 to July 2018 on the spinning labor section in the textile industry. This study uses a total sampling technique where all workers in the spinning section are assigned to be the research sample. The research sample of 96 workers.

The independent variables in this study were environmental dust and individual characteristics, including age, sex, years of service, exercise habits, and smoking behavior. While the dependent variable was vital lung capacity. The measurement of dust levels in the work environment is carried out at 6 points of the spinning area measured using a Low Volume Sampler (LVS) tool. To get the concentration of dust by using a sample filter before and after being entered into the LVS. The result is the dust content from the LVS tool. It was then weighed again with analytical scales to obtain the difference in dust after and before measurement. Procedure for measuring environmental dust based on SNI 16-7058-2004 regarding the total dust measurement. Other variables such as age, sex, years of service, exercise habits, and smoking behavior were assessed by a questionnaire.

Pulmonary function tests were carried out on a total of 96 workers in the textile industry spinning section of PT X. Measurements using spirometry are a tool used to determine the percentage of Forced Vital Capacity (FVC) and Forced Expiratory Volume / Forced Expiratory Volume / forced volume in the first second (FEV1) .

The vital lung capacity is classified into four. Namely normal, obstructive, restrictive, and mixed. Based on the% FVC and% FEV1 measured used a spirometer which is a tool used to find out the percentage of Forced Vital Capacity (FVC) and Forced Expiratory Volume / Forced Expiratory Volume / forced volume in the first second (FEV1). Pulmonary function is normal if % FVC ≥ 80% and% FEV1 ≥ 70% and obstructive disorders if% FVC> 80% and% FEV1 <70%, restrictive disorders if% FVC <80% and% FEV1 ≥ 70%, mixed disorders if % FVC <80% and% FEV1 <70%.

This analysis is to see the description and characteristics of each independent variable and the dependent variable. The variables of this study were analyzed using the frequency distribution of SPSS version 23 data tendencies to describe the characteristics of each study variable. Bivariate analysis is used on two variables thought to have a relationship or mutual correlation. The bivariate analysis uses the Spearman correlation test for work environment dust variables with obstructive, restrictive, and mixed pulmonary function disturbances. Because the independent variable uses a numerical data scale (ratio) and the dependent variable has a categorical (ordinal) data scale.

The relationship strength of a variable is obtained from the direction of the correlation that has positive (+) and negative (-) values. A positive value (+) means that the greater

the value of one variable, the greater the value of other variables. Conversely, for negative values (-). The greater one variable value, the other variables will be smaller. suggests that the correlation strength number (r) is divided into: 1) 0.00 - 0.199: very weak, (2) 0.20 - 0.399: Weak, (3) 0.40 - 0.599: (4) Medium 0.60 - 0.799: (5) Strong 0.80 - 1,000: the significance value of p is as follows: a) If p-value <0.05, the test results have a significant correlation. b) If the p-value is 0.05, the test results have no significant correlation and multivariate analysis to find which variables are the most influential among the variables with a P-value <0.25.

Results and Discussion

PT X textile industry is located on Jalan Raya Solo-Karanganyar km. 9.5, Surakarta, Central Java. The industry has a spinning production unit that produces yarn as a primary material for making fabrics.

Table 1 shows the relationship between respondent characteristics and lung vital capacity. From the age variable, age >40 years has obstructive pulmonary function disorder, restrictive, and mixed. In the BMI variable, the most lung function disorders in respondents with healthy BMI. From the working period, the variable in the period >10 years mostly experience obstructive and mixed lung function disorders. In gender variables, lung function disorders are experienced mainly by men. For the smoking behavior variables, most diseases are the smokers, and for the exercise habits variables, the conditions most occurred on respondents who do not do routine exercise. Correlations between the independent and dependent variables, the age and BMI variables, do not significantly affect the lung's vital capacity, while other variables significantly affect it. The obstructive, restrictive, and mixed pulmonary vital capacity, are theoretically incorporated into disorders pulmonary function.

Table 1. Variable Characteristics with Lung's Vital Capacity

Variables	Lung's Vital Capacity				Total	r	p-value
	Normal	Restriktif	Obstruktive	Mixed			
Age (year)							
17-40	8	0	0	0	8	-0,110	0,285
>40-60	69	15	2	2	88		
Body Mass Index							
Thin	6	2	0	0	8		
Normal	49	8	2	0	59	0,185	0,072
Overweight	14	0	0	0	14		
Obesity	8	5	0	2	15		
Employment Period (year)							
<10	4	0	2	0	6	0,236	0,020
≥10	73	15	0	2	90		
Gender							
Male	30	11	2	2	45	0,319	0,002
Female	47	4	0	0	51		
Smoking Behavior							
Yes	31	12	2	2	47	0,350	0,000
Not	46	3	0	0	49		
Excercise Habits							
Routine	64	5	0	2	71	0,420	0,000
Not Routine	13	10	2	0	25		
Dust	Min	Max	SD	Mean	Range	-0,390	0,000
	0,263	0,665	0,14	0,395	0,402		

Source: Primary Data, 2018

If we analyze the table for workers> 40 years, they have experienced many lung function disorders. In BMI, workers in the normal and obese categories have lung function disorders, then the working period that workers who have worked ≥ 10 years' experience more lung function disorders than workers who worked <10 years. Female workers have fewer lung function disorders than male workers, smoking habits, and exercise habits according to table 1 shows that smokers and workers who rarely exercise suffer from obstructive, restrictive, and mixed lung function.

Variables, which include in the multivariate analysis, are variables that have a p-value <0.25. In table 2, the variable most affects the lung's vital capacity is gender, where the four variables above can affect it 38.4% and 52.6% explained by other variables not examined.

Table 2. Variables that Most Affect the Vital Capacity of the Lungs

Variables	Coefficient β	*P-Value*	Adjusted R^2
Dust	-0.290	0.001	0.384
BMI	-0.348	0.000	
Gender	-0.409	0.000	
Excercise Habits	-0.175	0.040	

Source: Primary Data, 2018

Particles that are toxic to magrofag can stimulate the formation of new magrofags. The magrofags formation and destruction continue to play a vital role in the collagen connective tissue formation and the deposition of hyaline in the connective tissue that forms fibrosis. This fibrosis occurs in the lung parenchyma. That is the alveoli and wall intertestial connective tissue. As a result of pulmonary fibrosis will decrease lung tissue elasticity (shifting lung tissue) and give rise to impaired lung development, namely restriction. Obstruction disorder is a pulmonary disorder characterized by barriers to airflow in the respiratory tract that are irreversible. There were three were three respondents (6%) who experienced obstruction. Narrowing of the airways and disruption in airflow therein will affect the work of breathing. FEV1 will always reduce in respondents who experience obstruction. It can be a high amount. Whereas FVC cannot. A mixture of restrictions and obstruction occurs due to pathological processes. It reduces lung volume, capacity, flow, the presence of narrowing of the respiratory tract, and the landfill breathing's presence by particulates.

Measurement of work environment dust at 6 points at PT X Karanganyar, Indonesia Textile Industry obtains an average of 0.395 mg/m3. The analyses in all aspects are above the Threshold Limit Value (TLV) 0.2 mg/m3 every eight working hours per day for the type of cotton dust based on Permenaker RI No.5, 2018 concerning occupational safety and health work environment appendix 3 TLV Chemical Factors (Republic of Indonesia Ministry of Manpower, 2018). Research by Mwinykione et al. also shows that dust exposure above the threshold value has a risk of decreased lung function (Mwinykione et al., 2005). The workers in the textile industry have the risk of being affected by LFD from exposure to cotton dust. So they can cause the risk of disease. From 96 total samples, 77 workers have normal conditions, and 19 workers experience lung dysfunction (22.86%). Most lung function disorders are the restrictive type, with a total of 15 respondents. The mechanism of dust accumulation in the lung begins by breathing in, then the air containing dust enters the lungs. Dust, between 5-10 microns, will be retained by the upper respiratory tract. The middle will retain the 3-5 microns. Particles with a size between 1 and 3 microns will be placed directly on the surface of the pulmonary alveoli. The particles with a magnitude of 0.1 microns do not so quickly settle on the surface of the alveoli. The mass of dust which is less than 0.1 micron is too small so that it does not end on the surface of the alveoli or lender membrane, because of Brown's movement, causes such dust to move out of the alveoli. The impaired pulmonary

function in the spinning section is also caused by the inhalation of cotton fibers and dust in the working environment (Mahmoud and El-Megeed, 2004). It is consistent with research by Sultan that there was a decrease in lung function against prolonged dust exposure in wood industry workers (Sultan, 2007)

Suma'mur explains that continuous exposure to cotton dust for years irritates the upper respiratory tract of the bronchus. If the exposure continues, chronic obstructive pulmonary disease will happen, which can be interpreted that the more extended the working period, there will be more cotton dust that settles in the respiratory tract, the more severe the disease suffered byssinosis. Invisible cotton dust particles enter the lungs' alveoli through inhalation and accumulate in the lymph causing damage to the alveoli and reducing the capacity to retain oxygen. When cotton dust builds up, workers can suffer from byssinosis (Su et al., 2003). Dust can cause lung disease and fibrosis if inhaled during continuous work. If the alveoli harden, it reduces elasticity in accommodating the air volume so that the oxygen binding ability decreases. The analysis results show that the effect of occupational dust exposure significantly to the lung's vital capacity with a p-value of 0.000. It is in line with research on work environment dust against pulmonary dysfunction (Qian et al., 2016). These results are also in line with Qian's, which shows that there is a relationship between dust exposure and lung function disorder (Su et al., 2003).

Exposure to dust can reduce lung function. This study shows a significant relationship between dust exposure with reduced lung function. It is followed by research; there is a meaningful relationship between workers exposed to dust with lung function disorders where workers exposed to dust have a higher risk than those who do not (Khan et al., 2015; Said et al., 2017). Lung function will decrease as people get older. Age is related to the aging process, where the older a person is, the higher the likelihood of lung function capacity. The age of 20-40 years is the maximum muscle strength in a person and will be reduced by 20% after 40 years old. The older a person is, the risk of impaired lung function is also high (Schachter et al., 2009).

The longer a person is at work, the more he has been exposed to the dangers posed by the work environment, including exposure to cotton dust. Chronic disorders occurred due to occupational dust exposure is quite high. While for an extended period which is usually annual and not infrequently, the symptoms of lung function appear after more than ten years of exposure (Boschetto et al., 2006; Daba Wami et al., 2018). The work period is the length of time worked (years) in a Company environment. The longer a person works in a dusty environment, the further the lung's vital capacity is reduced. For every additional work period in one year, a decrease in lung capacity of 35.3907 ml will occur (Sumakmur, 2014). Research on Lung Morbidity of Traffic Wardens Exposure to Cronic Vehicular Pollution in Lahore Pakistan, involving 500 respondents, concluded that the lung capacity of traffic officers are reduced because of chronic exposure to vehicle emissions (Shelly et al., 2019).

The lung capacity of traffic officers who have a minimum working period of 10 years is moderately affected by 25% of officers and 2.5% of officers who experience a significant impact on the vital capacity of their lungs. The volume and capacity of the entire lung in women is approximately 20 up to 25 percent smaller than men and even higher to athletics and bigger people than people who are small and asthenic. Gender affects lung function disorders. Several pieces of research in the textile industry show that men have a higher risk of lung function disorders than women (Camp, et al., 2004; SchachterI et al., 2009). Other studies have also found that women aged> 50 years are at risk of developing acute respiratory problems due to particulates (Chen and Wu, 2018). Smoking can cause changes in the structure and function respiratory tract and lung tissue. In the large respiratory tract, enlarged mucosal cells (hypertrophy) and mucous glands are multiply. Where the small respiratory tract, inflammation occurs mild to narrowing due to increased cells and mucus buildup. When in the lung's tissue, an increase in the amount of cells inflammation and alveoli damage. As a result of changes in the anatomy of the channel breath, in smokers, changes in lung function and everything kinds of clinical changes (Jaén et al., 2006; KC et

al., 2018). It is the main basis for this chronic obstructive disease. Smoking can accelerate the decline in pulmonary physiology. It may also be caused by male smoking behavior, which makes them easier to experience lung function disorders (Jaén et al., 2006; Bakhsh et al., 2016).

A person's nutritional status affects the body's immune system to maintain personal health from various diseases, such as coughing, colds, diarrhea. Besides, the immune system influences the body's ability to detoxify foreign objects, such as dust that enters the body, which will automatically affect the function and performance of the lungs. A person's nutritional status affects the body's immune system to maintain personal health from various diseases such as coughing, colds, diarrhea, and also the body's ability to detoxify foreign objects such as dust that enters the body. As a result, the function and performance of the lungs also interfere. Besides, the research on obesity and mortality explained that obesity could reduce a person's age. Even obese non-smokers who live healthier lives have a higher risk of premature death than thinner people. One of the assessments of a person's nutritional status is also disturbed by calculating the Body Mass Index (BMI) (Dangi and Bhise, 2017). Lung capacity can be affected by a person's habit of running sports. Exercising can increase blood flow through the lungs so that many causes all pulmonary capillaries to get maximum perfusion. It causes oxygen to diffuse into the pulmonary's capillaries with a greater volume or maximum. Exercising has ten main elements of physical fitness. One of these elements is the function of breathing. Exercise should be done at least three times a week, for athletic people, large bodies, and greater lung volume and capacity. Good exercise can be done at least three times a week. The duration for daily exercise is 20-60 minutes. Lung capacity can be influenced by a person's habit of running sports. Having regular exercises can increase blood flow through the lungs, which will make the pulmonary capillaries get maximum perfusion so that oxygen can diffuse into the capillaries to the maximum (Mohammadien, et al., 2013; KC et al., 2018; Whitsett & Weaver, 2002).

Prevention of the decreased lung function risk can be done by controlling techniques, treatment, and management aspects. Control techniques by adding ventilation to the work area, covering the risk of dust exposure, using personal protective equipment. In the aspect of treatment carried out with the company providing health facilities and doctors, spirometry examination. As for management aspects, it is work rotation and the existence of clear operational standard procedures related to the prevention of occupational diseases (Boschetto et al., 2006; Portnoy et al., 2012) .

Conclusion

There is an effect between exposure to work environment dust with obstructive, restrictive, and mixed lung function in the spinning workers of PT X Karanganyar. Overall the level of dust in the work environment at PT X is above the threshold value (NAV) of cotton dust of 0.2 mg / m3 based on the Republic of Indonesia Ministerial Regulation No. 5 of 2018. Suggestion: For further research, it is better to do the measurement using the Personal Dust Sampler, so the measurement results of dust are more specific, namely respirable/respirable dust (1-10 microns).

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Marriage Pattern and Fertility in DKI Jakarta Province

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Abstract

Birth rate or fertility is one of the elements playing a role in determining the population number and age structure in an area. To maintain stable population growth, it is necessary to strive for a total fertility rate (TFR) of around 2.1 children per woman. DKI Jakarta Province had reached this condition before the 2000 period. But in the next period, there was an increase ranging from 2.2 - 2.3 children per woman. Fertility is affected by various factors, including marriage patterns and contraception usage. This study aims to determine the effect of marriage patterns on fertility in DKI Jakarta Province by using the concept of fertility decomposition. The data used are the results of the Indonesian Demographic and Health Survey (IDHS) 2002/03 and 2017 with the unit of analysis for women aged 15-49 years. The results showed that there was a slight increase in the effect of the marriage pattern on fertility restrictions, from 14% or preventing 1.89 births in the 2002/03 IDHS to 19% or preventing the occurrence of 2.1 births in the 2017 IDHS. in DKI Jakarta Province by 2.2 children per woman in the 2017 IDHS, although there was a sharp decline in the effect of contraceptive use. It is necessary to study the relationship between the pattern of marriage and the use of contraception because these two variables play an important role in determining the fertility rate in DKI Jakarta Province.

Introduction

Apart from being the nation's capital and government center, DKI Province is also an economic, educational, social, and cultural center that attracts many immigrants from outside the region. The DKI Provincial Government has succeeded in suppressing the population growth rate, but the population continues to increase, from 8.35 million in 2000 to 10.15 million in 2015 (BPS Provinsi DKI, 2016). The population density continues to increase as DKI Jakarta becomes the province with the highest population density in Indonesia. In 2015, the population density in DKI Jakarta Province reached 15,330 people/km2. While Indonesia's population density was only 134 people/km2. Population growth in DKI Jakarta Province is affected by births, deaths, and migration (BPS Provinsi DKI, 2016).

Before the 2000 period, the total fertility rate in DKI Jakarta Province had reached a condition known as the replacement level, namely a TFR of 2.1 children per woman (Gietel-Basten & Scherbov, 2020; DHS, 2017). If the TFR 2.1 can be maintained for a long time and there is no migration, then the population in the new generation will be the same or replace the population of the previous generation. It refers to balanced population growth. However, the enactment of Law no. 22/1999 on Regional Government, which delegated the authority to manage development programs including family planning programs to local governments,

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seems to have affected efforts to regulate births in DKI Jakarta Province. The total birth rate in DKI Jakarta Province increased from 2.0 children per woman in the 1997 Indonesian Demographic and Health Survey (IDHS) to 2.2 children in the 2002/03 IDHS. Subsequent survey results showed a slight increase to 2.3 in the 2012 IDHS and back to 2.2 in the 2017 IDHS (DHS, 2017). To stabilize population growth in DKI Province, fertility rates need to be maintained at replacement level conditions. In addition, it is also necessary to pay attention to the flow and pattern of migration into the DKI Jakarta Province. As an economic center, Jakarta attracts many immigrants from outside the region.

The results of the 2015 Inter-Census Population Survey show that 7 percent of the population of DKI Jakarta Province are recent migrants (change of residence within 5 years before the survey) (BPS Provinsi DKI, 2016). The highest proportion of the population who have recently migrated is the age group 15-39 years and the highest peak in the age group 25-29 years. The high number and proportion of young people followed by an increase in fertility in DKI Jakarta Province potentially cause population growth if not managed properly. The results of research on the fertility of the migrant population in DKI Province show that the fertility rate of migrant women tends to be higher than that of non-migrant women (Utomo et al., 2013).

The theory of fertility proposed by Davis dan Blake (1956), is widely used in analyzing fertility. It identifies sociological factors affecting fertility through intermediate variables. Economic and environmental factors refer to indirect variables. Bongaarts (1978) then identified four intermediate variables having the highest effect on inhibiting fertility. The variables are: 1) the proportion of women with marital status, 2) the prevalence of contraceptive use and effectiveness, 3) the duration of infertility during breastfeeding (postpartum amenorrhea), and 4) the prevalence of intentional abortion. These four variables refer to "proximate determinants of fertility", the concept widely used in analysing fertility decomposition..

The fertility decomposition analysis conducted using the 2017 IDHS data indicates that the strength of the influence limiting the fertility of the four variables varies by province (Samosir, 2019). The effect of marriage patterns on fertility restriction is highest in DKI Jakarta Province. Marriage pattern is one of the vital variables between fertility, especially in a country like Indonesia, where almost all births occur in marriage. Marriage patterns such as age at first marriage and the proportion of currently married women will affect fertility levels.

To identify the effect of marriage patterns on fertility in DKI Jakarta Province, this study conducted a fertility decomposition analysis using the 2002/03 IDHS and 2017 IDHS data. As previously stated, the total fertility rate in DKI Jakarta began to increase in the 2000 period after the autonomy policy area implementation. The fertility in DKI Jakarta during this period is reflected in the 2002/03 IDHS data. It continues to increase as shown by the results of the 2017 IDHS. By this study, we expect the marriage patterns in DKI Jakarta province and the effect on fertility restrictions will be known. The analysis was carried out using the proximate determinants of the fertility model developed by Bongaarts (1978).

Method

This study uses a descriptive analysis method with a quantitative approach. Data analysis used was the proximate determinants model from Bongaarts (1978, 2015). This model analyzes the contribution of the four intermediate determinants, namely the pattern of marriage, contraceptive use, abortion, and infertility during breastfeeding to fertility restrictions. However, according to the purpose of the study, the discussion will focus on the contribution of marital patterns to fertility restrictions.

This study uses data from the 2002/03 IDHS and 2017 IDHS in DKI Jakarta Province with the unit of analysis for women aged 15-49 years. The IDHS is a population and health survey conducted jointly by BPS, BKKBN, and the Ministry of Health every five years. The IDHS design refers to the Demographic and Health Survey (DHS) design developed by ICF International and used in many countries

(DHS, 2017).

The relation between proximate determinants with fertilities is formulated by Bongaarts (1978, 2015) in below equation:

TFR = □□ × □□ × □□ × □□ × TF

Where,
TFR : total fertility rate
TF : total fecundity rate
Cm : marital index
Cc : contraception usage index
Ca : abortion index
Ci :infertility index during breastfeeding

The four indices have values between 0 and 1. The lower the index value (closer to 0), the stronger the effect in limiting fertility. On the other hand, the higher the index value (closer to 1), then the lower the effect of these factors in limiting fertility. Data regarding accurate intentional abortions are not yet available in Indonesia, so in this study, the Ca value is assumed to be 1, or it is assumed that no women have had intentional abortions. The assumption that Ca is equal to 1 due to the unavailability of data is also used in the fertility decomposition analysis using DHS data in Ethiopia (Lailulo & Sathiya Susuman, 2018), Zambia (Chola & Michelo, 2016), Uganda (Rutaremwa et al., 2015), and Palestine (Hammoudeh & Hogan, 2012).

In the Bongaarts formula, TFR is a function of the four determinant indexes with TF. The total fertility rate (TFR) is the average number of children a woman will have at the end of her reproductive life if the woman follows the fertility pattern in a given year. The total fecundity rate is the average number of births to women who during their reproductive years were married, did not use contraception, did not have intentional abortions, and did not breastfeed. TF rates generally range from 13-17 births, with an average of about 15.3 births per woman (Bongaarts, 1978). TFR will be the same as TF if the value of all indexes is 1.

Results and Discussions

By using the Bongaarts formula (1978), the results of the 2002/03 IDHS and 2017 IDHS are obtained as follows (Table 1):

Table 1. Fertility Measures for DKI Jakarta Province IDHS 2002/03 and IDHS 2017

Fertility Measures	IDHS 2002/03	IDHS 2017
Total Fertility Rate (TFR)	2,20	2,24
Total Marital Fertility Rate (TMFR)	4,09	4,35
Marital Index (C_m)	0,54	0,52
Contraception Usage Index (C_c)	0,27	0,39
Total Natural Marital Fertility Rate (TNMFR)	15,1	11,06
Infertility index during breastfeeding (C_i)	0,96	0,83
Total fecundity rate (TF)	15,71	13,27

Source : Processed results of the 2002/2003 IDHS and 2017 IDHS

Table 1 shows that the total fertility rate in DKI Jakarta Province in the 2002/03 and 2017 IDHS is relatively the same, around 2.2 children per woman. This TFR figure is generated by the intermediate variable indicated by the marital index (Cm), the index of contraceptive use (Cc), and the index of infertility during breastfeeding (Ci). There was a decrease in the marital index and the infertility index during breastfeeding, indicating an increase in the effect of these two factors on fertility restrictions. On the other hand, an increase in the index of contraceptive use indicates a decrease in the contraceptive use effect on fertility restrictions. From the values of these three indexes, it can be seen that the increase in fertility restrictions caused by the marriage pattern and the breastfeeding pattern is covert by the decrease in the effect of contraceptive use. Therefore, TFR cannot be lowered, and there is a slight increase in TMFR.

In Table 1, the marital index (Cm) in DKI Province was 0.54 in the 2002/03 IDHS and then decreased to 0.52 in the 2017 IDHS. The 2017 IDHS results show that the marriage index in DKI Jakarta Province is the lowest compared to other provinces and well below

the national index (0.71). The decline in the marriage index indicates an increase in the age at first marriage in DKI Jakarta Province. The median age at first marriage for women is 25-49 years in DKI Jakarta Province increased from 21.4 years in the 2002/03 IDHS to 23.1 years in the 2017 IDHS. The median age at first marriage in DKI Jakarta Province is higher than the national figure, which is 19.2 years in the 2002/03 IDHS and 20.8 years in the 2017 IDHS. This condition is in line with the statement by Bongaarts (1978), who mentioned that the lower the marriage index, the higher the age at first marriage, and the greater the contribution to fertility decline.

Table 2 shows the relative contribution of each intermediate determinant to fertility restrictions in DKI Jakarta Province according to the results of the 2002/03 IDHS and the 2017 IDHS. The intermediate determinant with the largest contribution in both the 2002/03 IDHS and the 2017 IDHS is contraceptive use. However, there was a decrease in the effect of contraceptive use. From 81% or preventing 11.01 births in the 2002/03 IDHS to 61% or preventing the occurrence of 6.7 births in the 2017 IDHS. In contrast, the effect of marriage patterns increased. From 1.89% or preventing the occurrence of 14 births in the 2002/03 IDHS to 2.1% or preventing 19 in the 2017 IDHS. Likewise, the effect of infertility during breastfeeding. It increased from 0.6% or preventing five births in the 2002/03 IDHS to 2.2% or 20 in the 2017 IDHS. Overall, the three fertility determinants' effect in preventing births has decreased from 13.1 in the 2002/03 IDHS to 11.03 in the 2017 IDHS. This picture is different from the general condition in Indonesia. The results of the 1991 IDHS and 2017 IDHS show that nationally there is a decrease in the strength of the effect of limiting fertility on the pattern of marriage and infertility during breastfeeding. While the effect on limiting fertility from the contraceptive pattern use has increased (Samosir, 2019). These results are in line with research by Hertrich (2017) and Islam (2017) , showing the decreasing influence of marital patterns and increasing use of contraception in limiting fertility. Overall, the effect of the three determinants of fertility in preventing births has also increased.

Table 2. Effect of Intermediate Determinant Fertility Restriction IDHS 2002/03 and 2017 results

Intermediate Determinant	**IDHS 2002/03**		**IDHS 2017**	
	Prevented birth	% Contribution	Prevented birth	% Contribution
Marital pattern	1,89	14	2,1	19
Infertility During Breastfeeding	0,6	5	2,2	20
Contraception Usage Pattern	11,01	81	6,71	61
TF-TFR	**13.51**	**100**	**11.03**	**100**

Source : Processed results of the 2002/2003 IDHS and 2017 IDHS

Research on the determinants of age at first marriage in DKI Jakarta Province is very limited. Referring to the Islam dan Rahman (2020) research, based on DHS results in 15 Asian and African countries, Jones dan Yeung (2014), and DHS and UNPD data in 16 Asian countries, the high median age at first marriage may be related to the socio-economic characteristics of the population in the Province of DKI Jakarta is generally better than other provinces. In addition, the results of 2002/03 and 2017 IDHS show that in Indonesia, the median age at first marriage for women living in urban areas is higher than those living in rural areas (DHS, 2017). The relationship between age at first marriage and socioeconomic status is also proven by research conducted by Muharry et al. (2018); Wahyudi et al. (2019), and Islam (2017). The three studies revealed a significant relationship between education and economic status with age at first marriage. Similarly, research conducted by Bongaarts et al. (2017) using DHS data in 43 countries (including Indonesia), and Amoo (2017) research which also uses DHS data in 3 African countries show education as an important factor in increasing the age at first marriage. Research in other Asian countries also shows a positive relationship between women's education and employment and age at first marriage (Bongaarts et al., 2017; Islam, 2017; Lee et al., 2020; Marphatia et al., 2017; Nahar et al., 2013).

The significant relationship between socioeconomic characteristics and age at first marriage is also seen in the 2002/03 IDHS and 2012 IDHS data, analyzed by MacQuarrie (2016). There is a significant relationship between age at first marriage and women's participation in decision-making, women's education and employment, household economic status, place of residence (urban/rural), and husband's education and occupation. The research by MacQuarrie (2016) and Marphatia et al. (2017) in 4 Asian countries illustrated that participation in decision-making in the family is one indicator of gender context that is positively related to age at first marriage. According to Bongaarts et al. (2017), Kim (2010), and Marphatia et al. (2017), increasing education affects reproductive behavior because education can build self-autonomy to decide to marry and give birth at a more mature age, especially for women.

Although the marriage index (Cm) in DKI Jakarta Province shows a downward trend, the proportion of women aged 15-49 years who are currently married in DKI has increased, from 58.8% in the 2002/03 IDHS to 62% in the 2017 IDHS. It is different from the Bongaarts (1978) model, where the more women are married, the lower the effect of marriage on fertility restrictions. This difference may also be related to the increase in the median age at first marriage for women in DKI Jakarta Province, as described above. With a higher age at first marriage, the reproductive period spent by women in married status is shorter. It is a motivating factor for newly married couples to immediately have children and get the desired number of children as long as the wife is still of reproductive age. The desire to have children immediately is seen in the first birth interval in DKI Jakarta Province, which is lower than the national figure for both the 2002/03 IDHS and the 2017 IDHS.

In short, the distance between first births in DKI Jakarta is in line with the study by MacQuarrie (2016) , which uses DHS data in 7 Asian countries, including Indonesia. In the last decade, in Indonesia and several countries in Asia, there has been a significant increase in the age at first marriage, followed by a shorter first birth interval. The study indicated that age at marriage was the main factor affecting the distance between the births of their first child. Other studies in several countries in Asia and Africa also show that women with older age at first marriage have a shorter first birth interval than women who marry at a younger age (Alam, 2015; Dommaraju, 2011; Gurmu & Etana, 2014; Kamal & Pervaiz, 2013; Obite et al., 2021; Xu, 2019). Socioeconomic characteristics of the population in DKI Jakarta Province may also be related to the first birth interval. The study conducted by Hidayat et al. (2014) in Indonesia; Rahman et al. (2013) in Bangladesh; Gurmu and Etana (2014) in Ethiopia, Obite et al. (2021) in Nigeria, and Islam (2017) in Oman revealed a relationship between socioeconomic factors such as place of residence, education, wealth and work with the first birth interval. Women living in urban areas with higher socioeconomic status tend to have shorter first birth intervals.

In short, the first birth interval may also be related to the decline in contraceptive use in DKI Jakarta Province. This assumption is in line with the results of the 2017 IDHS, which show that one of the main reasons for not using contraception in DKI Jakarta Province is the desire to have children (32%). Since the 2002/03 IDHS, there has been a downward trend in contraceptive use in DKI Jakarta. From 63% in the 2002/03 IDHS to 57% in the 2017 IDHS. This figure is lower than the national figure. Which 60% in the 2002/03 IDHS and 64% in the 2002/03 IDHS. IDHS 2017 (DHS, 2017). If disaggregated according to the type of contraception used, it can be seen that in DKI Province, there has been a decrease in the proportion of modern contraceptive use. But on the contrary, there has been an increase in the proportion of traditional contraceptive use.

Research on the determinants of contraceptive use in DKI Jakarta Province is very limited. When referring to research with national data, contraceptive use is influenced by socioeconomic status, including place of residence, the number of children, education level, economic status, work status, and access to information sources (Gayatri & Utomo, 2019; Idris, 2019). However, there are differences in the results of these studies. The research conducted by Idris (2019) showed a

positive relationship between socioeconomic characteristics of the level of contraceptive use. On the other hand, Gayatri dan Utomo (2019) got a negative relationship. In both studies, women who live in rural areas have a greater chance of using contraception than those in urban areas. This finding is associated with the Family Planning program, which focuses more on rural areas.

Conclusions

The analysis results show a slight increase in the effect of marriage patterns on fertility restrictions in DKI Province. The marriage pattern effect increased from 14% or preventing the occurrence of 1.89 births in the 2002/03 IDHS to 19% or preventing the occurrence of 2.1 births in the 2017 IDHS. This increasing influence of the marriage pattern helped maintain the TFR in DKI Jakarta Province of 2.2 children per woman, although there was a sharp decline in the effect of contraceptive use. The contraception use effect decreased from 81% or preventing 11.01 births in the 2002/03 IDHS to 61% or preventing 6.71 births.

It is necessary to conduct further studies on the determinants of age at first marriage in DKI Jakarta Province. In addition, it is necessary to study the relationship between the pattern of marriage and the contraceptive use pattern to formulate a comprehensive family planning program strategy. These two intermediate variables play an important role in determining the fertility rate in DKI Jakarta Province.

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Hearing Aids and The Quality of Life of Children with Hearing Loss

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Abstract

Hearing loss in children may cause social isolation and poor communication skills, potentially affecting mental disorders and quality of life. Hearing aids (HA) provide auditory stimuli that can improve children's speech ability and influence their quality of life. A cross-sectional study in three special schools-B (SLB-B) in Semarang was carried out. A total of 82 children (7-12 years old) with severe hearing loss with or without hearing aids were included. Quality of life was assessed by the Hearing Environments and Reflection on Quality of Life (HEAR-QL) questionnaire. The results showed that 48 (58.54%) subjects used hearing aids, and 34 (41.46%) did not use hearing aids. The average subject's age was 10.77±1.56 years old. Hearing-aid use was associated with a good quality of life of children with hearing loss ($p<0.001$). Good quality of life was found in 68.8% of children with hearing aids compared to only 2.9% in children without hearing aids. Duration of hearing-aid use ($p<0.001$), mother education ($p<0.006$) was associated with good quality of life of children, whereas gender ($p=0.49$), number of siblings ($p=0.06$), and socioeconomic status ($p=0.63$) were not. The quality of life of children who use hearing aids is better than without hearing aids.

Introduction

Hearing loss in children that is not immediately treated can harm speech, language, academic, emotional, and psychosocial development (Madell, 2014). With the maturity process, the auditory function, and lasts speech development. A person's speech and language proficiency can only be achieved when sensory and motor input are normal. Speech development is closely related to the stage of hearing development (Suwento et al., 2017). Severe sensorineural hearing loss can cause more severe impairment in language and speech development, especially in the prelingual phase (Sobreira et al., 2015).

According to WHO, as many as 360 million people (approximately 5% of the world population) experience hearing loss, and nearly 32 millions of them are children (World Health Organization, 2016). Based on 29 countries' data, Stevens and colleagues (2013) reported that 1.4% of children and 9.8–12.2% of suffer hearing loss, whose prevalence is high, especially in low- and middle-income countries (Stevens et al., 2013). Sensorineural hearing loss (SNHL) is a result of damage to the auditory nerve or the hair cells of the inner ear and may be acquired, genetic or idiopathic. About 1–4 per 1000 babies are born with SNHL (Prosser et al., 2015). At the Ear, Nose, and Throat (ENT) outpatient clinic of Dr. Kariadi Hospital Semarang, there were up to 60 children visits monthly due to speech delay, in which nearly 50% had moderate-to-severe hearing loss. Hearing loss can cause social isolation and poor communication skills, which eventually may affect mental health and quality of life, (Azizi et al., 2013).

Quality of life that refers to individual health is called health-related quality of life

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(HRQoL) (Gustafson SJ, Davis H, Hornsby BWY 2015). Health-Related Quality of Life (HRQoL) can be defined as "how well a person functions in their life and how well-being is perceived in the physical, mental, social, and health dimensions." Person function is the individual's ability to carry out activities before. While well-being refers to the subjective feelings of the individual. HRQoL is those aspects of self-perceived well-being that are related to or affected by the presence of disease or treatment (Karimi 2016).

The impact of a particular health condition on a person's life is not sufficient only to be assessed from physical measurements alone. Evaluating HRQoL is very important for a complete understanding of the effect of health conditions on individuals (Haverman L et al., 2016). Hearing impairment may decrease their quality of life(Sumardiyono et al., 2019). Hearing impairment in children causes psychointelectual disorders and social development disorders due to children's difficulty interacting with the surrounding environment. Children with hearing loss have a higher incidence of mood disorders, poorer social relationships, and higher psychological distress. Children with hearing loss are reported to avoid participating in social activities (Gustafson SJ, Davis H, Hornsby BWY 2015). A study conducted a study on 255 students in class 7-12 with hearing impairment, aged 11-19 years, using health-related quality of life adolescent's questionnaire, it was found that the quality of life of students with mild hearing loss was better than students with severe hearing loss, female have a better quality of life than mele (Borujeni et al., 2015). A systematic review and meta-analysis study on quality of life in children with hearing impairments found that children with hearing impairments have a lower quality of life than children with normal hearing (Roland et al., 2016).

A validated quality of life hearing-related questionnaire can help a doctor determine when an intervention should be made to improve the overall well-being of the child, whether it is beneficial, and whether one intervention is better than another. Quantitative HRQoL measurements can use general instruments and/or specific diseases (Said 2017). A study found that health is related to the quality of life of individuals (Nugraha & Aprillia 2020). The general HRQoL questionnaire cannot describe the quality of life for specific health conditions, the validity, or insufficient sensitivity in subgroups with special conditions such as children with hearing loss. The quality of life for children with hearing loss can be assessed by the HEAR-QL (Hearing Environments and Reflection on Quality of Life) questionnaire designed to determine how children with hearing loss experience social and emotional effects, especially in an environment that has a significant impact on children's quality of life (Umansky et al., 2011).

A study evaluating the quality of life of children with hearing loss in association with the use of hearing-aid, especially in school-age children, is lacking. This study aimed to evaluate the association of hearing-aid use and the quality of life of children with hearing loss and to evaluate the effect of length of hearing aid use, gender, number of siblings, mother's education, and socioeconomic status on quality of life of children with hearing loss.

Methods

This was a cross-sectional study conducted in three Special School B (SLB-B) in Semarang from November 2018 until January 2019. Subjects were 7-12 years old children with moderate-to-severe hearing loss since birth, with a hearing threshold of >70dB determined by Brainstem Evoked Response Audiometry (BERA) examination. Subjects with the perforated tympanic membrane at ear examination, cerebral palsy, Down syndrome, craniofacial malformation, autism, or other syndromes were excluded from the study. The research sample was taken by consecutive sampling. After selecting subjects based on inclusion and exclusion criteria, this study included 82 subjects. Recorded age, gender, hearing test results (BERA / Audiometry), age at hearing loss, using hearing aids or not, length of use per day, frequency of speech therapy, mother's education level, average monthly income of parents, total siblings. The research sample was taken by consecutive sampling. After selecting subjects based on inclusion and exclusion criteria, this study included 82

subjects. Recorded age, gender, hearing test results (BERA / Audiometry), age at hearing loss, using hearing aids or not, length of use per day, frequency of speech therapy, mother's education level, average monthly income of parents, total siblings.

Quality of life was assessed using the HEAR-QL questionnaire adapted from the quality of life journal for adolescents and children with hearing loss, (Streuferd 2010). The HEAR-QL questionnaire consists of 35 items rated on a 3-point scale, wherein 0=no, 1=sometimes, and 2=yes. A linear transformation is used to convert the score to a 0-100 score. Scores are transformed with 0 = 100, 1 = 50, 2=0. HEAR-QL has a sensitivity of 91.2% and a specificity of 92.3% at a cut-off score of 93.5 (α =0.97). The HEAR-QL questionnaire was first validated in the Indonesian national language (Bahasa Indonesia) with Cronbach's Alpha reliability of 0.968. The subjects filled out the questionnaires accompanied by a class teacher. Quality of life was determined as good if the HEAR-QL score was ≥60% and poor if the score was <60%.

The research was approved by the Medical Research Ethics Commission of the Faculty of Medicine, Diponegoro University/ Dr. Kariadi Hospital, Semarang. Descriptive analysis was performed for patient demographic data and normality test to determine the normal distribution of all variables. Inferential analysis was conducted to determine the relationship between hearing aids and the quality of life of children with hearing impairments. Hypothesis testing used bivariate analysis and multivariate logistic regression.

Results and Discussion

The research took place at Special School B Semarang City. Among 82 subjects, 24 children use one side of hearing aids, 24 children use two, and 34 children without hearing aids. The research subjects consisted of children aged 7-12 years. The youngest was seven years old when the oldest was 12 years old. The subjects' average age was 10.77 + 1.56. This age group was selected based on the expectation that children in this age group could read independently and was adjusted according to the utility of the HEAR-QL questionnaire. Of the subjects of this study, 57.3% were male and 42.7% female.

ABR results obtained 21 (25.6%) subjects with severe hearing loss and 61 (74.4%) subjects with profound hearing loss. Hearing impairment is obtained from birth when there are no other congenital abnormalities. All subjects did not undergo speech therapy. Each subject performed a routine physical examination ENT. Then the subjects were asked to fill out questionnaires HEAR-QL accordance perceived by the subject. The reading of the questionnaire, especially for children who are not fluent in reading, is carried out by the teacher, but the teacher is not allowed to intervene in the subject's answers. The total average HEAR-QL score in this study was 49.56 +24.67. The lowest score was 8.56 when the highest score was 94.29.

Data from each variable is displayed in tabular form according to the type, including hearing aid use, gender, number of siblings, maternal education, socio-economy, quality of life (Table 1). 24 (29.3%) subjects used one hearing aid. 24 (29.3%) subjects used two hearing aids when 34 (41.36%) did not use a hearing aid. The average age was 10.77±1.56 years old. A total of 31 (64.4%) subjects used hearing aids for less than 8 hours per day. 47 (57.3%) subjects were male when 35 (42.7%) were female. Most (91.5%) had siblings. The subjects' mothers with undergraduate education were 19 (23.2%) and 63 (76.8%) not undergraduate. Socio-economy, seen from the monthly income of parents based on the city's minimum wage, the average subject has an income below the city's minimum wage (72%). 48 (58.5%) subjects had a poor quality of life. Subject characteristics can be seen in table 1.

Table 1. Subject Characteristics

Variable	N	%
Hearing aid (HA)		
With HA	48	58.5
Without HA	34	41.5
Duration HA application		
≥ 8 hours	17	35.4
< 8 hours	31	64.4
Gender		
Male	47	57.3
Female	35	42.7
Number of sibling		
Single	7	8.5
Have sibling(s)	75	91.5
Mother's education		
Graduated	19	23.2
Not graduated	63	76.8
Social economic		
≥minimum regional payment	23	28.0
Under minimum regional payment	59	72.0
Quality of life		
High	34	41.5
Low	48	58.5

HA = Hearing Aid
Source = Primary Data, 2019

Bivariate analysis between the factors that may affect the quality of life of children with hearing impairments such as HA used, gender, number of siblings, mother education, and parent income is shown in Table 2. Chi-Square test was performed on these variables. Bivariate results indicate HA application, mother's education, and socio-economic affect the quality of life of children with hearing loss p <0.05 (Table 2). This study analyzed the effect of the duration of HA application on quality of life. The duration of HA application had a significant effect on the quality of life p <0.001 (Table 3).

To determine the relationship of several significant factors to the quality of life of children with hearing impairments simultaneously, a multivariate analysis was performed. The multivariate logistic regression test was performed on variables with a p-value <0.25. There are HA applications, number of siblings, mother's education, and socio-economic. The multivariate logistic regression shows that hearing aid application and mother's education had p-value <0.05 (Table4).

Table 2. Bivariate Analysis

Variables		Quality of life				P
		High		Low		
		N	%	N	%	
HA	With HA	33	68.8	15	31.3	<0.001*
	Without HA	1	2.9	33	97.1	
Gender	Male	21	44.7	26	55.3	0.493
	Female	13	37.1	22	62.9	
Number of sibling	Single	1	14.3	6	85.7	0.230
	Have a sibling (s)	33	44.0	42	56.0	
Mother's education	Graduated	17	89.5	2	10.5	<0.001*
	Not graduated	17	27.0	46	73.0	
Social economic	≥minimum regional payment	18	78.3	5	21.7	<0.001*
	Under minimum regional payment	16	21.1	43	72.9	

HA= Hearing Aid
Source = Primary Data, 2019

Table 3. Correlation Between The Duration Of Hearing Aid And Quality Of Life

Group	Quality of Life				Total	P
	High	%	Low	%		
≥ 8 hours	14	82.4	3	17.6	48	<0.001*
< 8 hours	1	3.31	30	97.1		

Table 4. Multivariate Analysis

Variable	p	RP	95% CI
HA	<0.001	23.44	0.01-0.116
Number of siblings	0.059	1.22	0.889-444.89
Mother's education	0.006	3.3	0.003-0.375
Socio-economic	0.627	2.8	0.205-13.81

HA= Hearing Aid; RP= Ratio Prevalence; CI= Confidence Interval
Source = Primary Data, 2019

Hearing impairment is the inability of a partial or total to listen to the sound in one or both ears. Partial hearing loss (hearing impaired) is a state of hearing loss but can still be used to communicate with or without hearing aids. Total hearing loss (deaf) is a state of hearing function that is so disturbed that it cannot communicate even though it is amplified. Congenital hearing loss is a hearing loss that is present at birth. The proper identification and medical management of the child with hearing loss prioritize the minimizing language and speech deficits. As well as avoiding progressive otological disease. The most vital aspect of managing a child with hearing impairment is early identification (Chi & Sabo 2014). Child development is strongly influenced by the presence of severe or profound hearing loss. Children who do not get sufficient sound stimulation have difficulty understanding language (Ramires et al., 2016). In the absence of sound impulses, the brain will rearrange itself to receive input from other senses, especially from the sense of sight, this is called cross-capital reorganization, which affects reduced auditory nerve capacity (Madell & Flexer 2014). Hearing impairment in children can harm speech, language, academic, emotional, and psychosocial development. Children with hearing loss have difficulty, especially in reading and math concepts. Academic achievement of children with mild to moderate hearing loss, at lower levels one to four levels when compared with children with normal hearing (Marlow et al., 2017). Hearing impairment in children causes psychointelectual disorders and social development disorders due to children's difficulty interacting with the surrounding environment. Children with hearing loss have a higher incidence of mood disorders, poorer social relationships, and higher psychological distress. Children with hearing loss reported avoiding participating in social activities (Gustafson SJ, Davis H, Hornsby BWY 2015). Parents of children with hearing loss reported that their children often complained of being too tired compared to their peers who had normal hearing. These challenges leave children with hearing impairments having academic difficulties and even long-term health problems (McCreery 2015).

Early intervention with hearing aids (HA) and cochlear implants aims to access, stimulate and grow the auditory neural networks penetrating the brain as the foundation for speech and language development, reading, and academics. Neuroplasticity occurs most frequently during the first three and a half years of life. The rapid growth of the infant's brain requires immediate intervention, including amplification and provision of programs that support the development of auditory skills (Madell & Flexer 2014). The use of hearing aids in children who are born hearing impaired is very important to learn to speak and listen to conversations as well as possible. Early restoration of auditory input provided by HAs or cochlear implants (CI) can reverse the adverse effects of hearing loss in children. These treatment methods enable hearing-impaired children to improve not only in audiological aspects but also in other areas of life. Parents note a positive change in their child's lifestyle, academic performance,

psychological wellbeing, behavior, and self-esteem. It is important to evaluate the global effectiveness of HAs or CIs beyond hearing and speech development and, additionally, with more general objectives concerning the quality of life (Pérez-Mora et al., 2012).

A hearing aid system is a device that enables people with hearing loss to maximize the use of residual hearing. It should provide optimal speech intelligibility and capture maximum information with minimal distortion and distortion from unwanted background noise. Hearing aids amplify all sound, including noise, which is amplified along with speech. One of the limitations of hearing aids is the ability to help clarify sounds in noisy environments (Doldouras 2017). Hearing aids must be adjusted optimally. The hearing threshold must be determined as accurately as possible separately for each ear. Several things can affect auditory development in hearing-impaired children. Like the age when the child suffers from hearing loss (related to speech and language development), degree of hearing loss (mild to severe), age when identified, and received intervention, environment. Effective amplification in children is unlikely to succeed without parental support and understanding (Chi & Sabo 2014).

Some factors can limit the use of hearing aids in children. Hearing aids that are not suitable for babies and children make wearing them uncomfortable and difficult. A hearing aid that is not functioning or does not fit is a potential factor that causes hearing aids not to be used all the time by school-age children. Social pressure to "get along" with peers who have normal hearing may also negatively affect hearing aid wear. Hearing-deficient children between the ages of 6 and 11 showed lower self-confidence than their normal-hearing peers. A decrease in the consistency of using hearing aids in hearing-impaired children along with a decrease in self-confidence (Gustafson, 2015).

Quality of life is general well-being consisting of objective descriptions and subjective evaluations of physical, material, social, and emotional well-being, along with the level of personal development assessed by the person (Karimi 2016). Quality of life that refers to individual health is health-related quality of life (HRQoL) (Gustafson SJ et al., 2015). The impact of a particular health condition on a person's life is not only enough to be assessed with physical measurements, evaluation of HRQoL is important for fully understanding the effect of health conditions on individuals, (Haverman L et al., 2016). The same health condition can result in very different HRQoL ratings in different individuals. Patient reporting results are the best source of information about what patients are experiencing. The HRQoL measurement was developed for a variety of purposes: (1) assessing people's status at specific time points, (2) comparing HRQoL of patients with different health conditions (e.g., the relative impact of heart disease versus cancer), (3) measuring changes in HRQoL over time to time (for example, in clinical trials, observational studies, health care settings or for population surveillance), and (4) predicting future outcomes. (5) provide standardized information to doctors about patient problems to identify and monitor symptoms, evaluate treatment outcomes and support joint decision making (Haverman L et al., 2016).

Several classifications of the HRQoL questionnaire have been made in the literature. One of which is a generic instrument. The generic questionnaire intends to measure all HRQoL dimensions and can be applied to healthy populations. In any clinical population. Regardless of the type of health condition. The advantage of generic questionnaires is that they provide a comprehensive picture of HRQoL and allow comparisons of specific conditions (Haverman L et al., 2016). Glasgow Children's Benefit Inventory (GCBI) is a questionnaire used to retrospectively assess the benefits after an intervention. There are four domains. Namely emotions, physical health, learning, and vitality. Health Utilities Index Mark 3 (HUI3) is a utility-based measuring tool to determine the overall quality of life. There are eight domains. Including vision, hearing, speech, ambulation, agility, emotions, cognition, and pain (Roland et al., 2016). The generic PedsQL 4.0 scale is the questionnaire most frequently used in pediatric HRQoL studies. The PedsQL measurement model can be used for young children aged 5-7 years, children aged 8-12 years, and adolescents aged 13-18 years. PedsQL ™ consists of 23

questions covering the dimensional subscale: physical function (8 items), emotional function (5 items), social function (5 items), and school function (5 items) (Haverman L et al., 2016).

The general HRQoL questionnaire is not specific to a specific condition, the validity or sensitivity of specific subgroups such as children with hearing loss may be lacking. Without a proper assessment of the quality of life of children and adolescents, it is difficult to know which interventions are appropriate for their needs. A proper evaluation can effectively evaluate how a child's quality of life is affected by their hearing loss and any further interventions the child may need (Umansky et al., 2011). The Hearing Environments and Reflection on Quality of Life (HEAR-QL) questionnaire focuses on the quality of life of children with hearing impairments, a questionnaire created by (Streuferd 2010). The HEAR-QL questionnaire is a specific quality of life measure designed to determine how a child feels the social and emotional effects of hearing loss, particularly in environments where hearing loss has a major impact on the child's quality of life. The HEAR-QL questionnaire contains 35 questions for children aged 7-12 years with hearing impairments and their parents. Each component focuses on situations that affect interactions with family and friends, participation in social and school activities, and the impact of hearing loss on the emotional well-being of children (Streuferd 2010).

The measurement of the quality of life of children with hearing loss using the HEAR-QL questionnaire is designed to determine how they feel about social and emotional effects. Especially in their environment (Umansky, 2011). The previous study compared the total quality of life of children with hearing loss and normal hearing using the HEAR-QL questionnaire was lower, 71 + 18 compared to 98 + 5 with $p<0.001$ (Umansky, 2011). The research reported that the physical and psychological health status of adolescents with hearing loss was negatively affected by their disability and limited access to many services and the fact that they are often excluded from the community due to their difficulty in communication, which caused significant effects in daily life, academic performances, social growth, and emotional growth; and resulted in a loneliness feeling, isolation, frustration, ultimately causing substantial and permanent damage to the teen itself and their family, (Kirman, 2013) Early intervention with hearing aids and cochlear implants aims to access, stimulate, and grow auditory nerve tissue into the brain as the foundation of speech and language, also reading and academic development. The use of hearing aids in children who are born hearing impaired is very important to learn to speak and listen to conversations as well as possible (Madell, 2014).

The aims of this study were to (1) investigate the relationship between the use of hearing aids and the quality of life of children with hearing impairments, (2) investigate the factors that affect the quality of life of hearing loss children. This study found that 41.5% of children with hearing loss had a good quality of life and poor quality of life as many as 48 (58.5%) subjects. The average total HEAR-QL score was 49.56±24.67. The quality of life of children with hearing aids (68.8%) was better than children who did not use hearing aid (2.9%). It is consistent with the latest study that found an increase in HEAR-QL scores obtained by the use of hearing aids ($p<0.001$). The quality of life in children with hearing loss after the application of bilateral hearing aids or bimodal stimulation were high, and both children and parents reported that the quality of life after using hearing aid was similar to children with normal hearing (Pérez-Mora, 2012). Parents feel that hearing aids provide higher educational opportunities for their children, that children are also able to communicate their needs using short language, and enjoy music (Looi et al., 2016).

The duration of hearing aid application is related to the quality of life of children with hearing loss ($p<0,001$). The latest study found that hearing aid devices have to be used at least 8 hours a day to achieve optimal results (Azizi et al., 2013). The hearing aids usage during most of the waking hours is highly recommended. It tends to produce benefits for children with hearing loss (Muñoz & Hill 2015). Gender was not associated with the quality of life ($p=0.493$). It is per a study that found no significant association between gender and quality of life

among school-age children and adolescents with hearing loss(Laugen et al., 2016).Gender differences in self-esteem change with age. Boys and girls rate esteem identically until age 12 (Warner-Czyz et al., 2015).

This study found that the number of siblings did not affect the quality of life (p=0.059). It is in contrast to previous study that showed families with only one child have more time devoted to children, economic, social, and physical conditions thus had a good influence on children's health status (Kirman & Sari 2013). This variable might be influenced by the occupation of the mother and the total time parents spent to take care of their child, but these two possible factors were not studied in this study.

The mother's education level had a significant effect on the quality of life of children with hearing loss (p=0.006). According to a study, the higher the mother's education level, the better care she gives to her children (Kirman & Sari 2013). Maternal education was significantly associated with global psychosocial outcomes for children with HAs. Low maternal education is a risk factor for child behavior problems. Maternal education and socio-economic status affect child language outcomes through maternal speech input that was higher in quantity, lexical richness, and sentence complexity (Wong et al., 2017).

Unfavorable economic conditions can be related to limited access to food, social care, health, and education. Which eventually reduces the quality of life significantly. A recent study reported a relationship between socioeconomic status and perceptions of the quality of life of family members. The lower the socioeconomic status, the worse the perception of the quality of life in all domains except the environment (Nascimento et al., 2016). Individuals from lower social classes are more vulnerable as they are likely to be exposed to more stressful experiences than upper-class individuals. These stressful events may have a comparably more severe impact on their emotional functions than on individuals from the upper class. Children and adolescents in families with moderate and well socioeconomic status experience fewer social limitations related to physical health than children and adolescents in families with poor economic status (Kirman & Sari 2013). On bivariate analysis, we found that socioeconomic status (SES) was associated with the quality of life ($p<0.05$). But after being analyzed together with other variables, it did not affect the quality of life ($p> 0.05$). This study assessed socioeconomic status only from the amount of monthly income. Generally, SES is defined as the position of an individual or a household within a society. It is a combination of occupation, education, income, wealth, and residence neighborhood (Shafiei et al., 2019).

Conclusion

There was a relationship between the use of hearing aid and the quality of life of children with hearing loss. The quality of life of children with hearing loss who use hearing aid was better than those who did not. The duration of hearing aid use, maternal education, and socio-economic status affected the quality of life. Whereas gender and number of siblings did not affect the quality of life of children with hearing impairment. Further studies addressing family support to encourage children with hearing loss to use hearing aid is warranted to improve the quality of life of these children.

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"Health Belief Model" in the Prevention of Chronic Disease in the Elderly

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Abstract

Chronic disease is a non-communicable disease categorized as a long-term disease due to physiological changes in the body in the elderly. Chronic disease can be prevented with a healthy lifestyle and education through the Health Belief Model with the belief that someone takes a series of actions to overcome disease and reduce side effects. This study aims to determine how the effect of the application of the "Health Belief Model" in the Prevention and Health Care of Chronic Disease in the Elderly, which was carried out with a total sample of 100 respondents. The research design used Quasi Experiment with a pre-test and post-test approach with a control group design, a knowledge questionnaire about chronic disease, disease prevention, and health care including pre-test and post-test, used Paired T-Test with knowledge result p-value 0.000 <α (α = 0.05) and health prevention and maintenance p-value 0.000 <α. (α = 0.05) so it can be concluded that there is an effect of implementing the "Health Belief Model" in the prevention and maintenance of chronic disease health in the elderly.

Introduction

Chronic disease is a non-communicable disease and is categorized as a long-term disease because it undergoes physiological changes in the body (Ribeiro et al., 2014). Chronic illness can cause job loss, experience physical dependence, and require treatment assistance (Gonzalez, Maria, Roth, Gelehrter, & Lopes, n.d.). Indonesia has 20.24 million people in the elderly category, equivalent to 8.03% of the total population (Yuliati, Baroya, & Ririanty, 2014). The number has not been matched by good health. The elderly morbidity rate in Indonesia is calculated at 25.05%, meaning that out of every 100, there are 25 sick elderly. The morbidity rate of the elderly is moderate due to chronic diseases in the highest order, such as hypertension, arthritis, stroke, COPD, DM, cancer, coronary heart disease, kidney stones, heart failure, and kidney failure (Sudarmaja, Swastika, & Ariwati, 2020).

Chronic diseases generally attack the elderly, and this condition requires treatment until the end of life (Periyakoil, Neri, & Kraemer, 2016). The increasing population of chronic diseases affecting the elderly poses challenges for social care and health care. They experience the aging process, so they have a health burden. The decline in health functions prevents the elderly from being independent and participating in social activities (Perdamaian, Manus, Periska, & Steffiasih, 2020). The incidence of elderly people with chronic diseases requires long-term care and increases the cost of health care. In addition, chronic conditions cause the elderly to experience an inability to perform activities independently due to aging, disease conditions, and cognitive abilities that can make them dependent on care providers and require health services (Ondiege & Clarke, 2017).

The elderly with chronic diseases require long-term treatment. Treatment compliance is vital for them. Compliance is affected by several factors. Like medication, patient, physician, system-based factors, etc. Low medication compliance usually leads to poor

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clinical outcomes, drug-related side effects, and increased social health care costs. In addition, it has been established that the use of appropriate medication is a vital key factor for self-management in the management of chronic disease. Therefore, it is required to improve medication compliance in patients with chronic diseases, to minimize premature death and social burden (Van Der Laan et al., 2017).

The results of previous studies also showed that the elderly with chronic diseases had a low level of knowledge about treatment regimens. Knowledge and compliance to treatment in the elderly with chronic diseases revealed that more than half of people with chronic diseases (55.9%) reported low knowledge levels and compliance to treatment. Compliance is a person's behavior in carrying out the treatment, agreed by recommendations from health care providers (Nieuwenhuis, Jaarsma, van Veldhuisen, & van der Wal, 2012). The elderly's non-compliance with their lifestyle, ranging from changes in eating habits and medication compliance, shows behavior that affects their health conditions. The results show that several theory-based educational programs apply a cognitive framework that positively affects behavior change. One of them is the Health Belief Model (Jeihooni, Hidarnia, Kaveh, Hajizadeh, & Askari, 2016)

Health Belief Model (HBM) is one of the interpersonal health education models (derived from behavioral science theories) widely used for preventive behavior (Salama, 2018). HBM is a method developed to explain how a person's behavior in preventing and overcoming his disease condition. Parts of the HBM include perceived severity, perceived vulnerability, perceived usefulness, perceived inhibition, disease modification, cues for action, and self-efficacy (Hosseini et al., 2017).

Therefore, it is needed to educate the elderly to be more sensitive to adherence to their treatment program so that there is a need for an intervention that will change their mindset and knowledge. Considering the importance of chronic disease problems in the elderly this study aims to see the effect of the "Health Belief Model" application in Chronic Disease Prevention and Health Maintenance Behavior in the Elderly. The researcher would like to thank the Research Institute of the University of North Sumatra. This research was funded by the Research Institute of the University of North Sumatra by the Contract for the implementation of Talent Research at the University of North Sumatra, the Young Lecturer Research Scheme for the 2020 Fiscal Year Number: 307/ UN5.2.3.1/ PPM/SPP-TALENTA USU/2020 April 28, 2020.

Method

This study uses a quasi-experimental pretest-posttest control group design with one type of treatment and a purposive sampling approach. The number of samples consisted of the experimental group and the control group. The intervention was given for eight months and three times the intervention of the HBM cognitive model. The research took place in the working area of Medan Sunggal Health Center. The population in this study were elderly with chronic diseases as patients seeking treatment at the Medan Sunggal Health Center. A sample of 100 people, consisting of 50 in the intervention group and 50 in the control group. The instrument used in this study consisted of three types instruments. Demographic data questionnaire (age, gender, education, income, length of illness). Knowledge questionnaire about chronic disease, disease prevention. Health care behavior includes pre-test and post-test. Data analysis was carried out in two ways, namely: univariate analysis which was carried out to analyze the characteristics of respondents, and pre-test and post-test questionnaires of knowledge about chronic disease, disease prevention, health care behavior and then analyzed with frequency distribution tables and proportions. Bivariate analysis on the independent variable and the dependent variable used the statistical Paired t-test to determine the effect of the implementation of HBM on knowledge about chronic disease, disease prevention, health care behavior. Data analysis used a data processing program. This research has obtained an Ethical Approval permit from the Health Research Ethics Commission, Faculty of Nursing, the University of North Sumatra with Number: 2162/VI/SP/2020.

Results and Discussions

The results showed that the demographic data of the respondents in the intervention group in this study were the majority female as many as 35 people (70%) for the control group and 36 people (72%) for the intervention group, the average age of the respondents ranged between the ages of 46-65, namely 39 people (78%) for the control group and 37 people (74%) for the intervention group, income <2 million as many as 28 (56%) for the control group and 23 people (46%) for the intervention group, the most education is SMA 16 people (32%) for the control group and 20 people (40%) for the intervention, the most religion is Islam, both from the intervention and control groups, namely 40 people (80%), Javanese ethnicity is the largest ethnic group with a total of 18 people (36%) for the control group and 21 people (42%) for the intervention, and the average respondent status was married as many as 33 people (66%) in the control group and 29 people (58%) in the control group. The disease suffered by the majority was hypertension 24 (48%) for the intervention group and 17 people (34%) in the intervention group, the duration of illness was around 1-10 years as many as 31 people (62%) for the control group and 25 people (50%) for the control group, the most sources of health-related information were obtained from the family of 26 people (52%) for the intervention group, and for the control group the most by health workers 26 people (52%), and 18 people who participated in elderly activities (36 %) for the intervention group and 37 people (74%) for the control group.

The results showed that the p-value = 0.000 <0.05. It means that there is an effect of implementing the Health Belief Model on knowledge of chronic diseases in the elderly before and after being given the intervention. In line with the results of other studies showing that perceptions of vulnerability and seriousness of health outcomes are related to individual characteristics (i.e. gender, age), and those might influence the utilization of preventive services among those with health care coverage ((Luquis & Kensinger, 2019).

The results showed (Ng et al., 2014) that most health care behaviors were good, namely 44 people (58.7%). Health care behavior is vital in supporting the quality of life of the elderly in dealing with chronic diseases. Regarding symptom intensity and characteristics of chronic disease progression, participants with lower levels of schooling in the study (multiple and secondary education) showed more concern with possible symptoms. Because the representation of their perceived severity was higher than those at other school levels that would affect health care (Costa, 2020)

The results of other studies show that the quality of life associated with health maintenance in old age declines due to various causes, including physical inactivity and high blood pressure. In this regard, chronic diseases such as hypertension have affected 1.8 billion people worldwide. 50% of them are not aware of this condition. Only 25% of patients are aware of it. As a result, many elderly suffer from more severe chronic diseases. Unfortunately, they lack the necessary information and knowledge regarding health care and disease prevention and control. This problem has put 75% of the population with chronic diseases at risk for cardiovascular disease, heart failure or stroke, kidney failure, liver failure, and even sudden death (Onoruoiza, Musa, Umar, & Kunle, 2015).

A study on the elderly in Iran also showed that 48.1% of patients suffering from chronic diseases such as high blood pressure were undergoing treatment, and only 21.3% were under control. However, another opinion says about half of the patients who receive hypertension treatment do not continue their treatment for one year. Due to a lack of knowledge related to the problems that will arise due to the chronic disease. It will affect the prevention behavior of these chronic diseases (Mostafavi, Najimi, Sharifirad, & Golshiri, 2016)

Table 1. Distribution of Demographic Data Frequence

Demographic Data		Intervention Group		Control Group	
		f	%	f	%
Gender					
-	Male	14	28	15	30
-	Female	36	72	35	70
Age					
-	46-55 years	9	18	15	30
-	56-65 years	28	56	24	48
-	66-75 years	10	20	8	16
-	76-85 years	3	6	3	6
Education					
-	Elementary	12	24	8	16
-	Junior High School	8	16	12	24
-	Senior High School	20	40	16	32
-	Graduate	8	16	10	20
-	No education	2	4	4	8
Religion					
-	Islam	40	80	40	80
-	Christian	7	14	3	6
-	Catolic	3	6	5	10
-	Hindu	0	0	2	4
Ethnic					
-	Karo	5	10	4	8
-	Java	21	42	18	36
-	Malay	2	4	5	10
-	Batak	19	38	17	34
-	Aceh	0	0	3	6
-	Others	3	6	3	6
Diseases:					
-	Hipertension	17	34	24	48
-	Diabetes	9	18	8	16
-	Gout	8	16	11	22
-	Rheumatism	9	18	4	8
-	Others	7	14	3	6
Period of sickness					
-	1-5 years	14	28	14	28
-	6-10 years	11	22	17	34
-	> 10 years	25	50	19	38
Health Related Information Source					
-	Family	20	40	26	52
-	Health Attendant	26	52	21	42
-	Friend/Relative	3	6	2	4
-	Self sourcing	1	2	1	2
Elderly Activity					
-	No	37	74	32	64
-	Yes	13	26	18	36

Source = Primary Data, 2020

Table 2. Distribution of Respondent's Knowledge Frequence

Respondent	Pretest		Posttest	
	F	%	F	%
Intervention Group				
- Good	29	58	50	100
- Enough	16	32	0	0
- Poor	5	10	0	0
Control Group				
- Good	29	58	29	58
- Enough	16	32	16	32
- Poor	5	10	5	5

Source = Primary Data, 2020

Table 3. Distribution of Frekuensi Respondent's Prevention and Care

Respondent	Pretest		Posttest	
	F	%	F	%
Intervention Group				
- Good care	20	60	50	100
- Enough care	30	40	0	0
- Poor care	0	0	0	0
Control Group				
- Good care	20	60	20	60
- Enough care	30	40	30	40
- Poor care	0	0	0	0

Source = Primary Data, 2020

The results of previous studies also show that the elderly with chronic diseases have low health behavior in treatment. So it will have an impact on maintaining their health. In this case, Lo et al. (2016), conducted a study on knowledge and health care for chronic hypertension in the elderly with high blood pressure in Hong Kong. The results revealed that more than half of these people (55.9%) reported low levels of knowledge and adherence to treatment. In this case, influenced by seniority, living alone, and perceptions of independent treatment control accompanied by greater adherence to treatment. This study proves that the unmarried elderly in China are more likely to adhere to treatment which can determine the influence of cultural factors on adherence level. So the elderly's health can be maintained properly (Lo, Chau, Woo, Thompson, & Choi, 2016)

Other studies explain that health maintenance efforts are not solely related to the disease. Psychological problems will also affect health care. Others researches show that when old, most people live alone and have small social networks and low participation in social activities (Cornwell & Waite, 2009), making them more vulnerable to feelings of loneliness. Loneliness is a common, painful, emotional experience, and it is a significant public health problem, especially among the elderly (Gerst-Emerson & Jayawardhana, 2015). There is increasing evidence documenting that loneliness in old age appears to be a vital risk factor for inactivity (Shankar, McMunn, Banks, & Steptoe, 2011), and poorer health, including morbidity and mortality (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015), depression (Bodner & Bergman, 2016), lower levels of self-assessment of physical health ((Cornwell & Waite, 2009)), and hypertension (Christiansen, Larsen, & Lasgaard, 2016), as well as cardiovascular disease, diabetes, and migraine (Momtaz et al., 2012).

Another study observed that people's knowledge and perception of disease, their understanding of the disease burden, and their beliefs on treatment could be vital in predicting health care. Therefore, the higher the knowledge about the threat of disease, the higher the level of one's health care the prevention. Proper understanding and knowledge can also contribute to future interventions, which will affect the economy, such as high hospital costs (Rajpura J, Nayak R. 2014).

Other studies have shown that negative age beliefs harm health care (Gonzalez et al., n.d.) and emotional responses to stress (Bellingtier & Neupert, 2018) from those around them. In addition, age, which includes negative age stereotypes, can have a detrimental effect at the community level. For example, in terms of health care costs, age can incur high costs for countries, which can exacerbate economic pressures (Levy, Slade, Chang, Kannoth, & Wang, 2020)

In other studies related to health care behavior in the European countries as well as in the US, more than 60% of health care spending is for people who have chronic diseases. The findings suggest that the problem of various chronic conditions is not limited to older adults. But also in men and women under 65 years of age, possibly due to the increasing epidemic of chronic diseases associated with overweight and obesity due to excessive caloric intake, an unhealthy diet, and a lack of physical activity. Health care behavior is the main thing that must exist and must be applied to these problems.

Until efforts to prevent chronic diseases in the elderly can be maintained (Atella et al., 2015; Fontana & Hu, 2014 & Heymsfield & Wadden, 2017).

Another related study was conducted on 86 percent of Italian adults over the age of 65 now living with at least one chronic condition and 56.7 percent with more than one. They contribute a relevant share of the annual public health care budget (about 23 billion euros and 20% of the total budget). Without integrated strategic preventive interventions, the number is likely to increase and become unsustainable as the total Italian population aged over 65 is projected to increase sharply over the next 15 years, which is alarming. Thus patients' earlier exposure to chronic disease combined with a longer life expectancy extends the period of living in poor health. Moreover, obesity is the main problem in many other developed countries and developing countries worldwide because individuals with obesity are more likely to develop various chronic diseases, which have a high economic cost in direct and indirect health care costs (Atella et al., 2015; Fontana & Hu, 2014; Heymsfield & Wadden, 2017).

It should be noted that health care, especially in patients with chronic diseases, is of the utmost importance because these conditions have a progressive tendency, and low prevention rates lead to progression, decreased quality of life, and ultimately treatment failure. So they will experience health threats to the elderly and patients with chronic diseases (Rajpura & Nayak, 2014). In the study, many efforts by health attendants to prevent and keep the elderly away from chronic diseases. Such as approaching, promoting health, and providing support to the elderly and their families. In addition, social support such as promoting health because it facilitates healthier behavior and adherence will influence better behavior towards treatment and health care (Uchino, 2006). As getting older, the elderly are easier to experience physical complaints. Whether due to physiological changes or disease conditions. The aging process that occurs in the elderly will usually cause a decrease in the quality of life (Mulyawati, 2015), when older adults who perceive to have good social support are more likely to have better health outcomes and care. Previous studies revealed that adequate social support has a positive correlation with the physical and mental quality of life in older adults with chronic diseases (Yue, Li, Weilin, & Bin, 2015). As getting older, the elderly are easier to experience physical complaints. Whether due to physiological changes or disease conditions. The aging process that occurs in the elderly will usually cause a decrease in the quality of life (Sutikno. 2011).

Although changing disease risk factors reduces overall chronic disease risk, modifiable risk factors such as sedentary behavior are associated with increased risk for chronic disease. Non-modifiable risk factors are traits that cannot be changed, such as age, ethnicity, and genetics. However, although not changed directly, genes are strongly influenced by the environment and lifestyle that affect gene expression. Modifiable risk factors are positively affected by lifestyles, such as daily physical activity, regular exercise, healthy diet, social involvement, spirituality, and stress management. However, other modifiable risk factors are not directly related to lifestyles, such as education level, socioeconomic status, and occupation (Kirwan, Sacks, & Nieuwoudt, 2017).

The health improvements seen with activity are not limited to the cardiovascular system. Once physically active, elderly with chronic diseases such as type 2 diabetes improve their overall insulin sensitivity and positively alter skeletal muscle proteins and enzymes associated with glucose metabolism and insulin signaling. As a result, structured exercise programs are becoming a vital part of prevention and treatment management (Kirwan et al., 2017),

The same factors that make individuals more vulnerable are also related to a reduced ability to access and understand health information, make well-informed decisions, and take actions that promote optimal health skill set, commonly referred to as "health literacy". It is especially true if the health information itself is not timely, reliable, consistent, or actionable. Health literacy has emerged over the past three decades as one of the strongest psychological

Table 4. Effect of Implementation to Health Prevention and Care

Variable	Mean	SD	T	p-value
Intervention Group Pre-post test Health Prevention and Care	7.800	0.788	9.901	0,000
Control Group Pre-post test Health Prevention and Care				

(There is effect with p-value = 0,000 <0,05)

The study found an effect of providing intervention with the health belief model application on the prevention and control of chronic diseases in the elderly. The study revealed that the implementation of HBM-based educational interventions can improve patient adherence to the treatment of chronic diseases in the elderly such as hypertension (Yue et al., 2015). Therefore, medication compliance in older adults, attention to the prevention, control of different complications and diseases is critical. Based on the results of previous investigations, the most common self-care problems experienced by the elderly are associated with inadequate education for this population (Ghasemi, Moonaghi, Mohajer, Mazlom, & Shoeibi, 2018).

Appropriate educational interventions seem to be able to improve medication adherence in the elderly and patients in terms of prevention and control of chronic diseases in the elderly. The statistics provided have also emphasized greater attention to cardiovascular risk factors. As well as the importance of primary prevention more than ever. Therefore HBM-based education program for the control and prevention of hypertension in elderly patients has a significant effect. The results of other studies also show that the implementation of this model-based education program in the elderly can increase the rate of medication adherence by approximately 59%. Therefore, in the post-intervention phase, the mean score for prevention and maintenance of chronic disease in the elderly in the intervention group was significantly higher than in the control group. In addition, in the comparison of the average score of prevention and health maintenance by doing treatment by the elderly, the intervention group has increased significantly after being given the HBM cognitive model intervention, compared to before. However, there was no significant difference in the control group. Therefore, this study shows the positive effect of the HBM-based education program on medication adherence and disease control and prevention in the elderly with hypertension (Yazdanpanah, Moghadam, Mazlom, Beigloo, & Mohajer, 2019).

The results of this study indicate that the HBM can predict 48.8% of behavior changes with an accuracy of 82.8%. After moderating risk factors, HBM can also estimate a 50.5% change in medication adherence with an accuracy of 86.2%, which means that HBM can significantly affect control and prevention behavior in hypertensive patients (Yue et al., 2015). Perceptions and attitudes may determine how people practice and behave under certain conditions. HBM is widely used in health promotion and health education situations. Found to predict various health behaviors such as performing prognostic tests, choosing to use any treatment type or medication, or taking precautions regarding any disease (Albashtawy et al., 2016).

Conclusions

The cognitive models (HBM) application can change health-related behavior in preventive efforts. It is based on the expectancy-value theory. Assuming that individuals value disease avoidance or recovery and people expect certain health actions can prevent or improve disease. Based on the results of this study, HBM is effective in preventing chronic diseases and changing health care behavior in the elderly. Health attendants are expected to be the primary source of education for the elderly in providing health services and prevention efforts to maintain the health of the elderly in the community continuously.

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Bintaro Leaves (*Cerbera manghas*): Toxicity to *Aedes aegypti* Instar III Larvas

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Abstract

DHF cases tend to increase from year to year in Indonesia. So the government makes efforts to control cases of Dengue Fever (DHF) which are usually done chemically and harm the environment and health. There is a need for safer, more effective, and environmentally friendly controls, such as using natural ingredients as natural larvicides. Among the natural ingredients having potential as a larvicide is Bintaro leaves (Cerbera manghas). The purpose of this study was to determine the toxicity of Bintaro leaf extract against third instar larvae of Aedes aegypti mosquitoes. This experimental study used 7 treatments of Bintaro leaf extract concentration (5 %, 15 %, 25 %, 35 %, 45 %, 65 %, 75 %), abate as a positive control, and distilled water as a negative control. Each treatment used ten instar III Aedes aegypti larvae with four repetitions. The data obtained were then analyzed using probit analysis to determine the toxicity of Bintaro leaf extract to Aedes aegypti larvae by calculating the LC50 and LC90 values. The results showed that the most effective concentration was 75 % because it could kill 100% of the test larvae. The LC50 value of 5,097 % and the LC90 value of 25,300 % indicate that the level of toxicity is very toxic. The probit regression analysis shows a linearity line equation y = 1.15 + 1.43x with a correlation (R2) of 0.512 which indicates that the correlation is strong enough. It is related to the content of flavonoids, tannins, saponins, triterpenoids which are toxic to the abdomen, nervous system, and respiratory system of larvae. From the research results, Bintaro extract with a concentration of 75 % can be used as a natural larvicide candidate. Furthermore, further research to see the toxicity to the environment can be done.are toxic to the abdomen, nervous system, and respiratory system of larvae. From the research results, Bintaro extract with a concentration of 75 % can be used as a natural larvicide candidate. Furthermore, further research to see the toxicity to the environment can be done.

Introduction

Dengue fever is often a concerning problem, especially in the health sector for the community. DHF is a disease caused by the dengue virus (Halstead, 2012). Dengue virus is a type of flavivirus virus consisting of 4 serotypes, namely DEN-1, DEN-2, DEN-3, and DEN-4 (Costa et al., 2012). There is still no vaccine for it (World Health Organisation, 2014). Patients with DHF are characterized by symptoms of fever for 2-7 days, accompanied by a decrease in platelets, headache and muscle aches (Itrat et al., 2011) as well as abdominal pain, vomiting, diarrhea, weakness, and joint pain (Halsey et al., 2012). In general, the spread of dengue disease is carried by mosquito vectors of the Aedes genus, namely Aedes aegypti and Aedes albopictus. The main vector of dengue fever is the Aedes aegypti mosquito (Hamid et al., 2017). It has a biting preference indoors, which is different from Aedes albopictus having a bitting preference outside the home

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or plantation (McBride et al., 2015). The more vectors or populations of the Aedes aegypti mosquito, the higher the number of dengue fever sufferers (Rahayu et al., 2019).

Dengue fever in Indonesia from year to year tends to be high, especially in the provinces of Java. They have high dengue cases, especially in East Java. East Java occupied the highest dengue cases in 2011-2014, with 2,657 cases compared to other Java provinces (Sholihah et al., 2020). The increase in the number of DHF sufferers in East Java in 2017 was 7,866 cases and increased again in 2018 there were 9,425 cases (BPS, 2018) in addition to the number of cases in East Java, the high mortality rate also occupied the highest number in 2017 as many as 105 patients (Kemenkes, 2018). Malang Regency is one of the regions in East Java that has high dengue cases compared to others. DHF cases in Malang Regency in 2017 were 451 cases, an increase of 682 cases in 2018 (BPS, 2018). Efforts made by the government through the health department are the fogging program (Yee et al., 2017), larvae eradication using abate (Suriami et al., 2020), cypermethrin (A. P. de Araujo et al., 2019) as a vector control program.

The use of larvicides and chemical insecticides in the long term will cause negative impacts on the environment. It can cause environmental pollution, residues in the environment (Gutierrez et al., 2014) and can cause resistance in mosquitoes (Senthil & Sengottayan, 2020) . Then it will eventually lead to failure in a control vector program. The use of chemical insecticides using pyrethroids (Demok et al., 2019), malathion (Morales et al., 2019), temephos (Grisales et al., 2013), deltamethrin (Dusfour et al., 2015) is no longer effective because it causes resistance. It is necessary to find other alternatives to prevent these negative impacts by making larvicides from natural materials safer, more effective, and environmentally friendly. Larvicides from natural ingredients or natural larvicides can be obtained from mahogany plants (Shaalan et al., 2010), Jatropha, brotowali, grapefruit (Gutierrez et al., 2014), Maja leaves, curry leaves, srigading leaves, belustru roots (Patil et al., 2010), basil (Maurya et al., 2012), and sweet orange (Warikoo et al., 2012) which has been done by previous researchers. However, the toxicity test of bintaro leaves (Cerbera manghas) has never been carried out on the instar III Aedes aegypti larvae, so this research is needed.

The use of plants as natural larvicides has encouraged research that has potential as sources of larvicides, one of which is the Bintaro plant (Cerbera mangos). The bintaro plant can be used for the seeds, skin, fruit, and leaves because these parts contain active compounds, but in this study, only the leaves from the bintaro plant were used because they have higher levels of active compounds (Susilo et al., 2020). The active compounds contained in bintaro leaves are steroids (triterpenoids), saponins, alkaloids, flavonoids, tannins (Kristiana et al., 2015). Some of these substances are toxic and function as a lethal effect on larvae (Susilo et al., 2020), inhibiting mosquito development and reducing appetite (Kinney et al., 2014). The presence of active compounds in the bintaro plants can encourage its use as a potential natural larvicide for research on the toxicity test of bintaro leaf extract against the instar III larvae of the Aedes aegypti mosquito. This research will be used as the basis for further research to explore the active ingredients in the Bintaro plant (Cerbera mangos) as a candidate for larvicides.

Method

This research is an Experimental Research Group study using Post Test Only Group Design. It was conducted at the Chemistry Laboratory of the University of Muhammadiyah Malang and the Laboratory of Materia Medica Batu. Aedes aegypti larvae were collected through landing collections from residents' homes in Malang Regency. This research took time from August to November 2020.

Samples were obtained through the larval landing collection stage. Landing collection of larvae is done by taking the larvae in the bathroom tub using a larval filter and placing them in a tray. The larvae obtained were then sorted into instar III Aedes aegypti larvae. Then the larvae are acclimatized for 24 hours to let them physiologically adapt to the environment.

The next stage is the identification of larvae. Identification of larvae is done easily by looking directly at the characteristics of Aedes aegypti larvae which at rest condition, the

larvae are perpendicular to the water surface. Next, the larvae were taken from the tray using a dropper, dripped with slight alcohol, placed on a glass slide, and given a clear polish. Furthermore, identify under a microscope by looking at the morphological characteristics of Aedes aegypti larvae based on the identification key. Namely, Aedes aegypti larvae consist of the head, thorax, abdomen, abdomen tip, ventral brush, tuft, and comb. Then particular characteristics distinguish it from other larvae, namely having a jagged comb.

Then, the stage of making extracts is by taking the leaves of the Bintaro plant and choosing the ones that are still good, then washing the leaves with running water. The washing process is then continued by chopping process so that the leaves dry quickly and weigh the leaves as much as 6 kg, then dry the leaves for ± one week at room temperature so that the compounds contained in the leaves are not damaged. After drying, then mashed with a blender until it becomes powder, put into a glass beaker, and added with 3 liters of 96% ethanol. Then it is stirred and closed tightly for 24 hours for maceration. After 24 hours, it will be filtered with filter paper to obtain the filtrate or juice, then vacuumed. The filtrate obtained will be evaporated using a rotary evaporator, and the extract is placed in a glass cup, then the finished product is inserted into the extract bottle. After that, a phytochemical test was carried out. The result is the bintaro leaf extract has active compounds of flavonoids, tannins, saponins, and triterpenoids.

The toxicity test stage involved the treatment group and the control group. The control group consisted of negative control, given distilled water, and a positive control given abate. The treatment group consisted of 7 levels of Bintaro leaf extract, namely 5%, 15%, 25%, 35%, 45%, 65%, 75%. The total number of larvae used was 360 larvae. In this study, the leaf extract of Bintaro (Cerbera mangos) was used to make stock solution diluted with concentrations of 5%, 15%, 25%, 35%, 45%, 65%, and 75%. The 5% concentration was obtained by diluting 2.5 ml of stock solution of Bintaro leaf extract with 47.5 ml of distilled water, and so on. Toxicity test of bintaro leaf extract was carried out with ten larvae for each treatment unit/each plastic cup, which was then transferred to a plastic cup containing the diluted extract. The treatment in the sample group duration was 24, 48, and 72 hours. Then make observations and count the number of dead larvae or larval mortality at that time.

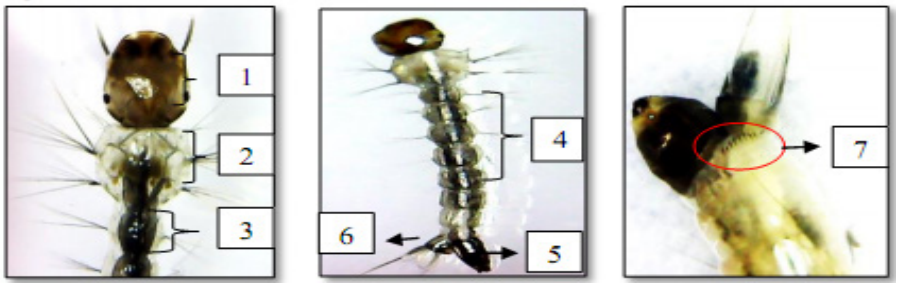
Data analysis in this study using the application program Ms. Excel and SPSS. The data obtained were entered in Ms. Excel to determine the percentage of larval mortality, then proceed with probit analysis used to determine toxicity. One of the toxicity test methods is LC50 and LC90. The values of LC50 and LC90 were obtained from the data on the mortality of the test animals. Test animal mortality data is a reference number for calculating the lethal concentration value. After knowing the lethal concentration value, it is adjusted to the level of toxicity of a substance.

Results and Discussions

The initial stage in this study was to identify Aedes aegypti larvae collected from larval collection activities.

Picture 1. Shows the results of the identification of Aedes aegypti larvae with a magnification of 600x.

Based on Figure 1, the identification of Aedes aegypti larvae using a Portable LCD



Description: 1. Caput, 2. Thorax, 3. Abdomen, 4. Ventral brush, 5. Tuft, 6. End of abdomen, 7. Serrated comb that shows the special characteristics of Aedes aegypti larvae.

Digital Microscope (G-600 China 3.6 MP) found that the Aedes aegypti larvae have several parts, including head, thorax, abdomen, ventral brush, tuft, comb. The particular feature that distinguishes Aedes aegypti larvae from other larvae is that they have a serrated comb.

The activity test stages of Bintaro leaf extract were collected from the results of the number of dead larvae from each concentration.

Table 1. The results of the percentage mortality of Aedes aegypti larvae at 72 hours.

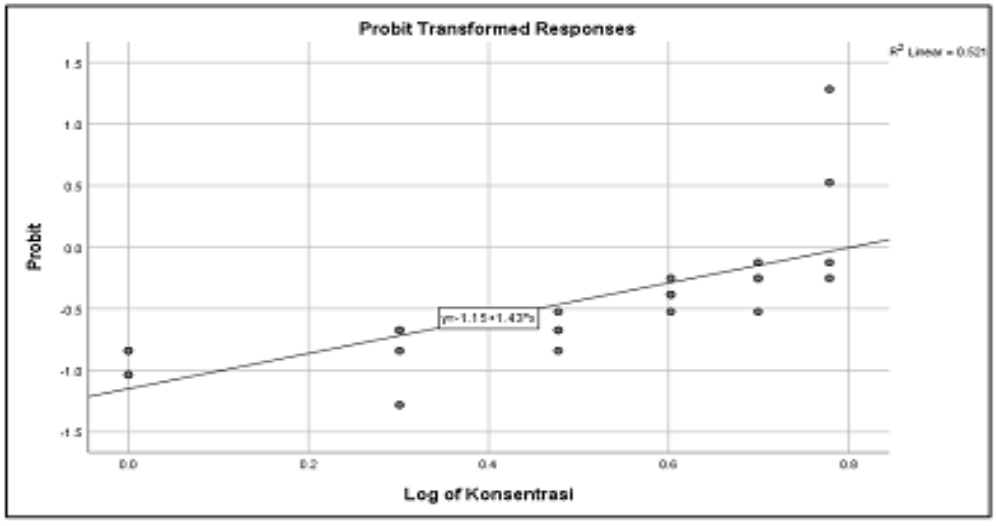
Concentration (%)	Average Mortality (%)
5 %	30 %
15 %	35 %
25 %	50 %
35 %	70 %
45 %	77,5 %
65 %	82,5 %
75 %	100 %

Source : Primary Data, 2020

Based on Table 1 shows that the percentage of mortality from treatment with Bintaro leaf extract concentration at 72 hours, it is known that the highest larval mortality is at a concentration of 75% with a percentage (100%), while the lowest larval mortality occurs at a concentration of 5% percentage (30%). Furthermore, The LC50 value at 72 hours has a value of 5.097% and the LC90 value 25.300%, which means that the administration of bintaro leaf extract on larval mortality can cause 50% and 90% of test animal deaths. It shows that bintaro leaf extract has been applied to tested animals can kill Aedes aegypti larvae.

According to Ullah et al., (2016) the level of toxicity consists of several categories, including (1) extremely toxic having a value <1, (2) very toxic having a value of 1-50, (3) moderately toxic having a value of 51-500, (4) slightly toxic has a value of 501-5000, (5) practically non-toxic has a value of 5000-15,000, and (6) less dangerous has a value of > 15,000. The results of probit analysis of LC50 and LC90 were 5.097 % and 25.300%, indicating that the level of toxicity is very toxic because the values of LC50 and LC90 are in the range of 1-50.

Image 1. Graph of Linear Probit Regression and Linearity Equation



Source : Primary Data, 2020

According to Banjarnahor et al., (2021), there is a correlation between probit concentration (x) and larval mortality (y) in probit regression analysis which will be interpreted based on the level of relationship, which has several categories, including (1) very strong having a value of 0 .80 – 1.00, (2) strong has a value of 0.60-0.79, (3) quite strong has a value of 0.40-0.59, (4) low has a value of 0.20-0.39, (5) very low has a value of 0.00-0.19. Based on Figure 1 shows that the graph of the probit regression analysis obtained a linearity equation, namely y = 1.15 + 1.43x with correlation (R2) has a value of 0.521, which indicates that the correlation between concentration probit with larval mortality is

quite strong because it has a value between 0.40-0.59 (Banjarnahor et al., 2021).

A phytochemical test on bintaro leaf extract was applied to find out the active compounds contained in bintaro leaves. Table 3 shows the phytochemical test result on Bintaro leaf extract. It contained flavonoids, tannins, saponins, and triterpenoids which were positive.

Table 2. Phytochemical Test Results

Active Ingredients	Parameters	Result
Flavonoids	Orange, brick red, pink, dark red	+
Tannins	Dark brown, dark blue	+
Saponins	Permanent foam	+
Triterpenoids	Orange, brownish orange	+

Source : Primary Data, 2020

The study results for the effect of bintaro leaf extract (Cerbera manghas) obtained from the activity test of bintaro leaf extract was an increase in the mortality of Aedes aegypti larvae instar III along with the increase in the concentration of bintaro leaf extract. It is proven that the larval mortality percentages at concentrations of 5%, 15%, 25%, 35%, 45%, 65%, 75% respectively were 30%, 35%, 50%, 70%, 77.5%, 82.5%, 100% (table 1) so that bintaro leaf extract is proven to have a larvicidal effect on Aedes aegypti larvae instar III refers to World Health Organization, (2005) which states that the concentration is considered to affect if it causes death 10-95%.

The toxicity test of Bintaro leaf extract on larvae was based on the LC50 and LC90 values. Based on the results of probit analysis, the LC50 value has a value of 5.097 % and the LC90 25.300 %, which means that the administration of bintaro leaf extract on larval mortality can cause 50% and 90% of test animal deaths. The smaller the LC50 and LC90 values, the higher the level of toxicity, the higher the number of larvae death. Based on the analysis results, natural larvicides based on bintaro leaves (Cerbera mangos) have a very toxic level of toxicity. According to Ullah et al., (2016), the level of toxicity shows it is a very toxic category because the LC50 and LC90 values have values between 1-50 mg/kg (%). In addition, the smaller the value of LC50 and LC90, the higher the level of toxicity of a compound. Conversely, the greater the value of LC50 and LC90, the lower the level of toxicity of a compound.

The phytochemical test showed bintaro leaf extract contains flavonoid compounds, tannins, saponins, and triterpenoids. It may be related to larval death. A concentration of 75% can kill 100% of larvae. Because the higher the concentration, the higher the content of active compounds that are toxic in Bintaro leaves. It is marked by the increasing number of dead larvae (Wahyuni & Yulianto, 2018). The larvae getting high concentrations, the content of these compounds will work quickly in suppressing the activity of the respiratory and nervous systems and break down cells quicker in the walls of the digestive tract of larvae so that the larvae will decrease their appetite (Steinwascher, 2018). The larvae's growth will be hampered even larvae will also die more quickly. In contrast to the larvae that received a low concentration, the workings of the active compound content were also slower. Even did not experience poisoning if it was low, or it could be said that it had no significant effect on larval mortality (I. . Araujo et al., 2018).

Bintaro leaf extract can be used as a bio larvicide because it has a toxic effect on Aedes aegypti larvae. As Kristiana et al., (2015) mentioned, the contents in bintaro leaves include flavonoids, tannins, saponins, steroids, and triterpenoids. Some of these compounds have toxic properties that can kill larvae (Susilo et al., 2019). It is per that flavonoid compounds work as inhibitors or inhibit the respiratory system or as respiratory toxins. Flavonoids have a way of working. Namely by entering the larva's body through the respiratory system that will cause withering of the nerves and damage to the respiratory system then cause the larvae to be unable to breathe and die (Kristiana et al., 2015), so the eggs do not hatch into larvae (Cahyati et al., 2019). In addition, flavonoids cause damage when

these compounds enter through the siphon, causing the larvae to change their position so that they are parallel to the water surface to get more oxygen intake (Subagiyo et al., 2017). According to Sutiningsih et al., (2017) saponins are bioactive compounds as toxic substances/ stomach poisons that enter through the mouth because the larvae usually take food from their place of life. In addition, saponins can damage cell membranes and disrupt the endocuticular protein layer causing toxic compounds to enter the larval body (Steinwascher, 2018), inhibiting metamorphosis or inhibiting the development of eggs to larvae (Cahyati et al., 2017). According to Kinney et al., (2014), tannin can reduce appetite which results in disruption of growth in larvae. Meanwhile, triterpenoids have anti feedant properties, which can cause the larvae to die (Carlos et al., 2015).

Based on the research conducted, it shows that the greater the concentration, the more effective it is to kill larvae so that bintaro leaf extract has the potential as a natural larvicide to kill Aedes aegypti larvae.

Conclusions

The research shows that bintaro leaf extract can be used as a larvicidal candidate for Aedes aegypti. The most effective concentration is 75% because it kills 100% of larvae and has an LC50 value of 5.097% and an LC90 25.300%. It is classified as very toxic. Further research to see the toxicity to the environment can be carried out.

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Detection of Dengue Virus Transovarial Transmission in Dengue Hemorrhagic Fever Endemic Areas

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Abstract

Dengue virus is a group of RNA viruses that are highly pathogenic in humans and spread quickly through the bites of Aedes aegypti and Aedes albopictus mosquitoes, especially in tropical countries. More than half a billion out of 100 countries worldwide are at serious risk of dengue virus infection. Vector surveillance activities with Ovitrap and detection of dengue virus types in Aedes aegypti and Aedes albopictus have never been carried out in Pontianak City. It is important in early alert systems at transmission foci. The purpose of this study was to prove the transovarial transmission of dengue virus in Aedes aegypti and Aedes albopictus mosquitoes with a transovarial transmission index (TTI) in endemic areas in Pontianak City, West Kalimantan. The method used in this research is descriptive observational, viral examination method with immunocytochemistry streptavidin-biotin peroxidase complex (ISBPC) and Polymerase Chain Reaction Transcription Reaction (PCR) aimed at proving the presence of transovarial transmission of dengue virus in the same period. The conclusion in this study is that there is evidence of transovarial transmission of dengue virus in Aedes mosquitoes in endemic areas by 29.3% in Sungai Jawi Dalam sub-district, West Pontianak sub-district, and 39.6% in Batu Layang sub-district, North Pontianak sub-district, mosquito density from the results of the Ovitrap Index measurement (OI) in Batu Layang Village is denser, namely 41.3%, compared to Sungai Jawi Village, which is 38.22% and has succeeded in identifying the type of dengue virus, namely the Dengue virus strain, in the two research locations.

Introduction

Dengue Hemorrhagic Fever is a health problem in Indonesia. All regions of Indonesia are at risk of contracting dengue disease because both the virus that causes it and the mosquitoes that transmit it are widespread in residential areas and public facilities throughout Indonesia. Based on the report from the Ministry of Health of the Republic of Indonesia, DHF has become an endemic problem in 33 provinces and 436 districts or cities, 605 sub-districts, and 1800 villages or urban villages. From 2014 to 2015, it reached 41.25/100,000 population, with a case fatality rate of 0.7%.

DHF in West Kalimantan Province in 2009, the mortality rate of DHF CFR ranked second in Indonesia. Although, the number of sufferers was only 979 cases compared to West Java with 35,453 and DKI Jakarta with 27,964. But the mortality rate reached CFR: 3,38%, after Jambi with a CFR of 3.67%. West Kalimantan Province ranks 2nd in the Kalimantan Islands region, after East Kalimantan with 5,762 cases of DHF. An increase in dengue cases occurs every year. In 2017 there were 5,049 dengue fever cases with 68 deaths. The highest mortality rate was in Pontianak with CFR; 7% and declared KLB.

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Previous research by Sucipto (2012) in the Pontianak Kota sub-district showed a transovarial transmission of 76.6%. This study was conducted one month before being declared a DHF outbreak. Another study in Malalayang and Banjar Negara Districts showed the transovarial transmission of the Dengue virus in Aedes mosquitoes. But the results were lower than in Pontianak City, namely 6.1%-17.1% and 9.42% (Sorisi et al., 2014). Transovarial transmission of the dengue virus in an area is an important etiological phenomenon. It is responsible for outbreaks due to the maintenance of the virus during the disease inter-epidemic period.

The spread of DHF in Pontianak City is evenly distributed in all sub-districts so that it is declared a DHF endemic city which every year there is an increase in cases of potential outbreaks. The 2017 data survey showed that the highest is in two urban villages, namely Batulayang Village, Batu Layang Health Center, North Pontianak Subdistrict. There are 40 cases of DHF and Sungai Jawi Village, Komyos Sudarso Health Center Working Area, West Pontianak District, with 93. It is known that the transmission of the dengue virus is from the bite of the Aedes aegypti mosquito, which initially bites people infected with the dengue virus and transmits it through bites to people who are not infected with the dengue virus. But there are also cases of DHF that appear when there are no previous cases of DHF. It is thought to be due to the transovarial transmission of the dengue virus in dengue hemorrhagic fever vectors. This study aims to determine transovarial transmission in dengue-endemic areas and detect the virus. This research is also an active observation in the context of implementing an early warning system (SKD) or an early warning system (EWS) in transmission foci, where dengue cases occur almost every year to prevent outbreaks (Fuadzy et al., 2020; Achmadi, 2012)

Method

This study used a descriptive design, carried out in July 2018 for four months, with the type of descriptive research with a cross-sectional study design, namely to prove the existence of transovarial Virden transmission in dengue-endemic villages, consisting of 2 outputs, namely dengue-endemic villages. Determination of population The sample was carried out by purposive sampling of Aedes aegypti and Aedes albopictus mosquitoes from 200 houses from 2 research locations, namely Batu Layang Village and Sungai Jawi Dalam Village (Saepudin, 2011). The research samples were Aedes aegypti and Aedes albopictus eggs taken from two locations, then colonized into adult mosquitoes with an average age of 7 days, not yet sucking blood, full of 10% sugar solution.

Laboratory research starts from the pre-adult stage to become an adult mosquito. Each village took 1000 mosquitoes that met the criteria for the test mosquitoes. The total number is 2,000. The method used to identify dengue virus infection in mosquitoes. Examination of dengue virus by immunocytochemical methods streptavidin-biotin peroxidase complex (ISBPC) and Reverse-Transcription Polymerase Chain Reaction (RT-PCR). The materials and tools used in this RT-PCR test are as follows:

a.Object glass, Cover slip, Phosphate Buffer Saline (PBS), absolute methanol, H2O2 (hydrogen peroxide), primary antibody (DSSC7 monoclanate antibody).

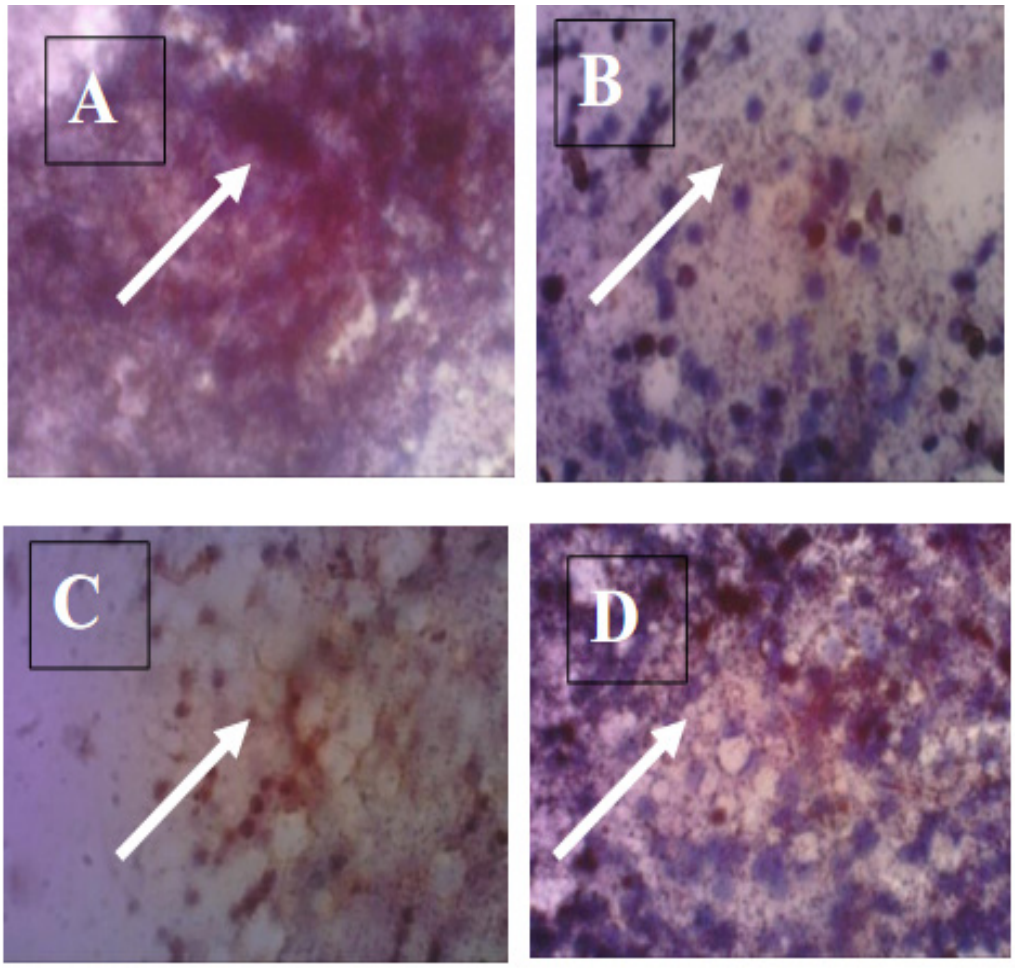
b. Starr Trek Detection Kit (Biocare medical) which contains five ready-to-use reagents: (i) Background sniper (cat. No. BS966L10) as a protein blocking solution containing non-immune serum; (ii) Trekki Universal Link (cat. No. STU700L10) containing a secondary antibody labeled Biotin; (iii) TrekAvidin-HRP label (cat. No. STHRP700L10), which contains streptavidin peroxidase Conjugate labeled with the enzyme horseradish peroxidase (HRP), (iv) Betazoid Diaminobenzidine retracloride (DAB) chromogen (cat. No. BDB900G5), and (v)) Betazoid DAB Substrate Buffer (paint NO. DS900L10), Mayer Hematoxylin paint (counterstain), alcohol, entellon, aluminum foil, tissue and immersion oil, the female mosquito Aedes aegypti (egg, larva, pupa, and adult stages).

c.Materials Preparation: (i) Peroxidase blocking solution: one part 30% hydrogen peroxide plus nine parts absolute methanol,

(ii) DSSE10 monoclonal antibody 1:10:100 l DSSE10 antibody plus 900µl fresh PBS, (iii) DAB chromogram substrate: 1 l Betazoid DAB chromogen was diluted with 600 l Betazoid DAB Substrate Buffer, immediately before use.

Results and Discussions

This research has received an ethical permit from the Pontianak Health Polytechnic Research Ethics Committee with certificate number: 019 / KEPT-PK.PKP / VI / 2018. The study was conducted in an endemic area of DHF with a case study in Pontianak City. The measurement results show that the average Ovitrap Index is mostly outside the house, 41.3% in Batu Layang Village, compared to 38.22% in Sungai Jawi Village. The mosquitoes used were Aedes aegypti and Aedes albopictus mosquitoes with an average age of 7 days, full of 10% sugar water solution. Each glass slide contains 12 head squash preparations. Specifically, the positive and negative control mosquitoes were taken from the mosquitoes of the Parasitology Laboratory of the Faculty of Medicine, UGM. Following the immunocytochemical streptavidin-biotin peroxidase complex (ISBPC) method, which was compiled and standardized by Umniyati (Sorisi et al., 2014).



Picture. 1 Micrograph photo of head squash preparation

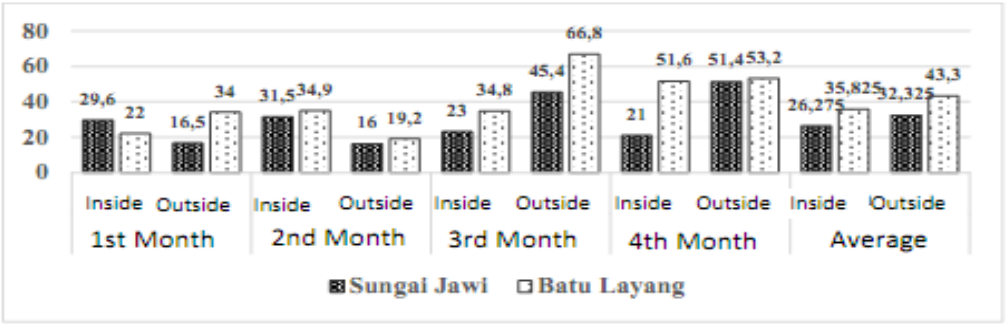
Picture. 1 Micrograph photo of head squash preparation with a magnification of 100x10, which shows positive DEN antigen in the form of brownish hexagonal granules that spread to mosquito brain tissue from Batu Layang sub-district (C) and Sungai Jawi sub-district (D). Figure A is a negative control of non-Aedes aegypti mosquito preparations and Figure B is positive control antigens from mosquitoes infected with Dengue virus with an incubation period of 7 days.

Picture 1. shows the positive (+) infection level, 400x magnification shows brownish-colored sand grains scattered between brain tissue, but almost no cells that show brown color in the cytoplasm. On the positive (++) the sand grains were more spread out, and 1-10 cells showed a brown color in the cytoplasm per field of view at 400x magnification. In positive (+++), the distribution of sand grains is getting wide. The 10-100 cells found show a brown color in the cytoplasm so that the infection appeared at 100x magnification. The description of positive (+++), (++), and (+) infection levels can be found in the preparations from the Sugai Jawi Dalam village. While in Batu Layang, only positive (+) infection rates. The results of dengue virus detection in Aedes aegypti mosquitoes from eggs can be seen in Table 1 below:

Table 1. Results of Microscopic Examination of Positive and Negative Head Squash Preparations in Aedes aegypti Mosquitoes

Villages	Numbers			ITT (%)
	Samples	(+)	(-)	
Sungai Jawi Dalam	1000	293	607	29,3
Batu layang	1000	396	604	39,6
Total	**2000**	**789**	**1.211**	**60,55**

Tabel 1 shows the TTI on Sungai Jawi Dalam is higher, namely 29,3% than Batu Layang with 39,6%. Based on table 1 and Picture 3, the highest TTI on dengue endemic areas is on Batulayang village namely 43,33% outside and 32,32% inside.

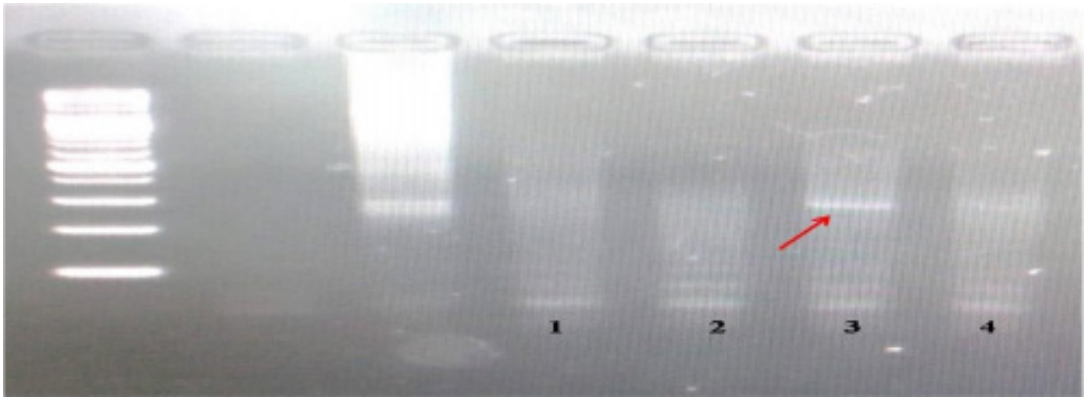


Picture 2. Transovarial Transmission Index in Pontianak

Table 2 Number of Positive Samples Based on the Gender of *Aedes* mosquitoes

Villages	Samples (+)	Female		Male	
		n	%	n	%
Sungai Jawi Dalam	293	268	91	25	9
Batu layang	396	359	90	37	10
Total	**789**	727	91	62	9

From table 2, in each research location in Sungai Jawi Dalam and Batu Layang Villages, male Aedes mosquitoes were positive for Dengue Virus, namely 9% and 10%. The results of the examination of the Aedes aegypti mosquito using the Reverse-Transcription Polymerase Chain Reaction (RT-PCR) method found a strain of the dengue virus. More details can be seen in Figure 3 below.



Picture 3, Left to Right: DNA marking, negative control, positive control, sample number 1,2, 3 and 4

Examination of the type of dengue virus in Aedes aegypti mosquitoes is by the RT-PCR method. Based on the observations and documentation of the electrophoresis results with Gel Doc, as shown in Figure 3, shows that in sample number 3 it is positive for Dengue strain 3.

Field research was carried out by collecting eggs of Aedes aegypti and Aedes albopictus carried out four times for four months with ovitrap. Then the positive ovistrip eggs were colonized in the parasitology laboratory of the Faculty of Medicine, Gadjah Mada University. The results of mosquito colonization in the laboratory showed the total population of each mosquito cage. The Aedes aegypti was almost the same as Aedes albopictus. The results of the Ovitrap Index (OI) calculation are higher outside the home (41.3%) than inside the house (38.22%). It indicates the number of vector mosquitoes in Batu Layang Village is denser. The results of this study are in line with the results of research in several urban villages in Jakarta. OI is higher outside (36.4%) than inside the house (33.5%) because Aedes albopictus prefers to lay eggs outside than inside the house. The density of vector mosquitoes also increases contact with the host (humans) in the vicinity. George et al. (2015) stated that Aedes aegypti and Aedes albopictus mosquitoes like resting areas and indoor and outdoor activities, specifically Aedes albopictus in gardens, so they have less contact with humans, also concluded that ovitrap is quite effective as a one way to monitor the density of Aedes aegypti.

This study also showed transovarial transmission in Batu Layang Village 39.6% and Sungai Jawi Dalam 29.3%. Transovarial transmission of Aedes aegypti and Aedes albopictus mosquitoes play a role in increasing and maintaining the dengue epidemic in dengue-endemic areas. According to Matangkasombut et al. (2020), female mosquitoes experience a viral infection of their ovarian tissue and are maintained until the next generation genetically and persistently. VirDen will be transmitted transovarially and increase the frequency to filial (F)-7 then persist in the next generation. The same thing was conveyed by Rahayu et al. (2019), stating a transovarial transmission of dengue virus in Aedes aegypti eggs in Malaysia up to the 5th generation of female mosquitoes, but absent from the 6th and 7th generations. The vertical transmission mechanism of arbovirus in the mosquito's body is by female mosquitoes in their eggs (transovarial). It will later become mosquitoes. This infection rate exceeds 80% (da Cruz et al., 2015).

It indicates that transovarial transmission potentially affects the maintenance of dengue endemicity, with the Aedes aegypti mosquito as the dengue virus reservoir over time. It proves that in villages with dengue-endemic, there are always cases of DHF every year. Transovarial transmission like this also occurred in several villages of Yogyakarta. Namely, the transovarial transmission rate with an infection rate of 38.5-70.2%, also in several DHF endemic districts in Central Java and Sampit, East Kotawaringin Regency, Central Kalimantan. The possibility continues to spread to other areas in Indonesia transovarial transmission of VirDen will naturally occur. The tests in several urban villages of Yogyakarta were also found similar things. (Rosa and Salmah, 2015).

The same study conducted in Puerto Iguazú, Misi, Argentina showed that 11.6% of positive mosquitoes were lower than TTI in Pontianak (Espinosa et al., 2014). In Malalayang and Banjar Negara Districts, there was a transovarial transmission of Dengue virus in Aedes mosquitoes, but the results were lower than in Pontianak, namely 6.1%-17.1% and 9.42% (Sorisi et al., 2014). Compared with previous research by Sucipto (2012) in the Pontianak Kota sub-district, it shows a much higher number, namely TTI of 76.6% one month before being declared a DHF outbreak. The results of previous studies and naturally 60% of transovarial transmission occurred in the 1st generation. The studies stated the Dengue virus transovarial transmission as a vital etiological phenomenon responsible for outbreaks. It is due to the maintenance of the virus during the inter-epidemic period of the disease (Hikmawati et al,. 2020: Ferreira-De-Lima & Lima-Camara, 2018). This study provides the natural transovarial infection evidence by the Dengue-3 virus in Aedes aegypti. Dengue virus-3 is the primary viral strain that is the most virulent (Sunardi et al., 2018). In line with

the results of Utama et al. (2019), infection with any of the four serotypes can lead to subclinical, life-threatening diseases. DENV 1-4 serotypes circulated during the study period, with the highest overall level from January to March, among the strains the most dominant being the Dengue Virus 3 starin, as researched by Halsey et al. (2012) and Soo et al. (2016), showed that severe cases occurred in DHF patients infected with VirDen-3. In contrast, the results of a study in Mato Grosso provided evidence of natural transovarial infection by the Dengue Virus-4 in Aedes aegypti. This type of infection may have served as a virus maintenance mechanism during the interepidemic period in Cuiabá, where dengue outbreaks are reported annually. These results emphasize the need for efficient vector population control measures to prevent arbovirus outbreaks in the state (da Cruz et al., 2015).

The difference in type and malignancy in each region is due to variations in topography and socio-demographic seasons. They cause the extrinsic cycle time to fluctuate. Cases that occurred in the study area are tropical climates and population mobility. As well as the optimal season for the extrinsic cycle of dengue strain-3. It is indicated by the data on BDB mortality with the highest number in the two research areas, namely Batu Layang Village, Case Fatality Rate (CFR) of 7.14%, and Jawi Dalam River Output of 4.44% (Dinas Kesehatan Kota Pontianak, 2017). Research using RT-PCR examination is very important. Besides identifying four dengue virus serotypes in larval samples, it can also contribute to the development of early detection systems for virus circulation and predictive models of outbreaks and epidemics of this disease (Da Costa et al., 2017; Da Cruz et al., 2015).

This research has not yet concluded a relationship between the severity of infection between patients with a specific dengue virus. But in the future, further studies can be carried out to ensure the relationship between the agent and the host. As large-scale cross-sectional studies conducted in Latin America are very important, longitudinal studies relating the temporal sequence of serotype-specific dengue infection and clinical development of manifestations are needed to confirm some of the new findings of this study. In addition, future studies concentrating on clinical differences in serotypes (eg, genotype and lineage-specific serotypes) will further elucidate the role of interindividual serotypes and DENV morbidity (Halsey et al., 2012).

This infection rate was also depicted in this study through microscopic images of head squash preparations showing positive (+) infection rate found in Sungai Jawi Dalam sub-district was lower than Batulayang output (+++). It shows that mosquitoes with a heavy infection rate when infecting the host will more easily cause symptoms of DHF because the amount of virus that enters is more. Some virologists say that the cause of the disease is the virulence of the virus. The theory of viral virulence says that for the emergence of dengue fever does not need two infections Just once is enough if the virus is virulent. The problem with proving this theory is that there are no laboratory markers for virulence. Until now there is no material, such as monoclonal antibodies, can be used to show virulent or non-virulent Dengue Virus. A Dengue infection will appear with clinical symptoms influenced by host immunity, the amount of virus, and the strain of the virus. However, the transovarial transmission may be a vital mechanism in the spread of DHF. Using RT-PCR, it was possible to identify four DENV serotypes in larval samples (Da Costa et al., 2017; Espinosa et al., 2014).

This study also found that 10% of male Aedes aegypti were infected with the virus transovarially in Batu Layang Village and 9% in Sungai Jawi Dalam village. It is in line with the study in Kenya, which detected dengue virus in immature mosquitoes, both male and female sexes. It provided evidence of transovarial transmission of this arbovirus in local mosquitoes. This phenomenon may be driving the maintenance of the underlying virus, highly contributing to its periodic reappearance among humans in Kenya (Heath et al., 2020). This research is vital information that the increase in cases throughout the year occurred in both regions due to the presence of the Dengue virus found in male and female mosquitoes.

Fridolina Mau (2014) emphasized that non-infective female mosquitoes mate with infective male mosquitoes, causing infection

with female mosquitoes. Transmission of the dengue virus through the mating behavior of Aedes mosquitoes (transveneral transmission) is part of the vertical transmission of mosquitoes that is still rarely studied (Da Costa et al., 2017). Recent laboratory studies have proven that male Aedes aegypti mosquitoes infected with DENV-3 intrathoracic with an incubation period of 5 days and 14 days can transmit DENV-3 to non-infectious female Aedes aegypti mosquitoes. The study also stated that the natural polygamous behavior of male mosquitoes also plays a vital role in the dengue virus spread. So a male mosquito infected with DENV-3 can mate with a certain number of non-infectious female mosquitoes. As a result, the infectious female mosquito will produce infected fertile eggs. Knowledge of mosquito mating behavior is related to some factors. Such as optimal physiology of mosquitoes, physiological mechanisms that regulate mosquito mating, and appropriate environmental conditions. Other factors need to be studied further. This study provides vital information in developing a more effective dengue control strategy in vector mating mechanisms.

The discovery of the Transovarial Transmission Index (TTI) value, the identification of dengue virus serotype 3, and the discovery of dengue virus in male mosquitoes in Batu Layang and Sungai Jawi villages in Pontianak City shows how high the potential for transovarial transmission of dengue virus is. The large number of Aedes aegypti and Aedes albopictus mosquitoes determines the potential for transovarial transmission of the dengue virus. The presence of housing density conditions in the urban environment can trigger optimal temperature and humidity levels in the Research Area, thus supporting the occurrence of transovarial transmission cycles throughout the year, having the potential for outbreaks in endemic areas of Pontianak City. It is in line with the in-depth study of Amazonian urban areas showing that transovarial transmission is a vital mechanism for the maintenance and spread of disease in the Amazon (Da Costa et al., 2017)

This study concludes that the dengue virus maintains its life in optimal numbers through the transovarial transmission to a genetically superior mosquito population, vital in dengue transmission. The phenomenon needs special attention. Because these two outputs, apart from endemic outputs, are also the areas with the highest cases and deaths in 2017. Therefore, continuous vector control efforts are needed until the F-8 generation (4 months) to stop the virus circulation by transovarial transmission. The most effective control is carried out on the source and their habitat by engineering the environment as a breeding place using a modified ovitrap plus tool called "Rekaitidiri". It can kill adult female larvae and mosquitoes, thus, effectively reducing the density index of larvae and adult Aedes aegypti mosquitoes (Saepudin et al., 2017; Saepudin et al., 2019). Detection of transovarial transmission of dengue virus in vector mosquitoes can be a vital part of the epidemiological survey of dengue fever and is used in the development of an early warning system to anticipate the spread of dengue virus transmission to humans and the emergence of new cases of dengue fever that previously had no cases of dengue.

Conclusion

This study finds evidence of transovarial transmission of the dengue virus in Aedes mosquitoes in Pontianak City. Previous research in 2012 showed the value of the dengue virus transovarial index (TTI) was 76.6%. Meanwhile, in this study, in the same area, there was a decrease of 29.3% in the Sungai Jawi Dalam sub-district, West Pontianak sub-district, and 39.6% in Batu Layang sub-district, North Pontianak district. Successfully identified the type of Dengue Virus strain 3.

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Diarrhea Incidence in Tanah Bumbu, South Kalimantan, Under A Spatial Approach

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Abstract

Indonesia has seen an increase in diarrhea incidence from 4.5% in 2013 to 6.8% in 2018. South Kalimantan, diarrhea is still a common disease with a relatively high incidence rate. In Tanah Bumbu itself, the incidence of diarrhea from 2014 to 2019 was among the top 10 most common diseases. The percentage of patients served in 2019 was 33.26% of the detection targets. While in infants, only 3.4% of the number of detection targets. This study aims to see the spatial description and influence of the districts' condition in Tanah Bumbu Regency with the diarrhea incidence. This research took place in the ten districts of Tanah Bumbu Regency. The analysis used in this study was SAR to see the relationship between districts and the incidence of diarrhea and other factors. The results showed that in Tanah Bumbu, factors that affected the incidence of diarrhea include population density (p-value 0.0001), access to quality drinking water (p-value 0.0001), and health facilities (p-value 0.0001).

Introduction

As a developing country, Indonesia has diarrhea problems prevalent because of its high morbidity and mortality (Margarethy, 2020). The incidence of diarrhea needs to be watched out for because it could cause outbreaks (Bellido-Blasco & Arnedo-Pena, 2019). Diarrhea is a condition characterized by loose or watery stool, increased defecation frequency, usually more than three times a day, and can be accompanied by blood and/or mucus (Jung et al., 2017; Margarethy, 2020). Factors that can exacerbate diarrhea cases include germs, nutritional conditions, hygiene and sanitation, population density, sociocultural and socioeconomic conditions. Diarrhea is highly affected by environmental conditions. If the environment is unhealthy (because it is contaminated with diarrhea germs) and it accumulates with unhealthy human behavior (through food and drink), diarrhea will likely happen (Jarquin et al., 2016; Vincent, 2018).

Based on Basic Health Research, Indonesia has seen an increase in diarrhea incidence from 4.5% in 2013 to 6.8% in 2018 (Kemenkes, 2018). Meanwhile, in South Kalimantan, diarrhea is still one of the largest disease groups. It has a relatively high incidence rate. In 2018, the coverage of diarrhea services for children under five was only 41.12% (Directorate General of P2P, Ministry of Health RI, 2019) (Kemenkes RI, 2019; Kementrian Kesehatan RI, 2014). This condition is supported by environmental factors, mainly by common sanitation conditions that are still not good. For example, the use of water for daily needs that do not meet the requirements, family latrines that are still insufficient and does not meet

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the health requirements, as well as housing sanitation conditions that are still lacking and unhygienic (Berendes et al., 2017; Jarquin et al., 2016). In Tanah Bumbu Regency, the diarrhea incidence from 2014 to 2019 was in the top 10 most common diseases with the percentage of patients served in 2019 being 33.26% of the number of detection targets, while in under-five children only 3.4% of the number of detection targets (Profile of Tanah Bumbu Health Office).

The World Health Organization estimates that the most causes of diarrhea in developing countries are Rotavirus and Escherichia coli bacteria (Mumtaz Y, Zafar M, 2014; Steffen, 2017). The two agents of the disease are closely related to environmental factors such as sanitation and hygiene, adequacy of clean water and drinking water facilities, food hygiene, and safety. Water is also a medium for disease transmission that potentially decreases public health status (Esrey et al., 1991). Pollution in clean water facilities declines the quality both physically and biologically. Microbiologically, contaminated water contains coliform bacteria. The other pathogenic microorganisms in the water are protozoa, viruses, and parasites (Anwar et al., 2019; Jung et al., 2017).

We need to investigate the spatial aspects because the spread of this disease is greatly affected by geographic conditions and fluctuating environments (Nilima et al., 2018). An important aspect of spatial epidemiology is the potential factors that influence disease incidence in a region (Waller, 2005; (Nilima et al., 2018). From this description, it can be concluded that diarrhea is closely attached to environmental and regional conditions. Also, diarrheal disease is still a high public health problem that requires locality-based studies (Gedamu, 2017). Therefore, the authors want to know the influence of several factors related to the environment and territory on the incidence of diarrhea in the Tanah Bumbu Regency.

Methods

This research was conducted in Tanah Bumbu Regency in 2019 with a cross-sectional design and spatial regression analysis method in the form of autocorrelation regression to determine the existence of a relationship between one district and another. This spatial analysis is used to determine a more appropriate regression model by considering regional aspects. All variables will be analyzed, then which one describing the risk factors for the diarrhea cases distribution will be determined. The data collected in this research is secondary data obtained retrospectively, including the number of diarrhea cases during 2019 from the local Health Office and Central Statistics Agency (BPS or Statistics Indonesia) report. Furthermore, a multivariate spatial analysis of the Spatial Autoregression (SAR) test was carried out to determine the relationship between independent variables and the number of findings on the diarrhea incidence. The results will form a global regression equation for one district and its relation based on the p-value ($p < 0.05$).

Results and Discussion

Data on the number of incidents of diarrhea found and several independent variables are presented per sub-district throughout Tanah Bumbu Regency based on district health profiles and BPS data. The independent variables consist of area, population density, the number of healthcare facilities, proportion of the population having sustainable access to quality drinking water, percentage of drinking water facilities inspected for environmental health, and percentage of the population with access to healthy latrines.

Table 1. Diarrhea Incidence Data in Tanah Bumbu

Districts	Diarrhea incidence	Area (km^2)	Population density (/ km^2)	Number of Healthcare facilities	Access to quality drinking water (%)	Inspected drinking water facilities (%)	Access to healthy latrines (%)	Healthy food-management places (%)	Healthy public amenities (%)
Kusan Hilir	212	382.34	166.99	4	88.86	1.23	70.78	11.65	65.91
Sungai Loban	202	293.48	63.31	5	36.60	0.12	81.00	36.33	38.18
Satui	781	877.97	59.85	6	94.46	0.95	83.03	50.31	52.91
Angsana	299	895.74	108.41	3	123.06	62.86	86.43	14.41	28.57
Kusan Hulu	294	114.64	13.43	2	79.87	3.63	77.29	45	12.24
Kuranji	109	195.83	88.93	1	42.39	20.99	67.92	26.29	81.82
Batulicin	133	201.4	150.48	2	73.35	0.74	100	64.84	67.18
Karang Bintang	283	1504.74	101.03	2	69.38	11.52	86.11	31.25	18.64
Simpang Empat	348	289.01	268.80	10	77.72	0.15	72.53	18.93	71.82
Mantewe	217	135.16	26.96	1	31.20	0.23	81.72	3.92	15.87

Sources: Report of Tanah Bumbu Health Office and Statistics Agency (BPS) in 2019

The highest number of diarrhea incidents throughout 2019 happened to be in Satui District with 781 incidents, followed by Simpang Empat District with 348 incidents. Meanwhile, in 8 other districts, the number of incidents was still quite high, namely over 100 incidents. For this regency, the largest district is Karang Bintang District. Simpang Empat is the densest district which is in line with the number of healthcare facilities, as many as ten healthcare facilities. For access to quality drinking water, inspected drinking water facilities, and access to healthy latrines Angsana District has the highest percentage. As for healthy food processing places, the highest was in Batulicin District with 64.84%. For healthy public amenities, Kuranji District is the highest percentage with 81.82%.

The multicollinearity test results show that all independent variables have mutual dependencies with a VIF value <10. So it can be continued for the next stage, the spatial autocorrelation test, to find the variables that tend to have a particular pattern in an area. If I> I0, then the clustering pattern or autocorrelation is positive. If I <I0, then the diffuse pattern or autocorrelation is negative.

Table 2. Moran's Index Test Results

Variables	I	I_0	Remarks
Diarrhea incidence	-0.018		Negative autocorrelation
Area	-0.140		Positive autocorrelation
Population density	0.009		Positive autocorrelation
Number of healthcare facilities	-0.258		Positive autocorrelation
Access to quality drinking water	-0.092	-0.111	Negative autocorrelation
Inspecting drinking water facilities	-0.148		Positive autocorrelation
Access to healthy latrines (%)	-0.212		Positive autocorrelation
Healthy food-management places	-0.282		Positive autocorrelation
Healthy public amenities	0.002		Positive autocorrelation

Sources: Result of Geoda Application

The test results presented in Table 3 show that all variables have autocorrelation. The incidence of diarrhea and the percentage of people having access to safe drinking water has negative autocorrelation or spreading pattern. Whereas area size, population density, availability of health facilities, inspected drinking water facilities, access to healthy latrines, food management places that meet health requirements, and public amenities that meet health requirements have positive autocorrelation or have a clustering pattern.

Table 3. List of Neighboring Districts in Tanah Bumbu Regency

No	Districts	Number of neighboring districts	List of neighboring districts
1	Kusan Hilir	4	Batulicin, Karang Bintang, Kusan Hulu, Sungai Loban
2	Sungai Loban	5	Angsana, Satui, Kusan Hulu, Kuranji, Kusan Hilir
3	Satui	3	Kusan Hulu, Sungai Loban, Angsana
4	Angsana	2	Satui, Sungai Loban
5	Kusan Hulu	6	Mantewe, Karang Bintang, Kusan Hilir, Kuranji, Sungai Loban, Satui
6	Kuranji	2	Kusan Hulu, Sungai Loban
7	Batulicin	3	Simpang Empat, Karang Bintang, Kusan Hilir
8	Karang Bintang	5	Mantewe, Simpang Empat, Batulicin, Kusan Hilir, Kusan Hulu
9	Simpang Empat	3	Mantewe, Karang Bintang, Batulicin
10	Mantewe	3	Kusan Hulu, Simpang Empat, Karang Bintang

Sources: Report of Tanah Bumbu Health Office in 2019

The district with the most neighbors is Kusan Hulu. Meanwhile, the results of Moran's analysis show that districts in Tanah Bumbu Regency are in quadrant 1 (high-high), which means that all of these districts have a high incidence of diarrhea and tend to be close to areas where the incidence of diarrhea is also high. Before carrying out the SAR test, the assumption test for homoscedasticity with Breusch-Pagan, normality test with Jarqeu-Bera, and Lagrange Multiplier was carried out. The results showed that the homoscedasticity and the normality tests showed a p value> 0.05, which means both met the requirements. Meanwhile, the Lagrange Multiplier value is <0.05, which means that the data has met the assumption requirements to continue with the SAR test.

Table 4. SAR Test Results with a Complete Model

Variables	Coefficient	P-value	R squared
W_y (Diarrhea incidence)	-0.037	0.922	
Area	-0.131	0.284	
Population density	-2.669	0.003	
Number of healthcare facilities	62.118	0.000	
Access to quality drinking water	4.621	0.003	0.882
Inspecting drinking water facilities	-3.311	0.114	
Access to healthy latrines (%)	2.223	0.435	
Healthy food management places	-1.268	0.022	
Healthy public amenities	-0.131	0.305	

Sources: Result of Geoda Application

The SAR test results show the autocorrelation regression results, but there are still some insignificant variables including the weighting coefficient (w_y) so that the insignificant independent variables must be excluded.

Table 5. Final Results of the SAR Test After Several Variables are Excluded

Variables	Coefficient	P-value	R squared
W_y (Diarrhea incidence)	-0.528	0.066	
Population density	-2.225	0.000	0.779
Number of healthcare facilities	58.009	0.000	
Access to quality drinking water	3.681	0.000	

Sources: Result of Geoda Application

The table above shows the final model. The variable W_y shows no relationship between diarrhea incidents number in the adjacent sub-districts. With a p-value of 0.06 and a coefficient of -0.528. The negative coefficient value also means that the diarrhea incidence in the nearby area does not contribute to an increase in the other/neighboring areas. Furthermore, the variables of population density, health facilities, and access to quality drinking water showed significant results (0.000). The population density coefficient value has a negative value, which means that the smaller the population density, the lower the incidence of diarrhea in an area. The number of healthcare facilities and access to quality drinking water has positive coefficient values. It means the smaller the number of health facilities or the lower the community's access to quality drinking water, the greater the incidence of diarrhea. The R squared value of 0.779 means that 77.9% of the incidence of diarrhea can be explained by population density, number of healthcare facilities, and access to quality drinking water. The rest is explained by other factors.

A spatial approach is essential in mapping the spread of disease and aiding in policymaking. Targeting the control on risk factors for diarrhea transmission is a potential strategy to reduce diarrhea cases. In this study, the value of the proximity coefficient (W_y) has a negative coefficient. It means the diarrhea incidence in an adjacent area does not contribute to an increase in that area. It is also proved by Moran's analysis which states that all sub-districts in Tanah Bumbu Regency are in the high-high quadrant where all sub-districts have a high incidence of diarrhea and or are not much different.

Population density is still a factor in underlying various diseases, such as diarrhea. The population density and mobilization allow it to spread. The densely populated areas, like urban areas, with lots of waterlogging and the flow of urbanization continuing to increase annually, have made the problem of population density the main scourge for various diseases as well as diarrhea (Jarquin et al., 2016). Research in Anhui China illustrates that densely populated areas have a higher burden of infectious diseases, including diarrhea, than less densely populated areas (Hao et al., 2019).

Simpang Empat is the district with the highest population density in Tanah Bumbu Regency. In 2019 it was populated by 268.8 people/km2. In this case, it can be related to the high diarrhea incidence, because the district had high cases of diarrhea from 2009-2011. It can be related to the diarrhea incidence in Simpang Empat became second-highest after Satui. Diarrheal disease is a contagious disease, so if the population density is very high, the possibility of the transmission rate of diarrhea is also very high due to the very close distance between houses (Adane et al., 2017; Jarquin et al., 2016; Jung et al., 2017).

According to several studies, population density can affect the process of disease transmission or transfer from one person to another (Anwar et al., 2019; Berendes et al., 2017; Nilima et al., 2018), where the density of human settlements forces the location or construction of a septic tank adjacent to a well in a residential area (Margarethy, 2020). This condition can worsen the quality of groundwater consumed by the people living in the area since the population density is a fertile nursery for the virus (Steffen, 2017). A densely populated area will be more susceptible to transmission and reproduction so that it becomes more susceptible to the spread of infectious diseases such as diarrheal diseases (Adane et al., 2017; Jung et al., 2017). Susanti et al's research also showed that occupancy density relates to the diarrhea incidence in children under five. The more densely populated an area can quickly increase the potential for disease transmission between individuals. Dense human settlements can affect the location or construction of septic tanks close to each other/close to wells/drinking water sources in a residential area (Berendes et al., 2017; Thiam et al., 2017). In dense settlements, groundwater can easily be contaminated with Escherichia coli bacteria. Then residents will consume groundwater contaminated with E. coli because the distance between the well and the septic tank is less than 10 meters. The results showed that the potential for families to suffer from diarrhea was 1,103 times if they consumed drinking water that did not meet health requirements (Jarquin et al., 2016).

Another problem of densely populated areas is waste disposal. Garbages contained in people's homes that are not properly managed can be seen from the community's behavior who piles up rubbish for a long time around the house or throw them into waterways until water bodies become inundated and the trash decays (Margarethy, 2020). As a result, disease vectors such as flies are an indirect intermediary for diarrheal diseases. Mubarak and Chayatin (2009) say that the problem of waste is not simple at this time, the more the city is developing, the more the amount of waste produced, the more diverse the composition, the greater the management funds and other problems. Most of the waste is garbage originating from households (Berendes et al., 2017; Jung et al., 2017; Vincent, 2018). Poor waste management or the behavior of disposing of waste inappropriately can be a source of disease for the community (Gedamu, 2017; Jarquin et al., 2016). Another problem is regarding the sewerage channel. The presence of standing water around the house due to the sewerage that does not meet the requirements can trigger the emergence of disease vectors such as cockroaches as well as a cause of diarrhea (Thomas et al., 2020; Vincent, 2018).

The Indonesian Ministry of Health said that people who are reached by the provision of truly clean water have a lower risk of suffering from diarrhea compared to people who do not get clean water (Jung et al., 2017; Vincent, 2018). Some research results state that the high number of diarrhea cases is an area with low coverage of clean water facilities (Adane et al., 2017; Jarquin et al., 2016; Nilima et al., 2018). In addition, it may be affected influenced by people's attitudes and knowledge (Mumtaz Y, Zafar M, 2014). The cause of diarrhea is not only affected by physical environmental factors, in this case, clean water facilities, but can also be influenced by the social environment, behavior, health services, and so on (Berendes et al., 2017; Hedengran et al., 2018; Jung et al., 2017). For example, most people have the habit of not boiling water until it boils before drinking them. It will cause germs or bacteria that may not die in the water, causing germs or bacteria that may be in the water to enter the body and cause illness (Jarquin et al., 2016; Jung et al., 2017).

According to Setyawati (2005), the diarrheal disease can be transmitted by waterborne and water washed. High clean water coverage can only prevent diarrhea transmission through a water-washed method (Vincent, 2018)(Thomas et al., 2020). It is because water-washed transmission is only related to general and personal hygiene. Meanwhile, waterborne prevention of diarrhea can only be done if the bacteriological quality of clean water meets health requirements (Steffen, 2017). It is due to waterborne transmission is related to the presence of pathogens in water that can cause disease in humans(Thiam et al., 2017; Thomas et al., 2020)(Jung et al., 2017). In another study, it was stated that families who consumed drinking water that did not meet the health requirements had a chance of suffering from diarrhea more than 1,1 times when compared to the ones who drink water that met health requirements (Thiam et al., 2017; Vincent, 2018) The active involvement of health professionals in hygiene and sanitation is essential to accelerate and consolidate progress in disease prevention (Adane, Mengistie, Kloos, et al., 2017).

People tend to seek treatment at healthcare facilities only when they are truly unable to help themselves. The public's misperception in response to illnesses has resulted in underutilizing existing healthcare facilities even though it is available in the area where they live. The wrong perception of the condition will result in low healthcare and insurance utilization (Arvelo et al., 2019). It also stems from inappropriate health behaviors (Nilima et al., 2018). Health behavior in preventing diarrhea is also affected by environmental factors, same as the availability of supporting facilities. Facilities can be interpreted as anything that can facilitate the implementation of any business (Arikunto dkk, 2008). Healthcare facilities whose primary goal is basic sanitation include clean water sanitation, sanitizing sewage, sanitation of waste and garbage (Adane et al., 2017; Nilima et al., 2018). Healthcare facilities must be available to all citizens. Increasing access to health facilities can provide a significant health benefit. Every effort should be made to achieve the highest possible public health degree. However, there are still people

who still do not have easy access to healthcare facilities. It is affected by economic conditions related to geographical location (Adane et al., 2017; Hao et al., 2019). The people having access to healthcare facilities are constrained by long distances and significant costs so that they cannot take advantage of these health facilities (Arvelo et al., 2019; Woldeamanuel, 2020). From the results of this study, the number of healthcare facilities in each district is not evenly distributed. Only one is available in Kuranji and Mantewe when another has up to ten healthcare facilities. A study in Addis Ababa, Ethiopia, in 2017 concluded that increased proximity to healthcare and health education facilities could encourage and improve health-seeking behavior and accessibility of healthcare facilities for the treatment of acute diarrhea in children under five in slum areas (Ahmed et al., 2009)(Luckow et al., 2017). It means that apart from the existence, the distance to healthcare facilities is also vital to determine the utilization of healthcare facilities so the level of public health can improve (Adane et al., 2017; Ahmed et al., 2009; Thomas et al., 2020). In one survey, the use of healthcare facilities was significantly associated with diarrhea accompanied by fever and vomiting. It means that the severity of the disease forces people to seek health facilities (Nhampossa et al., 2013; Woldeamanuel, 20-20). Thus the existence of healthcare facilities that are close to and easily accessible is very important as an input for the government to tackle disease incidents and improve the degree of public health.

Conclusion

This research shows spatially population density, the presence of healthcare facilities, and access to safe drinking water affect the incidence of diarrhea. These conditions are closely related to each other, so there is a need for cross-sector cooperation (health, population, urban planning, regional drinking water companies) to control diarrhea in Tanah Bumbu Regency.

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Stunting Incidence in Infant Related to Mother's History During Pregnancy

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Abstract

Stunting in an infant aged under two years old will affect the health and well-being of the children in the future. Banyumas Regency has 10 stunting locus villages with various nutritional problems that could lead to the incidence of stunting. Diet, nutritional status, and mother's history during pregnancy will affect stunting in infants aged under two. This study aims to determine the relationship between the incidence of stunting in under-two infants related to parenting styles and mother's history during pregnancy in stunting locus villages in Banyumas Regency. This study used a case-control design using a total sampling technique with 181 respondents. This type of data was collected through interviews using a questionnaire to mothers of the infants aged under two. While the measurement of body height and weight of under-five children was derived from the latest weighing data conducted by research enumerators using infatometers and digital baby scales. There was no relationship between maternal age (p = 0.21), birth spacing (p = 0.63), nutritional status (p = 0.40) with the incidence of stunting, and there was a significant relationship between maternal parenting styles and the incidence of stunting (p = 0.04).

Introduction

Several low and middle-income countries are facing the double burden of malnutrition. It is characterized by facing the problem of malnutrition and an increasing incidence of overweight and obesity (Demaio & Branca, 2018). One of the chronic nutritional problems in infants aged under two that becomes the world's concern is stunting or shortness in body length or height. Eighty percent of under-five children were reported to be stunted in 14 countries worldwide. Indonesia is in the 5th with the number of stunting (UNICEF, 2013). Stunting is the result of a formula measurement by dividing body length or height according to age which value is less than minus 2 Standard Deviations (-2 SD) from the World Health Organization (WHO) reference of median value (Ikeda et al., 2013). Stunting that occurs in infants aged under two could lead to poor health of children in the future, such as short height during adulthood, poor learning performances, and risks of developing chronic diseases (Dewey & Begum, 2011).

In Southeast Asia, the prevalence of under-five children with stunting has reached 33.8%, and Indonesia is in fifth place with the highest number of stunting amongst 81 countries in the world (Ohyver et al., 2017). The prevalence of stunting under-five children becomes a public health problem if its prevalence exceeds up to 20%. According to Basic Health Research Results in 2018, the prevalence of stunted children in Indonesia reached 29.6% (Kemenkes, 2018). So stunting in Indonesia is one of the health problems that need to be addressed.

The causes of growth faltering in toddlers are maternal parenting style and family income. Another study also has identified maternal factors that have a role in under-nourished children under five years old, such as education,

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nutrition knowledge, unemployed mother, parenting style of feeding, and exposure to information. The following research also identified the factors that influenced stunting in children aged 6 to 24 months. They are infectious disease, food availability, and environmental sanitation. The incidence factors of stunting under two were short body posture of the mother, short birth spacing, maternal age either too young or too old during pregnancy. Other factors also come from the baby, socio-economy, and environment (Kemenkes, 2018). Furthermore, those factors related to the incidence of stunting from the previous studies mentioned above lead to this study to choose the independent variables that were parenting styles and mother's history namely maternal age, birth spacing, and mother's nutritional status.

Infants aged more than 6 months to two years old or under two years old are vulnerable groups. At that age, complementary foods should be introduced, since it's also resulting in the importance of parents as the vital role in parenting styles, especially the mothers in implementing the right complementary foods' quantity and quality for the children (García Cruz et al., 2017). The feeding patterns then affect the growth and development of under-two infants because malnutrition is irreversible during that moment. Hence it requires good nutritional intake. Maternal behavior seen from parenting and adverse health and health is more common in stunting children (Pertiwi et al., 2019).

Antenatal Care (ANC) also affects the nutritional status of under-two infants. Antenatal care (ANC) is the obstetric care for pregnant women who aim to maintain the health of pregnant women and ensure to have a healthy pregnancy by conducting ANC at least four times before delivery. Pregnant women who are more frequently checking on their pregnancy at health facilities are less likely to experience chronic malnutrition (Khan et al., 2019). This ANC access will indirectly affect the health of under-two infants, both in the short and long terms (Addo et al., 2013).

Banyumas Regency is one of the districts included in the 100 priority cities/districts for the stunting program (Tim Nasional Percepatan Penanggulangan Kemiskinan, 2018). Banyumas Regency has 27 sub-districts with a stunting prevalence of 33.49% in 2013, and 10 villages are included in 1000 Villages in Phase 1 Priority Districts or Cities 2018 (Tim Nasional Percepatan Penanggulangan Kemiskinan, 2018). Because of its position as a locus stunting village in one of the priority cities and based on those mentioned, the purpose of this study was to determine the relationship between the incidence of stunting in under-two infants related to parenting styles and mother's pregnancy history at stunting locus villages in Banyumas Regency.

Methods

This research was an analytic observational study with a case-control study design. There were ten stunting locus villages in Banyumas Regency that were used to be selected as study area, namely Gunung Wetan Village, Karanglewas Village, Gentawangi Village, Srowot Village, Karangendep Village, Paningkaban Village, Banjaranyar Village, Gununglurah Village, Datar Village and Pandak Village. Data collection was carried out in October-November 2019. This study used a total sampling technique for selecting case samples with a 1: 1 comparison of case samples and controls. Sampling for control was determined by matching techniques based on gender and age. The case and the control groups were then chosen by meeting the inclusion and exclusion criteria. The case group inclusion criteria were children with stunting and their parents' willingness to be a respondent. Meanwhile, the exclusion was children with congenital impairments or physical disabilities. For the control group, the inclusions criteria were children without stunting and their parents' willingness to be a respondent. For exclusion criteria namely children with congenital impairment and has physical disabilities.

The dependent variable in this study was the incidence of stunting, while the independent variables were parenting styles, mother's nutritional status during pregnancy, and the number of visits to health facilities during pregnancy. This type of data was collected through interviews using a

questionnaire to the Mothers of under-two infants, while the measurement of body height and weight of under-five children was derived from the latest weighing data conducted by research enumerators using infatometers and digital baby scales. Maternal age is categorized as at risk when maternal age> 30 years and not at risk if the maternal age is ≤ 30 years. Birth spacing is considered at risk if it's <2 years and not if it's ≥ 2 years. This research has received approval from the Ethics Commission of the Faculty of Health Sciences, Jenderal Soedirman University No. 002 / EC / KEPK / X / 2019. Data analysis was conducted to see the relationship between variables and odds ratio (OR) using the Chi-Square or Fisher Exact test if the requirements for the Chi-Square test were not met with a confidence level of 95% (α = 0.05).

Results and Discussions

The characteristics of the research subjects are listed in Table 1 below. The number of study subjects was 181 infants aged (0-24 months) with an average z-score of body length according to age (height/age) of the case group was -2.9 ± 1.4 and in the control group was -0.6 ± 1.4. The mean age of under-two infants' mothers in the case group was 30.8 years old and in the control group was 29.9 years old. Most of the under-two infants' mothers in both groups work as a housewive up to 93.4% in the case group and 90% in the control group and had the latest education, namely graduating from elementary school, 41.4% in the case group, and 36.5% in the control group. Most of the under-two infants' fathers work as laborers, namely 60.2% in the case group and 51.4% in the control group, and had the latest education, namely graduating from elementary school, 39.8% in the case group, and 38.1% in the control group.

Table 1. Characteristics of Respondents

Variables	Case	Control
	n= 181	n= 181
Mother's Age (year)	30,8 ± 6,7	29,9 ± 6,2
Body Height/Age of under-two infants (z-score)	-2,9 ± 1,4	-0,6 ± 1,4
Gender of the under-two		
Male	108 (59,7%)	95 (52,5 %)
Female	73 (40,3 %)	86 (47,5 %)
Mother's Occupation		
Housewife	169 (93,4 %)	163 (90 %)
Farmer	1 (0,5 %)	0 (0 %)
Civil servant/Army/Police Officer	1 (0,5 %)	5 (2,8 %)
Teacher	7 (3,9 %)	7 (3,9 %)
Employee	3 (1,7 %)	6 (3,3 %)
Father's Occupation		
Farmer	7 (3,9 %)	6 (3,3 %)
Civil servant/Army/Police Officer	4 (2,2 %)	2 (1,1 %)
Teacher	33 (18,2 %)	43 (23,8 %)
Employee	28 (15,5 %)	37 (20,4 %)
Laborer	109 (60,2 %)	93 (51,4 %)
Latest Education of the Mother		
Not graduated from Elementary School	9 (5 %)	4 (2,2 %)
Elementary School Graduate	75 (41,4 %)	66 (36,5 %)
Middle School Graduate	57 (31,5 %)	67 (37 %)
High School Graduate	33(18,2 %)	32 (17,7 %)
University Graduate/higher	7 (3,9 %)	12 (6,6 %)
Latest Education of the Father		
Not graduated from Elementary School	11 (6,1 %)	5 (2,8 %)
Elementary School Graduate	72 (39,8 %)	69 (38,1 %)
Middle School Graduate	50 (27,6 %)	50 (27,6 %)
High School Graduate	44 (24,3 %)	47 (26 %)
University Graduate/higher	4 (2,2 %)	10 (5,5 %)

Source: Primary Data, 2019

The relationship between the risk factors and the incidence of stunting is shown in Table 2 below. Most of the maternal age was in the group without risk (age during pregnancy <30 years), the birth spacing was not at risk (> 2 years), and the nutritional status of the mother during pregnancy was normal. Based on the chi-square test, there was no relationship between maternal age, birth spacing, and maternal nutritional status with the incidence of stunting in under-two infants in Banyumas Regency. Maternal parenting style in under-five had a significant relationship with the incidence of stunting with a p-value of 0.04 (p<0.05).

Table 2. Risk Factors Relationship in the Incidence of Stunting

Variables	Case		Control		p-value
	n	%	N	%	
Maternal age					
Risk	38	21	48	26,5	0,21
No Risk	143	79	133	73,5	
Birth spacing					
Risk	159	87,8	158	86,2	0,63
No Risk	22	12,2	25	13,8	
Mother's Parenting Styles					
Not very good	78	43,1	103	56,9	0,04
Good	103	56,9	78	43,1	
Nutritional Status of Mother					
Underweight	29	16	38	21	0,40
Normal	117	64,6	114	63	
Overweight	35	19,4	39	16	

Source: Primary Data, 2019

The results of this study indicated that maternal age was not significantly associated with the incidence of stunting. Maternal age in <20 years old or >30 years old has a greater risk of their lifetime death or fetal death, either during pregnancy, delivery, or during the puerperium. The results found the prevalence of stunting in Indonesia in 2014 was 36.6%. The stunting prevalence is higher in toddlers of married mothers of adolescents (42.4%) compared to mothers of married mature (35%) (Simbolon et al., 2021). Entering the age of 30, pregnant women experienced decreasing in their digestibility of several nutrients, makes their nutritional intake was not well balanced, and might experienced decreasing in body resistance that leads to a greater risk of experiencing various diseases (Green et al., 2018).

The result obtained was different between the previous studies and this study. Previous research conducted in West Java showed the majority of under-five children indicated as stunted were found due to mothers' risky age to be in pregnancy and had a significant relationship between them (Sani et al., 2019). Other studies also showed that maternal age affects on the incidence of stunted infants (Rahmawati et al., 2018). Two previous studies have stated that the risk of maternal age was more in subjects who had a history of early marriage or were pregnant at the age of under 20 years old (Sani et al., 2019). However, the main difference between the results in this study and the previous study might be the percentage of respondents. The number of maternal age with no risk during pregnancy both in control and case group were higher in percentage.

Birth interval is the length of time between a child's birth and a previous and/or subsequent sibling's birth. A short subsequent birth interval can place the child at risk for several reasons. Long birth interval affects maternal, child healthy, and nutritional outcomes, while the short birth spacing could lead to preterm birth and low birth weight as the mother may not have recovered her nutritional status yet (Afeworki et al., 2015). Another study revealed that birth spacing influences the outcome of mother, newborn, and child. The prevalence of stunting and underweight decreases as birth spacing increases. Moreover, previous birth spacing of at least 36 months was associated with a 10–50% reduction in

childhood stunting. Contrarily, birth spacings of less than 12 months and 12–23 months were associated with higher risks for stunting as compared to 24–35 months (Chungkham et al., 2020).

Sufficient pregnancy or birth interval allows the mother to recover optimally and creates good parenting styles (Kinyoki et al., 2016). However, the result in Table 2 showed that at-risk-birth interval did not have a significant relationship with the stunting in the Banyumas Regency. It could happen due to the high proportion of risk pregnancies in each group. Another study in India conducted by (Chungkham et al., 2020) also showed the result of stunting and underweight percentage among the children born after birth interval of fewer than 24 months is higher than the percentage of stunting and underweight among the children born after birth interval of greater than 59 months. Children born after birth interval of fewer than 24 months experienced 46% of stunting. But there was no significant association between the outcomes (stunting and underweight) and preceding birth interval in the Union Territories (Chungkham et al., 2020).

Inadequate mother's nutritional status before delivering process as indicated by the Body Mass Index (BMI), could also cause inadequate nutritional-intake of the babies the mothers carrying (Abeway et al., 2018). Maternal nutritional factors before and during pregnancy are among indirect causes of infant growth because pregnant women with malnutrition may cause the fetus to experience malnutrition and low birth weight (LBW). Thus, growth failures became crucial to treat and eventually leads the baby to become stunted. In the past studies, maternal nutritional status was assessed by the incidence of Chronic Energy Deficiency (CED). CED is a marker of malnutrition for a long time. The CED occurred in pregnant women will be riskier in giving birth to children with short body lengths and might last until they are infants.

Stunting can be caused by several factors, one of which is the parenting factors. Parents play a vital role in shaping children's eating behaviors through parenting styles and feeding patterns (Wang et al., 2017). During the postnatal period, adequate feeding can prevent further effects of poor intrauterine growth (Titaley et al., 2019). After delivery, if dietary intake is inadequate, aggravated by unhealthy environmental conditions, children will have an increased susceptibility to infections, thus leading to poor absorption of nutrients and eventually leading to poor growth (Rahman, 2016). In this study, maternal parenting style in under-five had a significant relationship with the incidence of stunting with a p-value of 0.04 ($p<0.05$). This study found that parenting styles as poor feeding patterns included delaying feeding of the under-two infants, not paying attention to quality and quantity of nutritional needs that could cause stunting in under-two infants. Pertiwi et al. (2019) also stated that parenting style through poor feeding is the main factor that causes stunting in under-two infants. Feeding patterns are related to eating consumption patterns. They include food hygiene, preparing food, food safety, eating habits. Providing good quality foods is very important in determining the quality of the stunting incidence. Poor quality of feeding is indicated by low variation (less than four variations of food/drink in a day), low consumption of meat-protein sources, and low intake of micronutrients (vitamins and minerals). Well-fed infants who get at least four variations of food daily would likely have lower risks of stunting (Balalian et al., 2017). Furthermore, infants who started complementary feeding at six months showed a lower risk of stunting than those who only received complementary breastfeeding for less than six months (Abeway et al., 2018). Breastfeeding needs to be accompanied by the provision of complementary foods because breast milk alone is not enough to meet the nutritional needs of under-two.

Conclusions

There was no significant relationship between the mother's history during pregnancy and the incidence of stunting in the stunting locus villages in Banyumas Regency. However, there was a significant relationship between maternal parenting styles and the incidence of stunting in stunting locus villages in Banyumas Regency. Researchers would like

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Population Control Policy Implementation in the Framework of National Health Insurance

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Abstract

The presence of National Health Insurance at the same time with the implementation of regional autonomy affects the implementation of many other policies, including population control. Different understanding and commitment of implementors resulted in mixed results, with unsuccessful trends of implementing population control policy in the frame of National Health Insurance. Cimahi as the most populous city in West Java needs to implement the policies effectively to prevent negative impact of overpopulation. An analysis needs to be conducted to assess the implementation of the policies in Cimahi. The purpose of this study was to analyze the implementation of population control policy within the framework of National Health Insurance. This research was conducted in Cimahi and used qualitative design with case study approach. Data collected through in-depth interview and questionnaires to the implementors of the policies. Data analyzed with the concept of Edwards III and Analysis Hierarchy Process. The results showed that the policies implemented facing difficulties, with National Health Insurance not necessarily encouraging population control through the use of contraceptive. It is suggested that Cimahi City Government improve policies implementation by integrating mutually supportive policies, communicating and disseminating, increasing resources, and increasing cooperation between institutions.

Introduction

Until 2019, Indonesia was still ranked as the fourth country with the largest population in the world, namely 273,523,615 people with a birth rate of 2.3%. West Java is the province with the largest population in Indonesia of 43 million people, with Cimahi City as the most populous area. The high number of people with good quality in a country can support the development and economic growth of the country. However, too much population can also cause problems such as unemployment, food shortages, social problems, and environmental degradation (Bahadur, 2019). In modern times, high-income countries are associated with high levels of quality human resources and low fertility rates, whereas low-income countries have the opposite trait (Zhang, 2017). Children with a good level of education tend to come from families with a small number of children; therefore it boosts the level of economic development of the country (Fernihough, 2017).

Population problems cannot be separated from the impact of population policies that apply in the country. China, which was overpopulated, in 1979 implemented a one-child policy for its entire population, in which families with more than one child would be "forced" to undergo sterilization, and were penalized in many other ways (Zhang, 2017). In Indonesia, population control is carried out by the BKKBN. At the present time the implementation of population control is carried out in tandem with other policies, including the National Health Insurance policy. Population control in JKN is regulated through family planning programs in the preventive aspect.

The high population of Indonesia causes

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the implementation of this policy to require high financing. To cover the existing lack of funds, the government tends to take advantage of out-of-pocket payments from the public. This means that the goal of national health insurance will never be achieved. Therefore, it is necessary to streamline the main funding sources, such as taxes, and to improve the efficiency of the benefit package, such as controlling catastrophic diseases (Wagstaff, et al., 2018). The type of program the government chooses to fund also needs to be continuously analyzed. For example, the preventive health program in Ethiopia, namely measles and pneumococcal vaccination, is the most effective program in reducing community mortality, in addition to the sectio caesarea financing program (Verguet, et al., 2015). In the United States, in order to streamline health financing in the National Health System, a Population Health Management (PHM) was formed which focuses on the prevention and management of chronic diseases, as well as maintaining optimal public health (Mehta, 2016). The Indonesian government can follow the same example.

Population control in the framework of the National Health Insurance is also influenced by changes in the Indonesian government system which is now embracing decentralization. This has led to many changes in terms of institutions, bureaucracy, to laws and regulations and policies. Several policies issued by the central and local governments often contradict, causing confusion in implementation, including in terms of population control in JKN. As stated (Winarni, Najib, & Wijayanti, 2019) that the planning mechanism for the procurement of contraceptive devices and drugs in Jepara is carried out on a top-down basis, that is, it is fully regulated by the central government, resulting in discrepancies between the available stock and what is needed in the regions. This shows that the collaboration flow from BKKBN as a provider has not been synchronized with the local government as a user.

Changes in many things cause the problem of population control policies in the context of National Health Insurance in Indonesia to be very complicated. Seeing the large impact and affecting various aspects of life, it is possible that population problems that are integrated with health will become the category of wicked problems such as corruption and terrorism. For this reason, in-depth analysis and improvement is absolutely necessary in the near future before a problem is categorized as wicked problems (Daviter, 2019). As the most populous city in West Java, Cimahi City has an EFA reaching 15%, with Cimahi City's JKN membership rate being only 92.05%. Cimahi City has not yet established a BKKBD as mandated by legislation, and there is no integration between population control as part of JKN. Therefore, it is necessary to conduct an analysis of policy implementation in Cimahi City. This study aims to analyze the implementation of population control policies in the context of implementing the National Health Insurance in Cimahi City.

Method

The research uses a qualitative design with a case study approach in Cimahi City from July to August 2020. Research sources are implementers of population control policies in the context of implementing National Health Insurance in Cimahi City, namely: Head of Family Planning Division, JKN Payment Analyst of Cimahi City Health Office, and 4 people Family Planning Officer (PKB). Data was collected by means of in-depth interviews, observations, literature studies, and filling out the AHP questionnaire.

The data were analyzed using the Miles and Huberman (1984) technique through data reduction, data presentation and temporary conclusions drawn from the results of interviews and observations. The results of the analysis are then discussed using the policy implementation analysis approach by Edwards III (1980). Data from filling out the questionnaire were analyzed using the Analysis Hierarchy Process (AHP) method with the help of the Expert Choice 11 application. The validity of the research data was maintained by the method proposed by Stainback (1988) by fulfilling four criteria, namely the degree of credibility, transferability, dependability, and confirmability. It includes the use of data triangulation, member checking, and the use of reference sources.

Results and Discussion

Based on the population census conducted by the Central Bureau of Statistics of the City of Cimahi, the population in the City of Cimahi continues to increase from year to year. The population of Cimahi City in 2017 was 601,009, increased to 607,811 in 2018, and increased to 614,304 in 2019. This high population is the majority of the childbearing age group. The achievements of the family planning program are reported regularly by the Family Planning Division of Cimahi City once a year. Here are the results for the last 3 years:

TABLE 1. Family Planning Program Achievements in Cimahi City

No	Description	2017		2018		2019	
		Achievements	%	Achievements	%	Achievements	%
1	EFA	93.251		91.773		92.339	
2	MKJP Active Family Planning Participants	22.717	31,03	23.118	31,89	23.354	32,04
3	Number of Active Family Planning Participants	73.209		72.491		72.897	
	a. IUD	18.940	25,87	19.170	26,44	19.492	26,74
	b. MOW	2.916	3,98	2.958	4,08	2.791	3,83
	c. MOP	203	0,28	212	0,29	202	0,28
	d. Condom	1.420	1,94	1.409	1,94	1.733	2,38
	e. Implant	658	0,90	778	1,07	869	1,19
	f. Inject	38.485	52,57	28.132	52,60	38.204	52,41
	g. Pil	10.587	14,46	9.832	13,56	9.606	13,18
4	*Unmet Need*	9.142	9,80	8.763	9,55	8.497	9,20
5	Number of Family Planning Villages	4		8		12	

Source: secondary data

Based on data obtained from N6, JKN participation in Cimahi City in 2020 has reached 92.05%. A total of 509,715 people have been registered in JKN, with details of 354,144 (69.48%) being independent non-PBI participants, and 155,571 (30.52 percent) being PBI participants.

TABLE 2. JKN Membership in Cimahi City

PBI		Non PBI		
PBI APBN	PBI APBD	PPU	PBPU	BP
117 017	38 554	218 270	112 489	23 385
22.96%	7.56%	42.82%	22.07%	4.59%

Source: secondary data

The financing of the National Health Insurance in Cimahi City is carried out in 2 ways, namely claims and capitation payments. Claims are payments made by BPJS Health to hospitals in Cimahi City and in collaboration with BPJS Health. Meanwhile, the capitation payment is the payment of a certain amount of funds made by BPJS Health to all First Level Health Facilities (FKTP) in Cimahi City. The FKTP includes 13 community health centers that are part of the Health Office of the City of Cimahi.

Table 3. Capitation Payment of Cimahi City August 2020

No	Name PPK	Number of Registered Participants			Capitation Rate/ Participant	KBK weight	Total Funds Paid
		PBI (APBN & APBD)	Non-PBI	Number			
1	Citereup	11.338	5.258	16.596	Rp6.000	95%	Rp94.597.200
2	Cibeber	7.876	4.065	11.941	Rp6.000	90%	Rp64.481.400
3	Leuwigajah	12.626	1.945	14.571	Rp6.000	90%	Rp78.683.400
4	Central Melong	6.959	4.027	10.986	Rp6.000	90%	Rp59.324.400
5	Pasirkaliki	4.798	3.597	8.395	Rp6.000	100%	Rp50.370.000
6	North Cimahi	14.961	11.249	26.210	Rp6.000	95%	Rp149.397.000
7	Cipageran	15.837	5.778	21.615	Rp6.000	95%	Rp123.205.500
8	Central Cimahi	8.955	12.754	21.709	Rp6.000	95%	Rp123.741.300
9	Cigugur	15.920	3.488	19.408	Rp6.000	95%	Rp110.625.600
10	Padasuka	17.147	6.031	23.178	Rp6.000	100%	Rp139.068.000
11	South Cimahi	8.340	10.351	18.691	Rp6.000	90%	Rp100.931.400
12	Melongasih	9.270	9.215	18.485	Rp6.000	95%	Rp105.364.500
13	Cibereum	18.412	6.835	25.247	Rp6.000	90%	Rp136.333.800
	Cimahi City	152.439	84.593	237.032			Rp1.336.123.500

Source: secondary data

The National Health Insurance (JKN) has been running for more than 5 years, but has not been able to reach the entire Cimahi community. There are 44,040 people or 7.95% of the people of Cimahi who have not been accommodated. The reasons people do not become JKN participants are various, such as being economically incapable and unable to register as PBI participants and not having an administrative identity. There are also non-PBI participants who are then unable to pay the dues but find it difficult to change their status to become PBI participants, so that the arrears of the Health Social Security Agency contributions are very large. A number of other communities are wealthy people who choose not to participate for their own reasons. This means that policy communication about JKN is still lacking, because Presidential Regulation 82 of 2018 concerning National Health Insurance mandates that all Indonesian people are JKN participants.

The presence of JKN does not necessarily have a significant impact on the use of contraception in Cimahi City, especially the long-term method and the steady method. According to N1, N2, and N3 after the JKN era, contraceptive services for short-term methods such as pills and injections increased because contraceptives were accessible for free by the public. The IUD method that is used at the puskesmas is still not widely accessed by the public. Steady operating methods in the form of MOP and MOW are still low in achievement. The reason is because many people do not know that family planning services are one of the benefits provided by JKN. One of the health benefits of health insurance that remains low in achievement is the maternal and child health sector, including family planning programs (Nguhiu, Barasa, & Chuma, 2017). Mass media socialization is an important factor that supports the use of contraception by the community. It is necessary to socialize by each implementer of the JKN integrated population control policy in Cimahi City so that its utilization can be more effective (Bhuvanendran, Thyagarajan, & Viswan, 2014).

JKN financing organized by BPJS Health through capitation funds in August 2020 reached 1.3 billion Rupiah. According to Permenkes 21/2016, if the capitation funds owned by the puskesmas as FKTP belonging to the regional government are still remaining, it can be used for the next fiscal year. This means that the more efficient the management of the capitation funds owned by the puskesmas, the greater the remaining funds will be. If the remaining budget is large, it can be used to improve health services for the community.

According to (Fagan, Dutta, Rosen, Olivetti, & Klein, 2017), Integrating family

planning programs into the National Health Insurance scheme requires the government's role to: target the poor population and the informal sector, make family planning one of the benefit packages, ensure adequate financing for family planning programs, and minimize non-financial barriers. With these measures, the state can increase financial protection for family planning and better guarantee the right to health of the poor and marginalized. As a component of the SDGs, national health insurance is absolutely achievable. Middle-income countries are believed to be able to achieve this if they are equipped with qualified policies. Indonesia as a country with upper middle income should be able to fulfill this. However, with the confusion and overlapping implementation of population control policies in the national health insurance, this will be difficult to achieve (Stenberg, et al., 2017).

Based on in-depth interviews with 6 expert sources, a significant statement was obtained which was described into 4 dimensions of policy implementation according to Edwards III (1980). The main problem in implementing population control policies in the context of implementing JKN in Cimahi City is the different perceptions of the many parties involved. Meanwhile, in terms of resources, especially contraceptive tools and drugs, it is quite adequate. This is much different from the country of Ghana, where the implementation of the health insurance scheme is actually constrained by the lack of resources, supervision, and equity, so that the quality of the health services it facilitates is still low (Dalinjong, Wang, & Homer, 2018).

There are 3 groups of policies related to the implementation of population control policies within the framework of JKN in Cimahi City. The policy groups in question are population, health, and regional autonomy policy groups. If the three groups of policies are not communicated properly, it will cause policy implementers to have different interpretations and carry out policies in different ways. The transmission of population control policies-JKN in Cimahi City is not going well, as evidenced by N1-N3 who are completely unaware of the applicable laws and regulations. N4 and N5 know some rules. N6 said that all JKN programs implemented in Cimahi City follow the existing laws and regulations at the center and do not make additional regional regulations that can encourage the implementation of JKN-integrated population control activities.

The large number of regulations governing population control-JKN requires a detailed understanding of these regulations. All of the informants did not know the detailed regulations. This can cause the implementation that is running to be out of sync and uniform because each implementor has their own understanding, so that the effectiveness of policy implementation is reduced. The main obstacle to existing regulations regarding population control-JKN is the difference in the contents of one regulation and another. The entire population group legislation mandating local governments to form BKKBD was negated with the issuance of Law Number 23 of 2014 concerning Regional Government. Population and family planning issues in Law Number 23 of 2014 are included in the category of concurrent government affairs, which are carried out by the central and regional governments. The attachment to Law Number 23 of 2014 states that the implementation of population and family planning affairs utilizes PKB personnel from the Central BKKBN.

Communication between the government and each authorized field in each public service is important to be carried out properly to ensure the smooth implementation of policies (Putra & Khaidir, 2019). Actions that can be taken to increase the success of communication on the implementation of control policies and family planning-JKN in Cimahi City are socialization and policy communication between the Family Planning Division and other fields within the Cimahi City Government. The socialization was carried out by introducing the profile of the family planning sector and its programs. Two-way communication is carried out by holding regular inter-sectoral meetings to discuss public problems in Cimahi City, to then discuss their solutions. With direct communication, each sector can refer to the regulations and policies that each have.

The Population Control and Family Planning Policy in Cimahi City is mainly implemented by Family Planning Officers (PKB), in

accordance with the mandate of Law No. 23 of 2014 concerning Regional Government. The explanation section of the law explains that the local government utilizes the PKB which is an element of the central BKKBN to carry out the task of controlling the family planning population in Cimahi City. This utilization itself causes some confusion in its implementation, because PKB whose employment status is a central officer. The number of human resources implementing population control and family planning policies in Cimahi City consists of 3 types of personnel, namely PKB workers with ASN status and are elements of the Central BKKBN utilized by the Regional Government, TPD workers with Non ASN status and are West Java Provincial Government personnel, and cadres IMP consisting of cadres at the RT and RW levels. There are 8 PKB in Cimahi City who work on population control and family planning tasks in 15 urban villages in Cimahi City. Based on the age aspect, 4 PKB (N1-N4) are above 50 years old, and stated that their abilities are not as good as they used to be. N5 said that every year the Family Planning Division always proposes to increase the number of human resources, but considering the limited budget so that it cannot be realized. This imbalance in the number of PKBs was overcome by adding additional TPD personnel, which were equally utilized by the City Government, even though they were not elements under it.

HR implementation of population control policies in the framework of the National Health Insurance in Cimahi City is very few, if the quality of human resources is inadequate then the implementation process will be increasingly difficult. All PKB in Cimahi City do not have a population or health background. Furthermore, the Family Planning Division in the Cimahi City Government is not led by human resources with population science backgrounds. Echelon 3 and 4 officials in the Cimahi City Government regularly experience divisional changes or promotions every 1-2 years, so it is not uncommon for an official to hold a new position before mastering and animating the field previously occupied. In order to deal with acceptors who are not handled in FKTP and acceptors who do not have BPJS, the City of Cimahi routinely carries out family planning service celebrations. The activities carried out were the installation of IUD contraceptives and implants carried out in collaboration with the Kesdim, as well as vasectomy and tubectomy in collaboration with private hospitals. The costs arising from this gebyar activity are borne by the BKKBN and the Cimahi City Government.

According to N1-N4, PKB and TPD maximize the infrastructure provided by the Central BKKBN. The mechanism for this provision also passes through the family planning field first, so that often the assistance is felt to be less than optimal. PKB resource persons admitted that they often feel confused because people ask about the funds in question, but the Cimahi City Government stated that there were no funds for these activities. The community on the other hand participated in training or exchanged information with other districts/cities and knew that there were actual facilities available, but did not dare to confirm it with the City Government of Cimahi.

In terms of supervision, the implementation of population control policies within the framework of JKN in Cimahi City, activities carried out by each implementor are reported through the Provincial BKKBN and then forwarded to the center. In reporting PKB using the E-Visum application media, TPD uses the E-Klop application media, and cadres using the Silili application. PKB as ASN also works every 6 months on the List of Proposed Credit Score Assessment (DUPAK) whose mechanism is first checked by the Civil Service Sector of the Cimahi City Government and then proposed to the Provincial BKKBN. N1-N3 said that the Civil Service Human Resources in the Cimahi City Government did not master the techniques needed to assess DUPAK PKB so that it often caused delays in submitting to the Provincial BKKBN.

According to N1 and N4, supervision is only reporting or bottom-up where the Provincial BKKBN only receives and forwards reports, while top-down evaluation of policy implementation to PKB or the target area has never been carried out. This causes the obstacles encountered by PKB in the field to be difficult to follow up. In terms of authority resources, the main problem lies in the authority of the

BKKBN in implementing population control and family planning policies at the regional level. The enactment of the 3 groups of policies as described in the previous sub-chapter changes the authority of the BKKBN to facilitate local governments in controlling the population. On the other hand, PKB as an element of the BKKBN is utilized by local governments which should provide their own human resources. PKB has changed its authority in implementing population control policies in the field.

Human resources are a very important factor in an organization including policy implementing organizations. For this reason, HR must have the ability, skills and competence to be able to carry out their duties and functions. These things need to be continuously developed through various means including training. One of the important trainings is Competency-Based Training (CBT) which focuses on 5 strategies, namely: organizational scanning, strategic planning, competency profile, competency gap analysis, and competency development (Prabawati, Meirinawati, & Aoktariyanda, 2018). HR development is carried out quantitatively and qualitatively. Quantitatively, the Cimahi City Government needs to analyze the need for personnel in accordance with the conditions experienced by the family planning sector. Qualitatively, HR development is carried out through training to improve the competence and professionalism of the implementers.

According to Edwards III (1980), implementors who have a positive attitude towards a policy and support it will implement the policy in accordance with its initial objectives, while otherwise the policy will fall into the 'zone of indifference'. Based on Law 23 of 2014 concerning Regional Government, regional autonomy provides high flexibility to regional governments to manage all their affairs independently, including population control and the implementation of National Health Insurance. That way, local governments have a great opportunity to support and not support existing policies in accordance with their wishes. All PKB resource persons stated that the commitment of the Cimahi City Government in implementing population control and family planning policies was much lower than before regional autonomy. This means that the implementation of population control which should then be implemented integrated with the National Health Insurance is vulnerable to falling into the zone of indifference.

According to (Putra & Khaidir, 2019), providing incentives can increase the tendency of policy implementers to carry out their duties properly. Every individual has a motivation that underlies him to take an action in order to achieve his goals. Motivation can also be interpreted as the process of trying to influence and encourage the people he leads to do the desired work in order to achieve the desired goals. In the implementation of population control policies within the framework of the National Health Insurance in Cimahi City, the situation and conditions in the family planning sector are good but need to be improved, especially the relationship with PKB. The next action that can be taken is the provision of equal incentives for all policy implementers, both PKB, TPD, to cadres. Apart from incentives, other efforts in the form of a common perception regarding population control and family planning need to be made to increase acceptance and dispel myths and false beliefs about implementers (Maheen, et al., 2020).

Policies are made by the government which generally consists of various formal bureaucratic institutions (Chen, 2020). Bureaucracies exist in a wide complex environment and have different goals at each stage. Responsibility for a policy can be spread across several organizations. Each organization with its own tupoksi tends to oppose efforts to coordinate policies with other agencies that carry out related programs. This is because they are worried that they will experience a lack of access or change their program priorities.

The implementation of population control policies in the National Health Insurance in Cimahi City is spread over the family planning sector which is under the Social Service, Health Service, and the Population and Civil Registration Service which supports both programs. According to N5, there is no synergy with the Health Agency and other agencies in implementing existing policies and programs. N6 said that the task of the Health Service was only to pass on regulations from the central government to the puskesmas in the context of

administering the National Health Insurance. Whereas local governments are mandated to make regulations that support the optimal realization of National Health Insurance, one of which is through efficiency in health financing by implementing population control and family planning.

Mintzberg (1980) introduced an alternative structure of bureaucracy called adhocracy. Adhocracy structures have low complexity, centralization, and formalization. Adhocracy is considered an informal form of adaptive and flexible organization and provides opportunities for problem solving by cutting bureaucratic lines, including at the local state level (Chen, 2020). Decisions taken from adhocracy are collegial and democratic. Adhocracy can also be done in the form of advocacy on community-based primary health services to policy makers, including the importance of coordinating health services at the community level, collaborating with the community to increase understanding of primary health services, as well as collaboration with the private sector (Weel, et al., 2017). Cooperation with the private sector cannot be denied to encourage the level of achievement of national health insurance (Chakraborty, Mbondo, & Wanderi, 2016). Adhocracy has proven to be effective in overcoming various sectors of public problems, including health. For that, we need leaders who are able to foster a culture of adhocracy (Njagi, Ngugi Kamau, & Muraguri, 2020). The Cimahi City Government can form an adhocracy in the context of implementing population control policies in the implementation of the National Health Insurance. The selected form adapts to the existing conditions. Members who are included in the work unit or committee are mainly the Family Planning Division and the Health Office of Cimahi City.

The alternatives that have been described can be carried out according to the availability of resources and the capabilities of the existing implementers. For this reason, decision making is more suitable to use the judgment of decision makers in this case the implementor itself, namely the KB, PKB, and Cimahi City Health Offices. The selection of alternative recommendations used in this study is the Analysis Hierarchy Process (AHP). Based on the analysis using the AHP method, it is known that the priority dimension in implementing population control policies in the implementation of the National Health Insurance in Cimahi City is the bureaucratic structure.. For this reason, the institutional aspects of the agencies involved in policy implementation and the fragmentation of policies that occur need to be understood first before proceeding to the dimensions of resources, disposition, and communication. This is in line with what Edwards III (1980) said, namely an understanding of the bureaucratic structure is a fundamental factor in reviewing policy implementation.

For the selection of which recommendation decisions need to be made first, the experts through AHP stated that the integration of policies that support each other is a priority. The KB and PKB sectors need to discuss with the Health Office to integrate existing policies to determine the next steps. The integrated policies will provide an overview of the needs, expectations and motivations of each agency. Motivation can then be increased by creating positive situations and conditions and setting a pace making for shared goals. It is also necessary to provide incentives for implementers at lower levels, namely PKB, TPD, and cadres.

The next priority is the socialization and communication of integrated policies to policy makers from the Mayor to all City Government officials. Through socialization and communication, the Family Planning Division and the Health Office can advocate for policy makers at higher levels, including for the provision of incentives and resources. The next alternative priority is the addition of resources in the form of additional human resources, provision of training, and infrastructure. The last priority is to increase cooperation with the BKKBN and BPJS Health in the form of adhocracy to implement population control policies in the context of administering the National Health Insurance.

Conclusion

The conclusion that can be drawn from this research is that the achievement of the family planning program of Cimahi City is good with an unmet need of 9.20. Based on JKN membership as much as 92.05% of the

total population has been accommodated, of which Cimahi City bears 7.56% of the JKN PBI participant fees. The use of family planning services with the National Health Insurance is still not widely known, so it has not encouraged an increase in the use of contraception, especially vasectomy and tubectomy. The implementation of the JKN integrated population control policy is still experiencing many obstacles. The existing problems are mainly dominated by the transmission of policies that do not reach all implementers, policies that are not consistent with each other, inadequate human resources and infrastructure, low local government commitment, and the lack of synergistic cooperation between institutions in implementing existing policies. The recommendations generated based on the analysis using the AHP method result in a priority order of implementation, due to the availability of resources and the ability of policy implementers. Based on this, the researcher recommends integrating policies to support each other, communicating and disseminating policies to increase proportional resources, as well as increasing cooperation between the BKKBN, the Family Planning Division and the Health Office of Cimahi City.

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COPD Symptoms and Risk Factors of Respiratory Disorders in Builders

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Abstract

Decreased lung function is at risk for COPD (chronic obstructive pulmonary disease). Risk identification is a strategy to improve the quality of self-management, through the identification of risk factors and early symptoms of COPD. This study aims to determine the relationship between risk factors and early symptoms of COPD in builders related to pulmonary function disorders. The design of this study was case control in Rungkut District, Surabaya in September-December 2018. The research variables were lung function disorders, risk factors and early symptoms of COPD, with ordinal data scale and chi-square test analysis. This study involved 158 respondents consisting of 79 respondents with lung function disorders and 79 respondents with no lung function disorders. The highest total risk factor for COPD in both groups was smoking, and there was no significant difference (P = 0.75) on the early symptoms of COPD in the pulmonary dysfunction group and in the group with no lung function disorders. The highest total initial symptoms of COPD in both groups were chronic cough and sputum hypersecretion. However, there was no significant difference between the two groups (P = 1.00). There was no relationship between COPD risk factors and early symptoms of COPD in the pulmonary dysfunction group and the no lung function group.

Introduction

Surabaya city is experiencing rapid economic growth and infrastructure development. The rapid infrastructure development in Surabaya causes pollution, one of which is construction pollution. Air pollution is not only obtained from vehicles, but also from various types of substances that can be carried in the air in the work environment. The effects of exposure to the substance through the respiratory tract vary widely, depending on the concentration and duration of exposure and the health status of the exposed person (Enshassi et al., 2014; Teo et al., 2019). The air quality condition of the work environment can play a role in occupational health. All construction sites generate high levels of dust (usually from concrete, cement, wood, stone, silica) and this can be carried over long distances over long periods of time. Construction dust is classified as PM10 or particles less than 10 microns that cannot be seen by the eye directly and can penetrate deep into the lungs and cause various health problems including respiratory diseases and even cancer. Toxic fumes from oils, glues, thinners, paints, processed wood, plastics, cleaners, and other hazardous chemicals that are widely used on construction sites, also contribute to air pollution (Yan et al., 2019; Vinnikov et al., 2020). One of the diseases that arise due to work is a disease of the respiratory system which results in the weakening of the lung and airway organs, which are the organs most exposed to exposure to hazardous substances in the workplace. Air pollution is associated with many respiratory diseases. Adverse effects

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include decreased lung function, increased infection, increased respiratory symptoms, acute exacerbation of COPD (Jiang et al., 2016; Kim et al., 2018).

In Indonesia, occupational lung diseases or disorders caused by dust are estimated to be quite a lot, although the available data is still lacking. Dust that is inhaled by labor can cause abnormalities in lung function or capacity. This disorder occurs due to damage to lung tissue which can affect productivity and work quality (Habybabady et al., 2018). Therefore, it is necessary to have efforts to prevent and control the possibility of lung function disorders (Ambrosino and Bertella, 2018). According to WHO (2015) in 2000-2012, lung function disorders were the third deadliest disease for the past decade. In 2012, approximately 3.1 million died due to impaired pulmonary function COPD (Chronic Obstructive Pulmonary Disease). Across the Asia-Pacific territories surveyed, the prevalence of COPD is high, indicating a substantial socioeconomic burden (Lim et al., 2015). COPD is the fifth disease with the highest prevalence in the world, and it is quite frightening because the death rate is increasing every year. The prevalence of COPD in the moderate-severe category was highest at the age of 30 years and over, with an average of 6.3% worldwide. Although in recent years COPD has been given special attention by health agencies and the community, it is still unknown and tends to be ignored by the public. COPD in Indonesia is included in the Non-Communicable Disease (PTM) group and prevalence with ranging in 4.5% (Lim et al., 2015), which is a chronic disease that is not transmitted from person to person. Globally, the prevalence of COPD is likely to increase in the coming decades due to exposure to ongoing risk factors, aging of the population, and a lack of knowledge and awareness of the disease itself (Patel et al., 2019).

Factors that can trigger the risk of COPD are smoking, outdoor and indoor air pollution, occupational exposure (organic and inorganic dust, vapors, and chemical agents), genetic factors, age, gender, lung growth and development, socioeconomic status, and having a history of respiratory diseases can also increase the risk of developing COPD, such as asthma, chronic bronchitis and respiratory infections (Patel et al., 2019). The smoking habit is also proven to harm Body Mass Index (BMI), the results show that respondents who have smoking behavior have a BMI that is not ideal compared to not smoking. (Dare et al., 2017; Piirtole et al., 2018). Symptoms such as coughing, shortness of breath, and wheezing are common symptoms of respiratory disease, so education is needed to distinguish these symptoms as early signs of COPD disease (Patel et al., 2019). Exacerbations in COPD can reduce health-related quality of life, accelerate lung function decline, and increase mortality in individual patients. Early prevention with the right health care is the patient's first action to prevent exacerbations. Therefore it is necessary to identify risk factors and early symptoms of COPD to prevent the severity of the disease (Yawn et al., 2013).

Judging from the type of work, farmers, fishermen, and laborers are active smokers every day who have the largest proportion compared to other occupational groups. A builder or construction worker is one type of work that is prone to pulmonary dysfunction because the work environment is exposed to a lot of pollutants from street dust, debris, cement, and chemical substances such as paint. The majority of jobs at risk of developing COPD are jobs that are exposed to dust daily, such as construction workers or laborers, coal workers, factory workers, gold miners. COPD can be treated in two ways, namely pharmacological therapy (bronchodilators and corticosteroids) and non-pharmacology (smoking cessation, modification of self-management, and vaccination). Apart from being a cure, non-pharmacological therapy can also act as a preventive therapy for COPD, one of which is self-management (Franssen et al., 2019; Ambrosino & Bertella, 2018). Self-management can be a useful strategy in improving the quality of life (Dixit et al., 2016). Early prevention with the right health care is the patient's first action

to prevent disease. Therefore, it is necessary to recognize risk factors and early symptoms of COPD (Yawn et al., 2013). The purpose of this study was to determine the differences in COPD risk factors and early symptoms of COPD occurred between builders with pulmonary function disorders and builders with no pulmonary function disorders.

In patients with impaired lung function, the provision of IEC (communication, information, and education) is in the form of communication with patients by providing information about risk factors or causes of disease where smoking is one of the main causes of COPD. Steps to reduce the risk of developing COPD in the long term is to prevent adults in their productive period from smoking or being exposed to secondhand smoke. Health professionals can also help provide opportunities to discuss smoking cessation and increase motivation to quit smoking. Reducing smoking habits can also prevent respiratory diseases besides COPD. IEC can also be done to provide information about the initial symptoms that are caused and also provide education to be able to detect the presence of COPD early by measuring lung function using spirometry. Spirometric measurements are useful in health care surveillance (Patel et al., 2019). Early prevention with the right health care is the patient's first action to prevent disease. Therefore, it is necessary to recognize risk factors and early symptoms of COPD (Yawn, 2013).

Method

The research design was case control. The material of this research was in the form of information from subjects using direct questions and answers (interviews) with the respondents. The independent variable was impaired lung function and the dependent variable was the risk factors for COPD and early symptoms of COPD. A builder in this study was a person who works by relying on their physical strength and had the skills to do the work of the hand in making residential buildings and buildings in general (such as buildings), including diggers, masons, blacksmiths, carpenters, painters, and maids. Lung function disorders in this study were a condition where the FEV1 value was <70% on the measurement of lung function by spirometry (Patel et al., 2019). The research location used in this research is around the East Surabaya area, to be precise, Rungkut District in the Pandugo housing. This research was conducted from September to December 2018, with ethical tests that have been conducted and get no. 026/KE/VI/2018 at the University of Surabaya.

COPD risk factors are classified into 2 categories, namely low risk factors and high risk factors, which were obtained by dividing by median. COPD risk factors in this study consisted of: a) Smoker. A smoker is someone who has smoked at least 100 cigarettes in his lifetime and who currently still smokes (Assari and Mistry, 2018). Cigarette smoke is a major risk factor for COPD disease (Patel et al., 2019). The severity of smoking is calculated using the Brinkman Index (IB), which is the multiplication of the average number. The average cigarette smoked per day is multiplied by the length of time smoking in years, divided into three categories: mild (0-200), moderate (200-600), and heavy (>600) (Watanabe et al., 2011). b) Outdoor Pollution. Outdoor pollution is pollution that is usually found in the workplace, such as cement dust, building debris dust, wood dust, or vehicle fumes that enter the respiratory tract. Workers who work in dusty environments have a higher risk of contracting respiratory diseases for at least 5-10 years of work (Ayaabe et al., 2017). c) Indoor Pollution. Indoor pollution referred to in this study is the pollution found by respondents when doing their daily activities indoors. d) Age. The ages used in this study were adults, namely 18-60 years. The age of 60 years was chosen as the upper limit because it was considered to be in the age category where at the age of 60 and over there had been a significant decrease in FEV1 / FEC values (Thomas et al., 2019). e) Obesity. Determination of obesity status in individuals based on the measurement of Body Mass Index (BMI), a person's body weight (in kilograms)

divided by the square of height (in meters). In this study, respondents were said to be obese if they had a body mass index of ≥27kg/m² (Nuttall, 2015). f) History of Respiratory Disease. Health conditions can affect the value of a person's peak expiratory flow. The strength of the respiratory muscles can be reduced due to illness, such as asthma, post-tuberculosis, systemic diseases (Haynes, 2018).

The early symptoms of COPD were classified into 2 categories, namely low initial symptom levels and high initial symptom levels obtained by dividing by median. The baseline symptom level is low if the result is less than the median and the baseline symptom level is high if the result is more than the median. The early symptoms of COPD include: a) Chronic cough and sputum hyper-secretion is a cough that occurs almost every day for at least 3 months for 2 consecutive years (Patel et al., 2019; Kim & Criner, 2013). b) Wheezing is a high-pitched whistling sound that occurs when a person inhales or exhales (Patel et al., 2019). c) Shortness of breath, is difficulty breathing, gasping, feeling tight in the chest so that you cannot breathe freely, due to an imbalance in gas exchange causing hypoxemia and hyperapnea (Patel et al., 2019). d) The limitation in physical activity in question is the limitation in carrying out daily body movements that cannot be done at this time (Patel et al., 2019). e) The feeling of heaviness in the chest is a feeling in which the chest is like being pressed by a heavy object, tied tightly so that it makes it difficult for a person to breathe (Patel et al., 2019).

The population used in this study was an affordable population, namely builders who are currently working on a project or are active in the East Surabaya area. The sample (subject) was the part of the population that meets the criteria, namely: 18-60 years old, had been a builder for at least 5 years (Melen & Guerra, 2017), did not have chronic lung disease (such as: COPD, tuberculosis, asthma, lung cancer), and has disease. Others can affect lung function, such as heart disease, chronic kidney disease. The number of samples taken in this study uses a formula with an unknown or infinite population, namely:

$$n=(Z^2_{1-a/2}\,P(1-P))/(d^2)$$

Information:

N :Number of samples

$Z^2_{1-a/2}$:Standard normal value (if α = 0.05 then Z = 1.960)

P (1-P) :Estimated population proportion (if P = 0.1 then P (1-P) = 0.09)

d2 :Deviation tolerant (10%)

So the minimum number of samples needed in this study was 62 respondents for each group. The samples were collected using purposive sampling and consecutive sampling.

The initial development of the COPD risk factor questionnaire was by Walker et al. (2010) and Peng et al. (2018), and early symptoms of COPD from Patel et al., (2019). Data analysis was carried out by describing descriptively the risk factors for COPD and the level of early symptoms of COPD with impaired lung function and no pulmonary function disorders. Then the scoring used the median data (Q2) where the value <Q2 was initial symptom level was low and ≥Q2 was high. Data analysis of differences in early symptoms of COPD among builders who have impaired lung function and no lung function disorders using ordinal data scale and data analysis using the chi-square test.

The validity test was conducted on 30 people. In the risk factor questionnaire for COPD, with a value of rtable=0.36, it was obtained from the product moment table with a significant level of 5%. The value of rcount (no.1-9) was >0.36, so the questionnaire was declared valid. The reliability test was declared reliable if the Cronbach Alfa value was ≥0.6. The Cronbach Alfa value was 0.78 which was >0.60 so that the variable was said to be reliable. In the early symptom questionnaire of COPD, with a value of rtable=0.36 obtained from the product moment table with a significant level of 5%. The value of rcount (no.1-9) was >0.36, so the questionnaire was declared valid. The reliability test was declared reliable if the

Cronbach Alfa value was ≥0.6. The Cronbach Alfa value was 0.71 which was >0.60 so that the variable was said to be reliable.

Result And Discussion

Characteristics of respondents seen from age, the group with pulmonary function disorders was 33 years old and the most common age was 30 years, while in the group with no lung function disorders, the average was 34 years and the most common age was 20 years old. From the data obtained, the chi-square test was then performed, namely the value of P=0.08 was obtained, so that it was concluded that there was no significant difference in the group with pulmonary function disorders and no lung function disorders. In this classification, there were data that do not meet the requirements for the chi-square test because there were samples whose number was <5, but the P value was still calculated to see the difference between the lung function disorders and no lung function disorders (Table 1). The average Spirometric value obtained in the pulmonary function

Table 1. Subject Characteristics

Characteristics		Group				P value
		Lung function disorders (n:79)		**No Impaired lung function (n:79)**		
		Frequency	Percentage (%)	Frequency	Percentage (%)	
Age (years)	Late adolescence (17-25)	**13**	16.46	**20**	25.32	0.08*
	Early adulthood (26-35)	**40**	50.63	**25**	31.65	
	Late adulthood (36-45)	**17**	21.52	**21**	26.58	
	Early elderly (46-55)	**9**	11.39	**9**	11.39	
	Late elderly (56-65)	**0**	0.00	**4**	5.06	
Spirometry value (Patel *et al*., 2019)	*Mild* (FEV1 >80% *predicted*)	**59**	74.68	**0**	0	**
	Worsening (50% < FEV1 <80% *predicted*)	**20**	25.32	**0**	0	
Comorbidities	Hypertension	**1**	1.27	**1**	1.27	0.16*
	Dyslipidemia	**0**	0.00	**1**	1.27	
	None	**78**	98.73	**77**	97.46	

* does not meet the requirements for the chi-square test because the number of samples is less than 5
** Chi-square test cannot be performed because the data for the impaired and non-impaired groups cannot be compared

Age affects lung function because the increasing age of a person will increased the susceptibility to disease, especially respiratory disorders in the workforce. Lung function decreased significantly at the age above 60 years (Lowery et al., 2013). There was a significant relationship between age and pulmonary function abnormalities in labor. Age was also a risk factor for COPD because age can affect lung function. Aging affected the structure, function and control of the respiratory system. Both lung and chest wall, including the respiratory muscles undergo changed that can affect respiratory function (Patel et al., 2019; Lowery et al., 2013). In this study, age differences did not affect the results of the study. There were respondents who are under 20 years of age but had good lung function, other factors that might influence this result were the use of masks while working and the physical activities they did (Table 1).

Complementary diseases experienced by respondents were hypertension and dyslipidemia. The relationship between COPD and hypertension as in shortness of breath was explained when the body takes longer to carry out the breathing process, it caused air to start to enter before the air from the breath is exhaled. When this occurred it can produce symptoms of shortness of breath and potentially

hyperventilation. Pulmonary hypertension was high blood pressure in the heart system to the lungs when it delivers oxygen-rich blood to the heart and when oxygen-poor blood returns to the lungs. Hypertension in the lungs can occur when the arterial pressure in the lungs was greater than 25 mmHg at rest or 30 mmHg during physical activity. Long-term effects that occur on the lungs were narrowing, thickening and slowing down blood flow through the pulmonary arteries (Chandy et al., 2013; Wagner, 2015).

Dyslipidemia was one of the factors that can cause cardiovascular disease which can affect lung function. Smoking as one of the main risk factors for COPD could cause an increase in low-density lipoprotein (LDL), triglycerides and very low-density lipoprotein (VLDL) and a decrease in high-density lipoprotein (HDL) but the lipid profile was not well categorized in COPD (Kahnert e al., 2017).

Pulmonary function measurements in this study were carried out using a spirometer. Spirometer was used to measure lung function, it was needed to provide an overview of the pathophysiological severity caused by impaired lung function. Spirometers we-re used for reasons that are easier to use, inexpensive, lightweight, practical, can be carried everywhere, did not require a special place, are quite sensitive, have high accuracy, were not invasive and are sufficient to provide a number of reliable information (Haynes, 2018). Some requirements were needed, namely: not smoking 1 hour before the test, not eating heavily 2 hours before, and not doing strenuous activities 30 minutes before.

The risk factors described were based on smoking, exposure to cigarette smoke, pollution (exposure to dust and chemicals), obesity, and a history of respiratory disease/infection. A history of respiratory disease or infection was a COPD risk factor. In this study, there were no respondents who had a history of respiratory disease or infection because this risk factor was one of the exclusion criteria. The profile of answers to COPD risk factors can be seen in Table 2. The risk factors that most respondents had were smoking, exposure to cigarette smoke and outdoor pollution (Table 3).

The total number of risk factor scores owned by the respondent was assessed by adding up all the scores for each question that has been answered by the respondent. In the research on risk factors, the highest score found in the group with lung function disorders or in the group without pulmonary function disorders was at a value of 7, namely 42 people and 33 people, respectively. In the pulmonary function disorders group, the lowest score obtained was 3 and the highest score obtained was 5, while in the group without pulmonary function disorders the lowest score obtained was 0 and the highest score was 9. Categorization of risk factors in this study was divided into 2 categories namely low risk factors and high risk factors, where the categorization was done by looking at the median of the respondent's data. Median was the middle value of the observed values after being arranged regularly according to the size of the data. In this study, the median value of risk factors was obtained at 7. The risk factor was said to be low if the value was <7 and it was said to be high if the risk factor value obtained was ≥7 (Table 3). Based on the results of the chi square analysis is to see differences in risk factors for COPD in the group with pulmonary function disorders and no lung function disorders. The results were said to have a significant difference if the P value <0.05. In this study, a P value of 1.00 was obtained, so it can be concluded that there was no significant difference in risk factors for COPD in the lung function disorder group and in the no lung function disorder group.

Table 2. Frequency Distribution of COPD Risk Factors

COPD Risk Factor			Group			
			Lung function disorders (n:79)		No Impaired lung function (n:79)	
			Frequency	Percentage (%)		
Smoker	1. **What kind of cigarettes are used?**	a. Filter	59	74.68	62	78.48
		b. Non filter	20	25.32	17	21.52
	2. **What is the severity of smoking (calculated by the Brinkman Index)?**	a. Light	16	20.25	18	22.78
		b. Moderate	40	50.63	46	58.23
		c. Severe	23	29.11	15	18.99
	3. **Duration of smoking? (open question)***	a. 3 years	18	22.79	20	25.32
		b. 5 years	24	30.38	29	36.71
		c. 10 years	16	20.25	8	10.13
		d. 15 years	10	12.66	18	22.79
		e. 20 years	11	13.92	4	5.06
	4. **How many cigarettes do you smoke a day on average? (open question) ***	a. 6 cigarettes/day	9	11.39	33	41.77
		b. 12 cigarettes/day	21	26.58	20	25.32
		c. 16 cigarettes/day	30	37.97	16	20.25
		d. 24 cigarettes/day	19	24.05	10	12.66
Exposure to Cigarette Smoke	1. **Are you exposed to / inhaled cigarette smoke at the place where you live or work?**	a. Yes	69	87.34	72	91.14
		b. No	10	12.66	7	8.86
	2. **How often are you exposed to / inhaled cigarette smoke?**	a. Always/ everyday	69	87.34	72	91.14
		b. No	10	12.66	7	8.86
	3. **Since when have you been exposed to cigarette smoke? (open question) ***	a. 5 years	20	25.32	17	21.52
		b. 10 years	19	24.05	27	34.18
		c. 20 years	12	15.19	13	16.46
		d. >20 years	28	35.44	22	27.85
Outdoor Pollution	1. **Do you use a mask when you work?**	a. Yes	14	17.72	24	30.38
		b. No	65	82.27	55	69.62
	2. **When working, what part of the job do you often do? (open question) ***	a. Finishing	0	0.00	1	1.27
		b. Ceramist	4	5.06	3	3.80
		c. Bricklayer	7	8.86	7	8.86
		d. Plasterer	4	5.06	2	2.53
		e. Blacksmith	1	1.27	2	2.53
		f. Painter	1	1.27	1	1.27
		g. Digger	0	0.00	2	2.53
		h. Odd jobs	62	78.48	61	77.22
	3. **What pollution or chemicals do you breathe in? (open question) ***	a. Paint	6	7.59	3	3.80
		b. Sand, stone, cement	47	59.49	53	67.09
		c. Ceramic dust	9	11.39	15	18.99
		d. Sawdust	5	6.33	4	5.06
		e. Machine fume	12	15.19	4	5.06

COPD Risk Factor			Group			
	Lung function disorders (n:79)		No Impaired lung function (n:79)			
	Frequency Percentage (%)		Frequency	Percentage (%)		
Indoor Pollution	1. **Do you cook on a wood / charcoal stove everyday?**	a. Yes	11	13.92	7	8.86
		b. No	68	86.08	72	91.14
	2. **What is cooking?**	a. Yes	61	77.21	57	72.15
		b. No	18	22.79	22	27.85
	3. **Do you use a mask when cooking?**	a. Yes	6	7.59	5	6.33
		b. No	73	92.41	74	93.67
Obesity	**Body mass index (kg/m²)**	a. Thin (<18.5)	9	11.39	9	11.39
		b. Normal (18.5-<25.0)	66	83.54	56	70.89
		c. Overweight (25,0- <27.0)	2	2.53	9	11.39
		d. Obesity (≥27.0)	2	2.53	5	6.33

Source: Primary Data, 2018

Table 3. Frequency Distribution of Total COPD Risk Factors and Levels of COPD Risk Factors related to Pulmonary Function Disorders

COPD Risk Factor		Group				P value
		Lung function disorders (n:79)		Lung function disorders (n:79)		
		Frequency	Percentage (%)	Frequency	Percentage (%)	
Frequency Distribution of Total COPD Risk Factors						
1.	**Smoker**	79	100.00	79	100.00	0.60
2.	**Exposure to Cigarette Smoke**	77	97.47	78	98.73	0.60
3.	**Outdoor Pollution**	47	59.49	44	55.70	0.06
4.	**Indoor Pollution**	7	8.86	7	8.86	0.62
5.	**Obesity**	2	2.53	5	6.33	0.09
Levels of COPD Risk Factors related to Pulmonary Function Disorders						
Low Risk Factors		**29**	18.35	**29**	18.35	
High Risk Factors		**50**	31.65	**50**	31.65	
	TOTAL	**79**	50.00	**79**	50.00	

P value >0.05 means that there is no significant difference between the two groups

Source: Primary Data, 2018

One of the risk factors for COPD is the type of cigarette. Cigarettes are mostly used by respondents are kretek cigarettes. Kretek cigarettes are also divided into filter and non-filter clove cigarettes. The results above are in accordance with the theory which explains that non-filter cigarettes are more dangerous than filter cigarettes so that the Spirometric value of non-filter cigarettes is smaller because the nicotine and tar content in non-filter cigarettes is higher because non-filter cigarettes do not use filters so that all combustion results are from cigarettes will be sucked all and into the respiratory tract (Schulz et al., 2016). There are limitations in this study, namely that there were some respondents who changed types of cigarettes several times, so that it could affect lung function and data results, but in this

study it was overcome by asking which type of cigarette was used most often.

The use of cumulative cigarette consumption in the future can show a consistent relationship between lung disease and non-smokers, ex-smokers and smokers, which are differentiated based on the number of cigarettes smoked per day (Patel et al., 2019). In this study, the severity of smoking was calculated using the Brinkman index, namely the multiplication of the length of smoking with the average number of cigarettes smoked per day. This decrease in lung function is related to the length of smoking and the number of cigarettes smoked per day can affect lung function which is associated with decreased FEV1 values (Watanabe et al., 2011). Cigarette smoke contains a very high concentration of oxidants. The reactive oxidant substances produced by smoking induce inflammation in the lungs and airways, cigarette smoke causes inflammatory processes in the main airways, peripheral airways, and lung parenchyma, which occurs in smokers with normal lung function. Based on the results obtained above, the results obtained in both groups were in accordance with the theory, namely that the degree of exposure to cigarette smoke had a significant relationship with the severity of COPD, in this case the value of lung function. Cigarette smoke contains a very high concentration of oxidants. The reactive oxidant substances produced by smoking induce inflammation in the lungs and airways, cigarette smoke causes inflammatory processes in the main airways, peripheral airways, and lung parenchyma, which occurs in smokers with normal lung function.

Outdoor pollution in this study is pollution obtained from the work environment. Road or work exposure to dust, cigarette smoke and chemical irritants are the main causes of COPD (Jiang et al., 2016). In this study, to see the effects of exposure to dust obtained from the work environment, we used several questions, one of which was by looking at the use of masks while working, as well as seeing what work and dust were exposed to respondents to see the effect on lung function. Based on the results obtained above, the two groups obtained results in accordance with the theory, namely that the frequency of using masks has a significant relationship with the severity of COPD, in this case the value of lung function. The results obtained, both in the group with pulmonary function disorders or without pulmonary function disorders, the average FEV1 value for respondents who used masks was better than those for respondents who did not use masks, although the difference was not significant. This insignificant result may be due to other factors that can aggravate lung conditions, such as smoking. Although some occupations that are exposed to hazardous dust and gases are at risk of getting COPD, the effects are less than those of smoking.

The profile of answers to early symptoms of COPD can be seen in Table 4. The initial symptoms of COPD that most respondents had were chronic cough and hypersecretion of sputum (Table 5). The categorization of early symptoms in this study was divided into 2 categories, namely low initial symptom level and high initial symptom level, where the categorization was carried out by looking at the median of the respondent's data. In this study, the median value of early symptoms was obtained at 4. Early symptoms were said to be low if the value was <4 and said to be high if the initial symptom value was ≥4. Most of the respondents in both groups had high levels of early COPD symptoms (Table 5). Based on the test results of differences in early symptoms of COPD in the pulmonary function disorders group and the group with no lung function disorders, the P value was 0.75, where the P value obtained was greater than the α value, namely 0.05, so it could be concluded that there was no difference which was significant towards the early symptoms of COPD in the pulmonary function disorder group and in the no lung function disorder group.

Table 4. Frequency Distribution of Early Symptoms of COPD

Early Symptoms of COPD			Group			
	Lung function disorders (n:79)			Lung function disorders (n:79)		
	Frequency	Percentage (%)	Frequency	Percentage (%)		
Chronic Cough and Sputum Hypersecretion	**1. Have you ever had a cough?**	a. Yes	71	89.87	71	89.87
		b. No	8	10.13	8	10.13
	2. What kind of cough did you experience?	a. Cough with phlegm	35	44.30	42	53.16
		b. Dry cough	36	45.57	29	36.71
		c. Never	8	10.13	8	10.13
	3. Do you have frequent coughs?	a. Yes	7	8.86	2	2.53
		b. No	8	10.13	8	10.13
		c. Sometimes	64	81.01	69	87.34
	4. At what times do you usually cough? (open question) *	a. Fatigue	13	16.46	15	18.99
		b. Breathe a lot of dust	15	18.99	23	29.11
		c. Too much smoking	11	13.92	12	15.19
		d. Cold weather / change of seasonusim	32	40.51	21	26.58
	5. How long have you had a cough? (open question) *	a. 2-3 days	32	40.51	37	46.84
		b. 3-4 days	16	20.25	5	6.33
		c. 5 days	3	3.80	10	12.66
		d. 1 week	14	17.72	15	18.99
		e. 3 weeks	3	3.80	4	5.06
		f. 1 month	3	3.80	0	0
		g. Never	8	10.13	8	10.13
	6. Have you ever had to go to a doctor because of a cough?	a. No, just buy medicine at the pharmacy	39	49.37	34	43.04
		b. Never	40	50.63	45	56.96
Out of breath	**1. Have you ever experienced shortness of breath?**	a. Yes	11	13.92	6	7.59
		b. No	68	86.08	73	92.41
	2. Do you often experience shortness of breath?	a. Yes	1	1.27	1	1.27
		b. No	68	86.08	73	92.41
		c. Sometimes	10	12.66	5	6.33
	3. At what times do you usually experience shortness of breath? (open question) *	a. Fatigue	5	6.33	0	0
		b. Breathe a lot of dust	4	5.06	3	3.80
		c. Too much smoking	1	1.27	3	3.80
		d. Cold weather / change of seasonusim	1	1.27	0	0
		e. Never	68	86.08	73	92.41
	4. When experiencing tightness, which part of the chest is experiencing pain? (open question) *	a. The whole chest feels tight and painful	2	2.53	1	1.27
		b. Left chest	9	11.39	5	6.33
		c. Never	68	86.08	73	92.41
	5. Have you ever had to go to a doctor because of tightness? (open question) *	a. No, just resting	11	13.92	6	7.59
		b. Never	68	86.08	64	81.01

Early Symptoms of COPD			Group			
			Lung function disorders (n:79)		Lung function disorders (n:79)	
			Frequency	Percentage (%)		
Heavy chest pain	1. **Have you ever experienced pain or pressure and tightness in the chest?**	a. Yes	11	13.92	10	12.66
		b. No	68	86.08	69	87.34
	2. **Do you often experience pain or pressure and tightness in the chest?**	a. Yes	2	2.53	1	1.27
		b. No	68	86.08	70	88.61
		c. Sometimes	9	11.39	8	10.13
	3. **At what times do you usually experience pain or pressure and are tied to your chest? (open question) ***	a. Fatigue	7	8.86	4	5.06
		b. Breathe a lot of dust	1	1.27	4	5.06
		c. Too much smoking	2	2.53	2	2.53
		d. Cold weather / change of seasonusim	1	1.27	0	0
		e. Never	68	86.08	69	87.34
	4. **Which part of the chest is experiencing pain? (open question) ***	a. No, just resting	3	3.80	6	7.59
		b. Left chest	8	10.13	4	5.06
		c. Never	68	86.08	69	87.34
	5. **Have you ever had to go to a doctor because of the chest pain? (open question) ***	a. No, just take a break	11	13.92	10	12.66
		b. Never	68	86.08	69	87.34
Limitations of physical activity	1. **When you do your daily physical activities, have you ever stopped suddenly because you felt tired or weak?**	a. Yes	43	54.43	39	49.37
		b. No	36	45.57	40	50.63
	2. **Is there any physical activity that you normally do but can't do anymore at this time?**	a. There is	5	6.33	9	11.39
		b. There is no	74	93.67	70	88.61
	3. **What do you feel that makes you stop or rest in the middle of doing your daily physical activities? (open question)**	a. Tired and weak	26	32.91	25	31.65
		b. Dizzy	8	10.13	11	13.92
		c. Fireflies	6	7.59	2	2.53
		d. Nausea	0	0	1	1.27
		e. Out of breath	3	3.80	0	0
		f. Never	36	45.57	40	50.63
	4. **How often do you stop or rest in the middle of your physical activity? (open question)**	a. 2 times	57	72.15	53	67.09
		b. 3-4 times	11	13.92	17	21.52
		c. 5-6 times	11	13.92	9	11.39
	5. **What causes you to not be able to do physical activity? (open question)**	.a. Increasing age	5	6.33	9	11.39
		b. Never	74	93.67	70	88.61

Source: Primary Data, 2018

Table 5. Frequency Distribution of Total Early Symptoms of COPD and Levels of Early Symptoms of COPD related to Pulmonary Function Disorders

Early Symptoms of COPD	Group				P value
	Lung function disorders (n:79)		Lung function disorders (n:79)		
	Frequency	Percentage (%)	Frequency	Percentage (%)	
Frequency Distribution of Total Early Symptoms of COPD					
1. **Chronic Cough and Sputum Hypersecretion**	**30**	37.98	**40**	50.63	1.00
2. **Out of breath**	**15**	18.99	**13**	16.46	0.68
3. **Heavy chest pain**	**11**	13.92	**10**	12.66	0.55
4. **Limitations of physical activity**	**3**	3.80	**9**	11.39	0.06
Levels of Early Symptoms of COPD related to Pulmonary Function Disorders					
Low	**34**	21.52	**36**	22.78	**70**
High	**45**	28.48	**43**	27.22	**88**
TOTAL	**79**	59.00	**79**	50.00	**158**

Source: Primary Data, 2018

Research on the early symptoms of COPD in lung function disorders and no lung function disorders used a questionnaire which was assessed based on the total answer score. The questions regarding the early symptoms of COPD consist of 21 questions. The initial symptom questionnaire of COPD was divided into 4 question categories, namely chronic cough and hypersecretion of sputum, spasms, chest pressure, and limited physical activity. The assessment category was classified into 2 classifications, namely low initial symptom level and high initial symptom level. Respondents were said to have a low initial symptom level if the total value obtained was <4, while it was said that the initial symptom level was high if the total value obtained was ≥4. Cough with excessive phlegm or not occurring almost every day for at least 3 months of the year, for 2 consecutive years. Chronic cough was associated with worsening airflow obstruction and a progressive decrease in lung function (Patel et al., 2019). Two large epidemiological studies had also shown that mucus hypersecretion was significantly and consistently associated with a reduction in excess FEV1 and an increased risk of COPD. Pathophysiologically, chronic cough can be said to be an early symptom of COPD due to mucus hypersecretion, but not all COPD patients experience this symptom depending on the high number of goblet cells and enlarged submucosal glands in response to chronic irritation of the airways by cigarette smoke or other harmful particles (Patel et al., 2019; Kim & Criner, 2013).

Conclusion

There was no significant difference between the risk factors for COPD (P value = 1.00) and the early symptoms of COPD (P value = 0.75) in the pulmonary dysfunction group and the group with no lung function disorders.

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Determinats of The Parenting Experiences for Toodlers and Pre-School Children

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Abstract

Stunted growth in child development will pose a risk of various diseases, it is still found 11.5% of children under five in Indonesia have developmental disorders. This study aims to determine the determinants of childcare experience factors for toddlers and pre-school age. Using secondary data from the results of the 2019 BKKBN Program Performance and Accountability Survey (SKAP). This type of research is cross sectional. The study population was families who have toddlers and pre-school children, the study sample was 1316, with exclusion and inclusion criteria. Data analysis used univariate, bivariate and multivariate analysis, using the chi square test and logistic linear regression. From the research results, it was found that the related factors are; education level (p value = 0.00), number of children under five (P = 0.00), welfare level (P= 0.00), area of residence (P = 0.00). The most related factors were the level of education (OR 1.610) and the number of children (OR 2.421). It is hoped that the government can organize training programs or parenting classes and use local resources to improve childcare skills in families.

Introduction

Children as the nation's next generation are expected to grow and develop optimally, several factors affect the growth and development of toddlers, lack of nutrition and stimulation. In Indonesia, stunted children are still found (19.3%), the child development index in Indonesia is still low compared to other countries. The development index of children aged 36-59 months, Indonesia is 88.3. The child development index in 2018 in Indonesia was highest in East Kalimantan 92, the lowest in Southeast Sulawesi 74.8, while in Banten the early childhood development index was at the 4th lowest after East Nusa Tenggara and Papua at 81.9. (Ministry of Health of the Republic of Indonesia, 2018). Family support for children in growth and development includes roles in nurturing children's growth and development. (BKKBN RI, 2018). Parental care is influenced by several factors such as parents' education, area of residence, number of children, wealth quintile, maternal age, participation in insurance (BKKBN RI, 2018; Theresya et al., 2018).

The Index of Parenting Experience and Growth and Development of Toddlers and Pre-School Age Children, in 2017 and 2018 experienced an increase, the physical development aspect in 2017 (83.3%) and in 2018 increased to 85.9%, in the mental development aspect in 2017 (61.9%) and 2018 (67.1%), and for aspects of social development in 2017 (66.7%) and 2018 (70,0%). The index of parenting experience and child development in aspects of mental and social development in 2018, has not yet reached 80%, as is the aspect of physical development. (BKKBN RI, 2018). Based on the data above, it is still found that there are several conditions experienced by children in Indonesia due to poor growth and development.

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Method

This type of research is a quantitative research with a cross sectional research design. The population in this study were families who had children under five at the time of data collection for the Program of KKBPK Performance and Accountability survey (SKAP) in 2019. Samples are families who have toddlers with inclusion criteria; legally married couple, living together, age 14-49 years. This study uses secondary data from the results of the 2019 SKAP. The research data analysis was carried out using univariate, bivariate and multivariate analysis.

Results and Discussion

Table 1. Distribution of Parenting Experience Frequency, Family Characteristics, Area of Residence and Insurance Ownership

Variable	Frequency	Percentage
Parenting Experience		
Low	709	53,9
Good	607	46,1
Age		
(≤34)	703	54,3
(>34)	613	46,6
Total	1316	100
Level of education		
Elementary school	670	50,9
Middle	474	36,0
Higher education	172	13,1
Total	1316	100
Number of Toddlers & Preschool Age Children		
Single child	1159	88,1
More than one child	157	11,9
Total	1316	100
Prosperity level.		
Low	183	13,9
Middle	739	56,2
High	394	29,
Total	1316	100
Residential Area		
Urban	887	67,4
Rural	429	32,6
Total	1316	100
Insurance Ownership		
Having Insurance	876	66,6
No Having Insurance	440	33,4
Total	1316	100

Source: SKAP, 2019

From table 1, it is known that the majority of parenting experiences are low (53.9%), the majority of the age of the head of the family is in the age group 34, which is 54.3%, the majority of the head of the family has a basic education of 50.9%, the majority of the family has 1 toddler which is 88.1%, the majority with a medium level of welfare 56.2%, the majority of families live in urban areas 67.4%, the majority of families have BPJS insurance, which is 66.6%.

Table 2. Frequency Distribution of Aspects of Family Parenting Experience and Physical, Mental and Social Growth

Physical Growth Aspect	**Ya**	**%**	**No**	**%**	**N**	**%**
Children's height and weight are measured	946	71,9	370	28,1	1316	100
Children are given balanced nutrition	1087	82,6	229	17,4	1316	100
Children are immunized	1006	76,4	310	23,6	1316	100
Child is breastfed	966	73,4	350	26,6	1316	100
Children are given vitamins	795	60,4	521	39,6	1316	100
Children are treated when sick	820	62,3	496	37,3	1316	100
Children are taught to behave in a healthy way	353	26,8	963	73,2	1316	100
Other	96	7.3	1220	92,7	1316	100
Do not know	4	0,3	1312	99,7	1316	100
Aspects of Mental Growth and Development	**Ya**	**%**	**No**	**%**	**N**	**%**
Parents stimulate children	622	47,3	694	52,7	1316	100
Parents accompany to play	942	71,6	374	28,4	1316	100
Parents accompany to study	753	57,2	563	42,8	1316	100
Parents listen to spiritual songs/readings	424	32,2	892	67,8	1316	100
Parents as role models	537	40,8	779	59,2	1316	100
Parents teach to worship	775	58,9	541	41,1	1316	100
Parents teach gratitude	433	32,9	833	67,1	1316	100
Parents teach respect / respect for others	463	35,2	853	64,8	1316	100
Other	128	9,7	1188	90,3	1316	100
Do not know	6	0,5	1310	95,5	1316	100
Aspects of Social Growth and Development	**Ya**	**%**	**No**	**%**	**N**	**%**
Providing opportunities to play with childrenAnak	1072	81,5	244	18,5	1316	100
schooled/Early childhood education/Playgroup/Day	655	49,8	661	50,2	1316	100
Care	133	10,1	1183	89,9	1316	100
Children are being taught	172	13,1	1144	86,9	1316	100
Children enter the competition	670	50,9	646	49,1	1316	100
Children are invited to socialize with other people	159	12,1	1157	87,9	1316	100
Others	16	1,2	1300	98,8	1316	100
Do not know						

Source: SKAP, 2019

The category of children being taught healthy behavior is still low at only 26.8%. In the aspect of mental growth and development, the lowest presentation on parental activity was listening to spiritual songs/readings by 32.2%. In the aspect of growth and social development, the lowest presentation on children's activities was 10.1%.

There is a significant relationship between the level of education, the number of children owned by the family, the level of family welfare and the area of residence with the experience of family care for toddlers and preschool age children. There is no relationship between age and insurance ownership with family care experience for children under five and pre-school age.

Parenting patterns affect the parenting experience of children, parenting patterns are related to parents' confidence in providing care, parental characteristics, parental personality in general (Prabowo et al., 2017). Maternal age was not associated with sensitivity beliefs on the role of parents in child care. The higher the age will have good parenting attitudes and behavior, the adolescent age tends to provide less care. Age is related to care responsibilities, the higher the age the mother will have a better care attitude. The concept of parenting is different for older mothers, mothers who are older in parenting, experience less depression than younger mothers, where partners express less warmth to their partners, but focus more on parenting (Emmen & Grada, 2014).

One of the parents' knowledge about child care and upbringing is influenced by the level of education, the higher a person's education level, the more likely they will choose reliable information and have scientific evidence. Sources of information that have clear and reliable references. Mother's education influences many areas of child education efforts.

Table 3. Relationship between Family Characteristics, Residential Area and Insurance Ownership with Family Parenting Experience for Toddlers and Pre-School Age Children

Variable	Parenting Experience				Total		P Value
	Low		Good				
	F	%	f	%	f	%	
Age							
≤ 34	381	54,2	322	45,8	703	100	0,846
> 34	328	53,5	285	46,5	613	100	
Level of education							
Low	403	60,1	267	39,9	670	100	0,000
Middle	251	53,0	223	47,0	474	100	
High	55	32,0	117	68,0	172	100	
Number of children							
One child	656	56,6	503	43,4	1159	100	0,000
More than one child	53	33,8	104	66,2	157	100	
Prosperity level							
Low	120	65,6	63	34,4	183	100	0,000
Middle	414	56,0	325	44,0	739	100	
High	175	44,4	219	55,6	394	100	
Residential Area							
Urban	442	49,8	445	50,2	887	100	0,000
Rural	267	62,2	162	37,8	429	100	
Insurance Ownership							
Have no insurance	459	52,4	417	47,6	876	100	0,145
Having Insurance	250	56,8	190	43,2	440	100	

Source: SKAP, 2019; Analysis Data Statistik

Mothers with higher education tend to have the resources needed for child care and education, mothers will focus on things that are useful for child development and child education and have different psychological developments. Mother's education has a direct and indirect influence on children's educational attainment. Educated mothers tend to plan their children's education well. Educated mothers plan well for the development and future life of their children (Augustine, 2017). Mothers with higher education have higher quality interactions and show better parenting than mothers with lower education. In addition, fathers with a high level of education have better emotional control than those with low education (Pellerone et al., 2017).

Parental knowledge about child development is positively related to the quality of parent-child interactions and practices that promote child health development. Parents who have scientific evidence-based parenting knowledge show better parenting patterns or parenting practices compared to parents who do not have parenting knowledge (for example in breastfeeding practices, calming crying babies and preventing injury to children) (Gadsden et al., 2016). The education level of parents shows differences in the approach to caring for children, parents with low education approach in caring for children with extra care, but in the academic setting the child is unstable. This strategy contributes to poor academic achievement in children (Idris et al., 2020). The better the level of parental education, the parenting pattern will increase, this is in line with a systematic review research, which was quoted by Emmen and Grada (2014) that mothers with higher education have higher positive parenting sensitivity scores in their parenting roles towards children (r (73)=0,34. p<.01. (Emmen & Grada, 2014)

The stimulation given to the child is adjusted to the child's ability based on the child's psychomotor and cognitive development according to age, the mother's or father's ability to provide a stimulus depends on the father's knowledge of the child's growth and development, parenting classes teach many things about parenting. Tutiek et al. (2018)

research with experimental design; one group pre-test and post-test design, said that there was a significant difference in the practice of parenting before and after attending parenting classes, indicated by the increased growth and development of children after mothers took parenting classes, p value 0.000 (Prabowo et al., 2017). Pufall et al, said that in Zimbabwe in the period 2001-2011, parents with higher education educated their children well. Literate mothers with secondary education are consistently associated with better educational outcomes for their sons and daughters (Pufall et al., 2016). A person's knowledge of parenting through the act of caring for his child directly ultimately affects his attitude about parenting and creates confidence in the parenting role. Caring for their child directly leads to positive care practices and parenting experiences. Parental warmth increases obedience to children in parental care. One measure of warmth is sensitivity to children's needs and how parents can express them well. (Leijten et al., 2018). Caring with love and compassion in Kirby's research (2019), is also defined as sensitivity to children's suffering/needs with a commitment to reduce suffering/meet children's needs (Kirby, 2020). As research by Kiff (2012) shows that the positive influence, appreciation, affection and involvement of parents with their children enable a good child temperament. Parenting with negative emotions is associated with difficult child temperament. Negative parenting can harm children (Kiff et al., 2012).

Direct practical actions make parents learn from the care provided and increase parental insight about child development. Gadsen et. all (2016), stated that the attitude of parents, mostly formed from the self-confidence of parents to provide care (parenting self-efficacy), the ability of parents, and this affects the development of children. Parental efficacy/confidence has been shown to affect the competence of parenting. Mothers become confident and have skills in caring for children, parents have confidence in their capacity to care for children. Parents who practice parenting regularly will increase their competence in caring for their children. (Gadsden et al., 2016). The behavior of parents in providing care for children has a significant positive effect on children's growth; behavior has a direct effect on growth (0.427), meaning that each increase in behavior will increase growth by 0.427. Behavior also has a direct effect on children's development (0.321), meaning that every increase in behavior will increase the growth factor in children by 0.321 times (Prabowo et al., 2017). The self-confidence of parents in providing care is certainly different because they have different capacities for caring for children, which is caused by previous parenting experiences and the direct interactions provided when caring for children and providing stimulus to children. Families with more than one child have a good parenting experience, this is possible because of the previous experience of parents caring for and caring for children (Augustine, 2017).

Sufficient family economic conditions more or less affect the attitude of parents towards children, the socio-economic conditions of the family play a role in the development of children. For example, children whose parents earn enough, then these children have more opportunities to develop skills (Oemar & Novita, 2015). Low income, especially at the poverty level, generally weakens parenting. Parents with different socioeconomic status have different experiences and will apply different parenting styles. Parents carry out their activities in different places according to their social status. Economic conditions make parenting behavior different for children, experiences and daily life are also different, as well as the goals that parents have, the emotional climate they create in providing care. Socio-economic status greatly affects parenting, parenting patterns for children are adjusted to the economic conditions of their parents, such as parenting practices, the language used and the introduction of the world of education from the start at home, this will affect children's communicative abilities. Higher incomes have higher sensitivity confidence scores in parenting roles with r (65)=35,53. As stated by Conger & Donnellan, 2007 cited by Emmen & Garda (2014) that economic pressure results in lower quality of child care and in turn harms child development. (Emmen & Grada, 2014). Parents with higher education and greater economic resources will be exposed to, obtain,

and adopt information relevant to parenting practices more quickly than parents with lower socioeconomic status. (Roubinov & Boyce, 2017).

The wealth quintile shows a certain pattern of relationship to some parenting practices, where the higher the family wealth quartile, the better parenting practices in children's physical growth and development (BKKBN RI, 2018). Low socioeconomic status and family economic conditions will have an unfavorable parenting experience; low economic level affects the quality of parenting which will ultimately affect the child's brain development. White's Research et al. (2017) shows that positive parenting shows improvement in child development (Whittle et al., 2017). Low socioeconomic status and lack of time lead to failure in terms of children's education (Idris et al., 2020).

The importance of parenting references is influenced by the state of the social environment and social development, child care systems, cultural and ethnic values at a time when interactions between children and parents are important in family relationships. The influence of culture and civilization around it affects parenting patterns (Shabas, 2016). The skills and role of mothers are very valuable for the growth and development of children, parents who are skilled in parenting fully can quickly recognize the process of growth and development of children as early as possible and can provide stimulus from an early age for aspects of growth and physical development of children. It is important for parents to pay attention to the growth and development of babies, without parental guidance and attention, children's growth and development will not run optimally (Meliati et al., 2018).

Children's growth and development is supported by all the surrounding factors, children grow up in an environment that responds to their emotional needs Parents contribute to improving children's social competence by teaching them skills such as self-control, cooperation and developing positive relationships with peers. Parents can increase the promotion of learning and acquisition of social skills by building strong relationships with their children, parents socializing their children to adopt culturally appropriate values and behaviors that enable them to become socially competent and act as members of social groups. The environment in which children are cared for will have an influence on their growth and development, socially competent children demonstrate good social skills, model positive relationships and provide experiences and opportunities that enrich and train their social skills. (Gadsden et al., 2016).

Based on the results of the multivariate test, it can be seen that the variable most related to the experience of caring for toddlers and pre-school age children is the level of education (p value = 0.000) with an OR of 1.610, meaning that the higher the level of education, the 1.6 times the experience of good parenting will increase. toddlers and pre-school children and the number of children (p value = 0.000), with an OR of 2.421, meaning that a large number of children will provide a good experience of parenting as much as 2.4 times. The higher the level of education and socio-cultural status, the higher the level of knowledge is. The level of knowledge starts from knowing, understanding, applying, analyzing, synthesizing, and evaluating. The higher a person's level of knowledge, the higher the individual's ability to judge material or objects as the basis of their actions, children who have better knowledge will have a tendency to better behavior (Hendriyani et al., 2018). Parents who raise children well, with good knowledge will give good knowledge to children. September et al. (2017) his research proves that there is a relationship between mother's knowledge about child growth and children's knowledge of parenting patterns in early childhood development (September et al., 2017).

A prospective study conducted by Pellerone, et.all (2017), for 1 (one) year on 209 samples in Sicily, Italy, to measure the perception of parenting between men and women, the results showed that parenting between fathers and mothers (men and women to children is still low), the parenting pattern given by the father (male) with optimal affection is only 5.1% and the female (mother) who has the parenting pattern with optimal affection is only 25.2%. Research by Potharst, et.all (2021) on 247 parents who were trained

in providing parenting to their children showed an improvement in children's function in caring parenting. Interventions given to parents by providing training in parenting have been proven to improve parenting patterns with full attention to children and improve children's health status (children's psychosocial condition) after parents are given training. This shows that parenting classes are important in improving parenting patterns for children (Potharst et al., 2021). Parenting classes also have a significant influence on parenting practices by parents for their children and increase cognitive, affective and psychomotor development in children. (Jeong et al., 2021). Parenting classes and parenting training are proven to increase parents' knowledge and have a positive effect on the dimensions of parenting (September et al., 2017). Research on the application of parenting to children recommends that good parenting done at home is more likely to allow children to have a high sense of self-confidence, a parenting pattern that is developed looks at the overall aspects that maximize child development through education and training in parenting classes with a measurable curriculum that has been proven to have improved child's confidence (Bax et al., 2018) .

Conclusion

Based on the results of the research and discussion, it can be concluded that there is a significant relationship between education level, number of children, welfare level and area of residence with parenting experience for children under five and pre-school age. The government must continue to increase efforts and programs that increase parental involvement in child care and development programs, provide training programs or parenting classes, communication and education as well as use local resources to increase parents' knowledge and understanding of parenting patterns. Program improvement can also be done through programs carried out by the BKKBN. Thank to BKKBN of Banten Province for conducting this research.

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The Affecting Factors of Compliance Diabetes Mellitus Treatment of Type 2 in Pandemic Era

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Abstract

Diabetes mellitus (DM) is one of the non-communicable diseases that cause serious health problems. This chronic disease requires lifelong treatment to prevent complications and death. In the pandemic era, DM became comorbid that contributed to the death rate in Covid-19 cases, so that patients with type 2 DM become important to comply with the treatment underway. Aim: This study aimed to evaluate the treatment compliance in patients with DM type 2 at the Purwodiningratan primary health care, Surakarta. Method: This study was conducted in 2020 used an analytical method with crosssectional design. Populations were all of the patients who experience DM type 2, sampling techniques used total sampling with 108 respondents. Univariate, bivariate analysis, and logistic regression were used in this study. Compliance levels measured used the MMAS-8 questionnaire. Result: The results of this study were obtained from several independent variables that related to compliance with DM type 2 treatment. The descriptive analysis result of patient compliance showed that 70.4% of patients were obedient. The significant variable was the side effects on DM drugs with (OR = -0.44; 95% CI = -0.74 - 0.15; p = 0.003). Conclusion: Most of the patients were adherent to the treatment and the most influencing factor was the side effect of the drug.

Introduction

Diabetes mellitus (DM) is one of the global health threats with a tendency to increase the number of sufferers every year. Based on the International Diabetes Federation in 2019, 9.3% (463 million) of the world's population suffer from DM and it is estimated that it will reach 10.9% (700.2 million) in 2045. Indonesia ranks of 7th with the largest number of sufferers in the world, which is 10.7 million people and is projected to increase to 16.6 million by 2045 (International Diabetes Federation, 2019). The 2018 Basic Health Research (RISKEDAS) report also shows that the national DM prevalence is 10.9%. In addition, based on the 2018 RISKESDAS, the city of Surakarta has a fairly high prevalence compared to other cities in Central Java, which is 2.97% (Health Research and Development Agency, 2019)

During the Covid-19 pandemic, the prevalence of DM sufferers is also increasing. The results of the report from the Chinese Center for Disease Control found that the case fatality rate due to Covid-19 in patients with DM was much higher when compared to patients without DM, which was 7.3% compared to 2.3%. (American Diabetes Association, 2019). Diabetes mellitus is classified into type 1 DM, type 2 DM, gestational diabetes, and other types of diabetes. Type 2 DM patients make up 90% of the total population with DM. WHO predicts that there will be an increase in the number of type 2 DM patients in Indonesia from 8.5 million to 21.3 million in 2045 (International

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Diabetes Federation, 2019). Covid-19 patients with type 2 diabetes are more likely to receive treatment in the ICU compared to patients without type 2 diabetes. It is proven that people with comorbid DM are at risk for more severe Covid-19, especially if they have other comorbidities (Michalakis et al., 2021).

The prevalence of DM in Covid-19 patients in China was 5.3% among the 44,672 confirmed cases of Covid-19 until February 11, 2020. This is different from the study from Italy which showed that among 146 Covid-19 patients, the DM prevalence rate was 8.9%. In addition, a study from Milan reported a DM prevalence of 14.9% out of 410 people hospitalized with Covid-19 (Pugliese et al., 2020). This shows that patients with DM are a risk factor for COVID-19. The impact of Covid-19 on DM patients has an increased risk of more severe infections and contributes to poorer DM clinical outcomes due to stress, changes in routine care and medication, diet and physical activity. A meta-regression study reported that Covid-19 patients with DM were at risk of death by 2.12 times compared to Covid-19 patients without comorbid DM and at risk of experiencing more severe Covid-19 by 2.45 times compared to Covid-19 patients without comorbid DM (Hartmann-Boyce et al., 2020; Huang et al., 2020).

Monitoring treatment for DM patients during the Covid-19 pandemic is an important thing to do. A systematic review and meta-analysis found that patients with DM had shown a substantial effect on the mortality rate of Covid-19 patients. DM sufferers are shown to be more susceptible to infectious diseases, especially those caused by bacteria and viruses that affect the lower respiratory tract, high glucose levels are responsible for impaired neutrophil function. Microangiopathic occurs in the respiratory tract of DM patients, thereby inhibiting gas exchange in the lungs. Several reports have also shown a higher susceptibility to lower respiratory tract infections caused by atypical microorganisms and episodes of severe pneumonia in DM patients (Mukona, 2020; Ali, 2021)

The pneumonia pathogen that is currently feared by many people is SARS CoV-2 which causes the disease Covid-19. Diabetes mellitus is one of the most common comorbidities found in patients with Covid-19. There is evidence of an increased incidence and severity of COVID-19 in patients with DM which results in increased complications in sufferers. These complications can be in the form of disorders of the blood vessels or nervous system (neuropathy) that can affect the heart (coronary heart disease), brain (stroke), eyes (diabetic retinopathy), and kidneys (diabetic nephropathy). Neuropathy can affect motor, sensory, or autonomic nerves. In addition, neuropathy can also cause acute complications that can cause permanent damage to the nervous system, coma, and even death (Mukona, 2020).

Several programs have been carried out to suppress and reduce the incidence of type 2 DM. Such as the Joint Asia Diabetes Evaluation Program (JADE) which is a web-based program that combines comprehensive risk management, treatment guidelines, and clinical decision support to improve outpatient diabetes care. (Welch et al., 2011). Unlike the Indonesian government, the government has made efforts to control the increase in DM and its complications, including issuing Guidelines for the Management and Prevention of Type 2 DM, but cases of patients experiencing complications with varying incidence rates are still found. In contrast to Singapore that a pilot study reported good satisfaction of patients receiving telemedicine monitoring for type 1 and 2 DM, patients were referred to a DM center only for blood collection and HbA1c monitoring. While the provision of counseling, therapy and blood test results were informed through telemedicine devices and 80% of the interviewed patients reported no difference between in-person visits and telemedicine, the remaining 20% were more satisfied with telemedicine facilities compared to face-to-face meetings (Umano et al., 2021).

With the morbidity and mortality rates that are still increasing, efforts are needed to identify the factors that cause DM complications to appear even though treatment management has been carried out. One of the factors that influence the increase in morbidity and mortality is poor medication adherence, causing failure of pharmacological therapy. In a study also showed that there are still many type

2 DM patients who are not disciplined in self-management such as non-adherence in taking medication, routine blood glucose checks, diet, knowledge and physical activity (Sofiana et al., 2019). World Health Organization (WHO) defines compliance as an active and voluntary behavioral change including taking medication, following a diet, and changing lifestyles in accordance with the recommendations of health workers. The level of compliance of DM patients during the Covid-19 pandemic is very important to be able to suppress complications in DM patients, to prevent DM morbidity and mortality (International Diabetes Federation, 2019).

The level of adherence to treatment of type 2 DM is poor, which can result in uncontrolled blood glucose control. Non-adherence in the treatment of type 2 DM is usually associated with low socioeconomic factors, non-routine blood sugar monitoring, and inadequate information from health facilities, treatment only when symptoms occur, and lack of support from family. (Polonsky et al., 2016). Therefore, this study aims to identify the factors that influence adherence to type 2 DM at the Purwodiningratan Public Health Center, Surakarta. These data are expected to assist in providing appropriate interventions so that the success of type 2 DM therapy can be achieved which can prevent complications and reduce mortality and morbidity rates.

Method

This study is an analytic study with a cross-sectional approach. This design is used to determine whether there is a relationship between the independent variable and the dependent variable observed at the same time. In this study, the independent variables were the characteristics of the respondents (gender, education, occupation, age, duration of suffering from type 2 DM, family history, smoking, eating patterns and side effects of type 2 DM drugs), while the dependent variable was the level of adherence. The sampling technique uses non-probability sampling, namely total sampling. The study population is patients diagnosed with type 2 DM and undergoing treatment therapy for type 2 DM at the Purwodiningratan Public Health Center for at least 1 month (August-October) 2020. This study has received approval from the ethics committee. Data collection was carried out using a google form accompanied by electronic informed consent which was distributed to type 2 DM patients in the working area of the Purwodiningratan Health Center through puskesmas officers. The sample of this study amounted to 108 people.

The level of compliance was measured using the MMAS-8 questionnaire, consisting of 8 questions whose results were categorized into high compliance if the score 8, moderate adherence if the score was 6-7 and low compliance if the score < 6. Changed into two categories with a mean 7 is compliant category and < 7 is a non-compliant category. The analysis test in this study used univariate, bivariate and multivariate tests with multiple logistic regressions.

Results and Discussion

In this study, it was found that 76 respondents (70.4%) adhered to the treatment of type 2 DM and 32 respondents (29.6%) did not comply, even though the treatment was carried out during the Covid-19 pandemic. Based on data in the field, the rate of patient visits decreased during the Covid-19 pandemic. This is evident from the results of the study which found that there was a decrease in visits to health facilities, especially hospitals, from 66.4% before the pandemic to 37.4% (Chou et al., 2020). Despite maintaining health protocols, the fact is that people are still afraid to come to health facilities for examination and treatment. However, even so, the level of compliance of type 2 DM patients at the Purwadiningratan Health Center was classified as obedient. This is because the measurement of Type 2 DM treatment adherence is based on indicators of adherence or not taking medication, not whether or not the patient is diligent in checking himself into a health facility.

It was found in a meta-analysis, the prevalence of DM in Covid-19 patients was 9%, with the prevalence of DM in severe patients with Covid-19 the mean age of 56.5 years was 17% and in moderate patients with Covid-19 the mean age was 17%. average 46.4 years is 7% (Mukona, 2020). Many factors cause DM disease does not go away and even

cause various complications in sufferers. One of the factors is due to non-compliance in carrying out treatment. In this study, the characteristics of respondents related to type 2 diabetes treatment adherences. A total of 89 respondents (82.4%) aged 26-65 years. Most of them have higher education as many as 84 respondents (77.8%). DM sufferers work as many as 86 respondents (79.6%). Type 2 DM patients with DM 10 years were 87 respondents (89.6%). A total of 61 respondents (56.5%) in their families did not have a history of DM. A total of 98 respondents (90.7%) carried out the diet. A total of 102 respondents (94.4%) did not smoke and as many as 98 respondents (90.7%) did not experience side effects from the DM drugs of type 2 consumed.

A good level of medication adherence, if balanced with good self-care activities such as diet control, physical activity and routine check-ups will have an impact on glycemic control so that it will reduce complications in DM patients of type 2(Sayeed et al., 2020). From the results of the study, the age of the respondents did not significantly affect compliance (p = 0.37). However, based on the age range classified according to WHO, the prevalence of type 2 DM shows that it occurs more in adulthood and the late elderly (26-65 years) than the elderly (> 65 years). In line with the research of Jeremiah (2019), as many as 61% of type 2 DM are more susceptible to being affected at the age of 56-65 years, namely in the late elderly group. The increase in cases of type 2 diabetes in the elderly is due to decreased insulin sensitivity and glucose metabolism in the body.

People who do not work or IRT tend to be more focused on undergoing treatment because they do not have a lot of busyness at work so that it will affect the level of adherence to DM treatment of type 2. DM will tend to be more aware of himself. So it has high adherence in treatment. Respondents will learn to maintain their diet, lifestyle and activity patterns (Aminde et al., 2019). However, the results of this study indicate that a family history of DM has no significant effect (p = 0.65). Based on the results of the analysis, although there is no family history of DM, respondents are obedient in carrying out treatment due to the education and knowledge that has been conveyed by health workers, so that respondents are also more concerned with the therapy they are undergoing.

The results of the chi square test show that the relationship between compliance and education has a p value of 0.05. Furthermore, the chi square test between the relationship between the implementation of eating patterns and adherence to taking medication also has a significant relationship value, namely the value of p = 0.03. The results of the chi square test the relationship between drug side effects and medication adherence have a p value = 0.003. In addition, the results of the study show that almost most of the respondents are highly educated. In theory, education will have an impact on health. The higher the level of education will increase awareness in maintaining health, while lower education will affect the lack of knowledge so that it can increase the risk of DM of type 2 (Saheb Kashaf, 2017).

However, in this study the increase in educational knowledge about DM of type 2 was carried out by health workers at the Purwodiningratan Health Center through audio visuals, in this case education was carried out in the form of video playback with the aim of increasing respondents' knowledge. Previous research has also shown that education using this video can improve medication adherence in DM of type 2 patients. Good knowledge of patients will help improve type 2 DM treatment adherence from management, monitoring, medication, physical activity and diet to things that needs to be controlled. Lack of medication adherence often occurs, and this will affect glycemic levels resulting in complications and death in DM of type 2 patients. Uncontrolled glycemic control can lead to an increased risk of cardiovascular disease, neuropathy, retinopathy, and nephropathy so that patients require intensive care in hospital. In addition, according to other studies, diabetes mellitus that is not well controlled can increase the risk or complications of stroke (Mulyawati, 2015).

Therefore, the importance of adherence to treatment for therapeutic success is increasing the effectiveness of treatment for DM of type 2 patients, so that glucose levels are well controlled. (Nogueira et al., 2020). Almost

all respondents at the level of medication adherence made arrangements for eating patterns, exercising regularly and not smoking because in addition to being obedient to taking medication, patients compensate by adjusting their diet to control sugar levels. In controlling eating patterns, respondents who are more obedient avoid consuming excess sugar. In addition, obedient respondents will better prevent complications, reduce DM morbidity and mortality of type 2. If complications can be prevented, the respondent can carry out daily activities more healthily and consistently. Thus, in compliant patients, HbA1c was lower than in non-adherent patients. Respondents who do not comply can be given an evaluation related to the results of the analysis of the factors that can affect the complications of type 2 DM. It is hoped that in this way respondents can further improve adherence to treatment.

Table 1. Characteristics Associated with DM Compliance Level of Type 2

Independent Variable	Number (n)	Percentage (%)
Age		
26-65 years old	89	82.4
>65 years old	19	17.6
Education		
Low education	24	22.2
High education	84	77.8
Occupation		
Not working	22	20.8
Not working	86	79.6
Gender		
Male	29	26.9
Female	79	73.1
Long time suffering from DM2		
≤ 10 years	87	89.6
>10 years	21	19.4
Family History		
No	61	56.5
Yes	47	43.5
Implement eating patterns		
No	10	9.3
Yes	98	90.7
Smoking		
No	102	94.4
Yes	6	5.6
Side effects of DM drugs		
No	98	90.7
Yes	10	9.3

Source: Primary Data 2020

The results of the bivariate analysis showed that the three variables that were significantly related to type 2 diabetes mellitus adherence were education, dietary practices, and side effects of DM drugs (table 2). In contrast to the other six variables, which were not significantly related, namely age, gender, occupation, duration of suffering from type 2 diabetes, family history, and smoking. Significantly related variables are explained as follows, namely DM . patients of type 2 with higher education 2.5 times adhered to DM treatment compared with those with low education (OR = 2.5; 95% CI = 0.87-7.18; p = 0.05), while DM patients of type 2 who had a good diet had 4.2 times medication adherence than those who did not (OR = 4.2; 95% CI = 0.88-21.34; p = 0.03), and patients with type 2 diabetes who did not experience drug side effects have treatment adherence 0.2 times than

those who experience side effects when taking DM of type 2 (OR = 0.2; CI 95% = 0.02-0.72; p = 0.003).

Because the variables of education, occupation, diet and side effects of DM drugs have a p value of <0.25, this variable is included in the first modeling stage of multiple logistic regression analysis with DM drug side effects as the main variable. The results of statistical tests with logistic regression showed that the side effect variable had a p value of <0.05, meaning that the side effects of DM drugs had a significant relationship with medication adherence. The variables of education, occupation, and diet have their respective values (p = 0.14, p = 0.96 and p = 0.25) so that these variables do not have a significant relationship and are excluded from the next stage of the logistic regression test.

Table 2. Factors Affecting Compliance with DM of Type 2

Independent Variable	DM Compliance Rate of Type 2				OR 95% (CI)	p
	Disobedient		Obedient			
	n	%	n	%		
Age						
26-65 years old	28	31.5	61	68.5	1.72 (0.48-7.73)	0.367
>65 years old	4	21.1	15	78.9		
Education						
Low education	11	45.8	13	54.2	2.53 (0.87-7.18)	0.048
High education	21	25	63	75		
Occupation						
Not working	9	40.9	13	59.1	0.53 (0.18-1.60)	0.194
working	23	26.7	63	73.3		
Gender						
Male	8	27.6	21	72.4	0.87 (0.29-2.42)	0.778
Female	24	30.4	55	69.6		
Long time suffering from DM2						
≤ 10 year	26	29.9	61	70.1	1.06 (0.34-3.73)	0.905
>10 year	6	28.6	15	71.4		
Family History						
No	17	27.9	44	72.1	0.82 (0.33-2.06)	0.648
Yes	15	31.9	32	68.1		
Implement eating patterns						
No	6	60	4	40	4.15 (0.88-21.34)	0.027
Yes	26	26.5	72	73.5		
Smoking						
No	30	29.4	72	70.6	0.83 (0.11-9.69)	0.838
Yes	2	33.3	4	66.7		
Side effects of DM drugs						
No	25	25.5	73	74.5	0.15 (0.02-0.72)	0.003
Yes	7	70	3	30		

Source: Primary Data 2020

In multivariate analysis using multiple logistic regression between independent variables that have a p value > 0.25 in bivariate analysis as the main variables, namely education, occupation, diet and side effects of DM drugs of type 2 it was found that the independent variable with a p value < 0.05 was a side effect of the drug, then the side effect of the drug would be included in the next modeling stage (Table 3).

Table 3. Results of Multivariate Analysis Modeling 1 Factors of Patient Compliance with DM of type 2 with Double Regression Logistics

Independent Variable	OR	95% CI		p
		Lower limit	Upper Limit	
Education	0.16	-0.07	0.39	0.175
Occupation	0.01	-0.23	0.24	0.970
Implement eating patterns	0.18	-0.13	0.49	0.246
Side effects of DM drugs	-0.39	-0.68	-0.08	0.012

Source: Primary Data 2020

The medical history of the obedient respondents, most of them took more than one type of DM drug, namely metformin and glimepiride or what is called a combination drug. Metformin is more effective when combined with glimepiride or glibenclamide. Treatment with combination drugs (metformin and glimepiride) can reduce HbA1c by 0.8% - 1.5% with fewer hypoglycemic side effects. There are almost no side effects felt by respondents, thereby increasing adherence to DM treatment of this type 2. In line with previous studies, it was found that the effectiveness of DM therapy of type 2 were metformin and glimepiride (7.47%). Therapy that is carried out only by taking the drug metformin or this so-called monotherapy, will reduce the level of treatment adherence. This is because separate drug therapy has more side effects, but also has a higher cost, causing discomfort for people with DM of type 2. The potential side effects of metformin are nausea, diarrhea and hypoglycemia. In line with Raden's research, it was found that there was a potential side effect of nausea with the use of metformin (18.5%) and glimepiride (13.3%) and glibenclamide caused a side effect of hypoglycemia (15.8%) so that patients stopped taking DM drugs of type 2 to reduce the side effects he feels (Putra et al., 2017). In addition, the patient's lack of confidence in the benefits of the drug causes a less than optimal level of adherence.

In a meta-analysis study by Marcel et al. (2020) it was found that knowledge and care based on pharmaceutical care or adherence to medication had a significant impact on DM of Type 2. Adherence to this treatment will be useful in monitoring the recovery of patients with DM of type 2 (Nogueira et al., 2020). In carrying out treatment compliance for DM patients of Type 2 requires collaboration between patients and health workers, agreement and decisions to work together considering clinical factors and patient preferences that are agreed by both parties. According to Charles, there is a need for construction such as involvement between patients and health workers, mutual support for contributions to treatment deliberation, exchange of information and mutual agreement. Recent guidelines from the American Diabetes Association (ADA) and European Association Study for Diabetes (EASD) recognize and support the existence of a patient-centred approach to treatment to improve medication adherence in DM patients of type 2 (Saheb Kashaf et al., 2017).

In addition, factors that influence medication adherence in DM patients of type 2 include socio-economic factors, information from health facilities, family support, treatment when symptoms appear, routine checks of blood sugar levels, complexity of pharmacotherapy and patient beliefs about drugs. Respondents who do not comply need to intervene by providing education to both individuals and families about the importance of controlling blood sugar, taking medication, doing physical activity and how to improve medication adherence. Education and information related to DM treatment adherence of type 2 during this pandemic, an alternative solution that can be done is to provide education through digital

media, educational videos or telemedicine. In addition, interventions need to be carried out to monitor medication adherence in DM patients of type 2 who has not complied. In the study, the results of the multivariate analysis test in the final model showed that the presence of side effects of DM drugs felt by the respondents had an effect on reducing 0.44 times the medication adherence of type 2 DM patients compared to respondents who did not experience side effects of DM drugs (OR = -0.44; 95% CI = -0.74 to -0.15; p = 0.003).

Conclusion

Based on the results of research conducted at the Public Health Center of Purwodiningratan, it showed that there was a relationship between medication adherences of patients with DM of type 2 with side effects of DM drugs consumed. The level of adherence to treatment of DM patients of type 2 is at Public Health Center of Purwodiningratan mostly fall into the obedient category. The most influential factor is the side effects of DM drugs of type 2. From this study, it was found that patients who did not experience side effects of DM drugs were more compliant by 0.44 times than patients who experienced side effects of DM drugs. In future research, it is expected to conduct research related to other risks related to factors that influence DM treatment adherence of type 2 such as knowledge, motivation, and attitudes of DM patients of Type 2.

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Determinants of Low Birth Weight in Indonesia

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Abstract

Low birth weight (LBW) is one of the main factors influencing the development of chronic disease in adulthood in surviving or surviving infants. This study aims to determine the determinants of the incidence of LBW in toddlers (infants aged 0-5 years) in Indonesia. This study uses a data set from the 2017 Indonesian Demographic and Health Survey (IDHS). The dependent variable is the child's LBW status, while the independent variable consists of 3 variable blocks, namely; distal, intermediate and proximal variables. The number of samples in this study was 14,372 people. Data analysis was done descriptively and inferentially. The results showed that, of the 14,262 samples analyzed, 7% showed LBW. The highest probability of LBW was associated with the type of birth of twins (AOR: 22,087; 95%CI: 18,344-26,194), the order of birth of the 4th child or more (AOR: 2,231; 95%CI: 1,887-2.598), experiencing pregnancy complications (AOR: 1.887; 95% CI: 1.543-2.134), number of ANC visits less than 4 times (AOR: 1.763; 95% CI: 1.411-2.202), low maternal education (AOR: 1.711; 95% CI: 1.344-2.143), no consumption of iron tablets during pregnancy (AOR: 1.316; 95% CI:1.109-1.623), and households with low wealth quintiles (AOR: 1.301; 95% CI: 1.197-1.324. Various aspects have been associated with LBW which is expected to contribute on elaborating health and family policies and promoting better living conditions for mothers and children in Indonesia.

Introduction

Although the prevalence continues to decline, the stunting rate among children under five in Indonesia is still above the global average prevalence of 27.7% compared to 22.0%. (UNICEF/WHO/World Bank, 2021). The low level of intelligence and child productivity as a result of stunting and other nutritional disorders affects economic growth and the provision of quality Human Resources (HR) (McGovern et al., 2017). This has prompted the government to target reducing stunting to become one of the National Priority Programs.

One of the biggest risks of stunting in Indonesia is due to low birth weight (LBW) (Aryastami et al., 2017; Lestari, Hasanah and Nugroho, 2018; Utami et al., 2018). Although children's physical development is more influenced by postnatal conditions, a study in Pakistan found LBW is the main cause of failure to thrive in infants less than three years old. (Avana, Razab and Kirkwoodc, 2014). In line with that, research in Wuhan, China also showed that babies with low birth weight were at risk of experiencing delays in gross motor development, fine motor skills, and adaptability (Zhang et al., 2020). This situation worsens if LBW infants do not receive adequate energy and nutrient intake. Babies with LBW also have a higher risk of experiencing neonatal jaundice or jaundice and causing death (Puspita, 2018). This shows that birth weight is an important indicator of vulnerability to disease risk and child survival (Mulu et al., 2020; Sabbaghchi, Jalali and Mohammadi, 2020).

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Data from the 2012 Indonesian Demographic and Health Survey (IDHS) noted that the prevalence of LBW in Indonesia reached 12%, while the prevalence of extreme LBW (with a baby weighing less than 1,500 grams) was 0.7%. Basic Health Research Results (Riskesdas), 2018 shows that around 6% of children under five in Indonesia have low birth weight, where in general this figure has increased from previous years, although not too big (Ministry of Health of the Republic of Indonesia (Kemenkes, 2018). This condition indicates that LBW is still an important problem that requires special attention and must be resolved immediately because it will affect the quality of Indonesia's next generation of human resources.

Various studies have shown that the incidence of LBW is influenced by internal and external factors of the mother (Falcão et al., 2020; Trerotoli et al., 2021). Indoor air pollution, lack of iron intake during pregnancy, insignificant weight gain during the second and third trimesters of pregnancy, comorbidities during pregnancy, and preterm delivery were found to be risk factors associated with LBW (Anil, Basel and Singh, 2020). In addition, short mother, occurrence of pregnancy complications, gestational hypertension, incomplete antenatal visits, and low maternal education are also predictors of LBW (Mulu et al., 2020).

Although there have been many similar studies, research related to the determinants of LBW is still interesting to continue. The prevalence of LBW which tends to increase and the varying socio-economic conditions of the community, which are thought to have contributed differently to the number of LBW cases in Indonesia, are problems that still require solutions. This study aims to determine the determinants of LBW in children under five in Indonesia using the 2017 IDHS data. This study analyses not only the proximate causes of LBW but also the distal and intermediate variables that influence it, namely social demographics and characteristics of prenatal care. With the information generated from this study, it is hoped that the risk of LBW can be prevented, making it easier for policy makers to formulate strategies to intervene to prevent stunting and other child development disorders due to LBW..

Method

This study uses the 2017 IDHS data which is a cross sectional study. The unit of analysis in this study were women who gave birth in the last five years and their children were weighed at birth. In accordance with these criteria, the number of samples obtained was 14,372 women (Figure 1). The dependent variable in this study is the child's birth weight status, which is categorized into two, namely normal (baby birth weight 2,500 grams) and LBW (baby birth weight <2500 grams). The independent variable used is a modification of the research (Belfort et al., 2018) and (Falcão et al., 2020) which consists of 3 blocks of variables, namely distal variables, intermediate variables (intermediate) and proximal variables. The distal variable is a sociodemographics characteristic consisting of area of residence, source of drinking water, sanitation, fuel for cooking, availability of hand washing facilities, number of members in the household, mother's marital status, mother's education, mother's ownership of health insurance, wealth quintile and last pregnancy status. The intermediate variable is the characteristic variable of prenatal care, namely the number of ANC visits. Proximal variables are biological and obstetrical characteristics variables consisting of maternal age at delivery, pregnancy complications, consumption of iron tablets during pregnancy, maternal smoking status, sex of newborn, birth order of newborns, and type of birth.

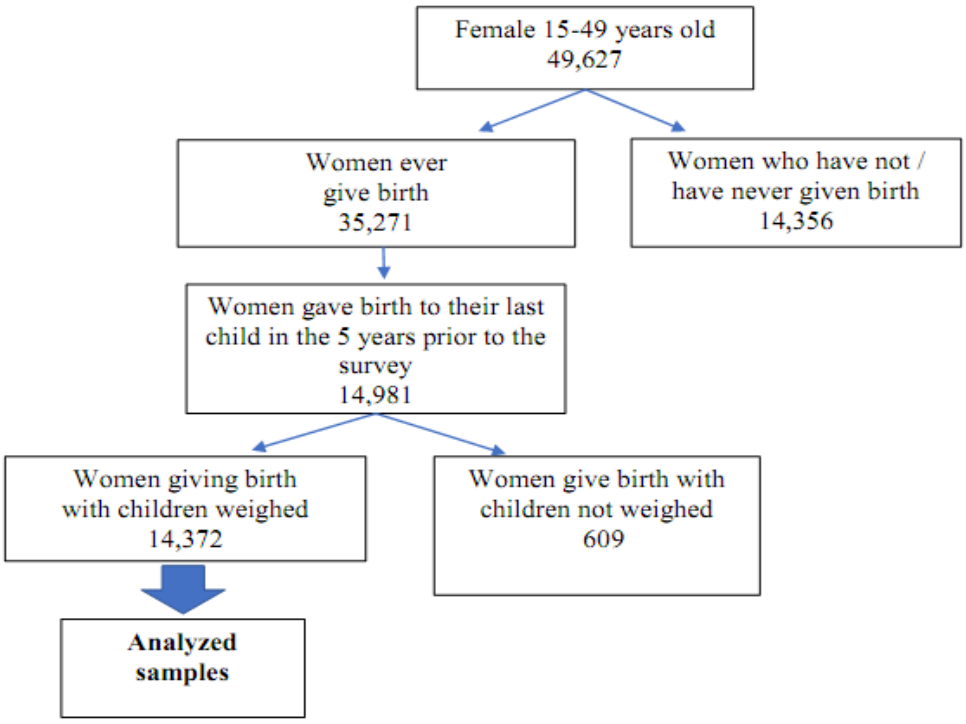

Figure 1. Flowchart Description Detailing the Acquisition of the Unit of Analysis/Research Sample

Data analysis was done descriptively, bivariately, and multivariately. Bivariate analysis was carried out through the Chi Square Test which aims to examine the relationship of each independent variable with the dependent variable, namely the baby's birth weight status. Meanwhile, to analyze the relationship between the independent variables and the baby's birth weight status multivariately (simultaneously with several variables), binary logistic regression analysis was used.

The limitations of this study are: 1) This study is limited to data from the 2017 IDHS processing for WUS (15-49 years) who had given birth to their last child in the 5 years prior to the survey with children being weighed. 2) The lack of data on LBW babies is very dependent on the respondent's memory (recall bias), because this question occurred before the survey and allowed respondents to forget and not remember for sure.

Results and Discussion

Among the 14,372 samples investigated, 6.7% found LBW. Table 1 lists the characteristics of newborns with LBW. About sociodemographic characteristics (distal), 50.1% live in urban areas, 88.0% have proper drinking water sources, 82.7% have proper sanitation, 78.9% cook using electricity/gas fuel, have proper hand washing facilities (88.9%), the number of household members is 5-7 people (48.4%), the mother's marital status is married/living together (97.1%), secondary education (59.4%), has health insurance (59%), high wealth quintile (40.9%), and desired last pregnancy status (83.6%). Regarding the characteristics of prenatal care (intermediate), 92.8% had complete ANC visits (>4 times).

According to biological and obstetric characteristics (proximal), 77.0% maternal age at delivery was 20-35 years, did not experience pregnancy complications (82.1%), consumed iron tablets during pregnancy (87.6%), maternal status did not smoke (98.5%), the sex of the boy (51.1%), the order of birth of the last 2-3 children (53.8%), and the type of single birth (99.3%).

Table 1. Distribution of Sample Characteristics

Variable		Frequency	%
Baby's weight			
Baby's weight at birth	Normal (>=2500gr)	13,403	93.3
	LBW (< 2500gr)	968	6.7
Sociodemography (Distal)			
Residential area	Urban	7,196	50.1
	Rural	7,176	49.9
drinking water source	Worthy	12,646	88.0
	Not worthy	1,726	12.0
Sanitation	Worthy	11,887	82.7
	Not worthy	2,485	17.3
Cooking fuel	Electric/gas	11,343	78.9
	Non-electric/gas	3,029	21.1
Hand washing facilities	Worthy	12,775	88.9
	Not worthy	1,597	11.1
Number of members in Ruta	<= 4	5,965	41.5
	5-7	6,963	48.4
	>7	1,444	10.1
Mother's marital status	Married/live together	13,950	97.1
	Not married (divorced/separated)	422	2.9
Mother's education	Low (<=Elementary School)	3,641	25.3
	Middle School (Junior High School-High School)	8,543	59.4
	College (Academy/College)	2,188	15.3
Mother's ownership of health insurance	No	5,894	41.0
	Yes	8,477	59.0
Wealth quintile	Low	5,450	37.9
	Medium	3,039	21.2
	High	5,883	40.9
Recent pregnancy status	Yes, wanted	12,009	83.6
	Wanted later	1,188	8.3
	Unwanted	1,175	8.1
Prenatal care (intermediate)			
Number of ANC visits	Never	207	1.4
	1-3 times	830	5.8
	≥4 times	13.335	92.8
Biological and midwifery (proximal)			
Mother's age at birth	<20	886	6.2
	20-35	11,069	77.0
	>35	2,417	16.8
Pregnancy complications	No	11,804	82.1
	Yes	2,568	17.9
Consumption of iron tablets during pregnancy	No	1,780	12.4
	Yes	12,592	87.6
Mother's smoking status	No	14,152	98.5
	Yes	220	1.5
Gender of child	Male	7,339	51.1
	Female	7,033	48.9
Birth order	1	4,872	33.9
	2-3	7,739	53.8
	≥4	1,769	12,3
Birth type	Single	14,270	99.3
	Twins(>1)	101	0.7
	Total	14,372	100.0

Source: IDHS, 2017

Table 2 illustrates the results of our bivariate and multivariate analyses. After analyzing simultaneously (multivariate) it was seen that not all variables statistically related to LBW in the bivariate analysis had an effect on LBW, after being controlled by other variables. In the adjusted model for multivariate analysis, the likelihood of LBW was higher among infants born to women who self-proclaimed multiple births (AOR: 22,087; 95% CI: 18,344-26,194), birth order of children to 4 or more (AOR: 2,231; 95% CI: 1.887-2.598), experienced pregnancy complications (AOR: 1.887; 95% CI: 1.543-2.134), the number of ANC visits was less than 4 times (AOR: 1.763; 95% CI: 1.411-2.202), low maternal education (AOR: 1.711; 95% CI: 1.344-2.143), did not take iron tablets during pregnancy (AOR: 1.316; 95% CI: 1.109-1.623), and households with low wealth quintiles (AOR: 1,301; 95% CI: 1,197-1,324).

Table 2. Tendency Ratio (Odds Ratio) Effect of Independent Variables on Infant Weight Status at Birth, 2017 IDHS

Variable/Category		Baby Weight Status at Birth				Bivariate		Multivariate			
		Normal (>=2500gr)		LBW (< 2500gr)		OR	P-value	AOR	P-value	CI 95%	
		N	%	n	%						
Sociodemography (Distal)											
Residential area	Urban*	6,707	93.2	489	6.8	1.00	0.799				
	Rural	6,696	93.3	480	6.7	0.98					
Source of drinking water	Worthy*	11,814	93.4	832	6.6	1.00	0.035				
	Not worthy	1,589	92.1	137	7.9	1.22					
Sanitation	Worthy*	11,133	93.7	755	6.3	1.00	0.000				
	Not worthy	2,271	91.4	214	8.6	1.39					
cooking fuel	Electric/gas*	10,611	93.5	732	6.5	1.00	0.008				
	Non-electric/gas	2,792	92.2	237	7.8	1.23					
Hand washing facilities	Worthy*	11,945	93.5	830	6.5	1.00	0.001				
	Not worthy	1,458	91.3	139	8.7	1.37					
Number of members in Home	<= 4*	5,603	93.9	361	6.1	1.00	0.015				
	5-7	6,467	92.9	496	7.1	1.19					
	>7	1,333	92.3	112	7.7	1.30					
Marital status	Married/live together *	13,024	93.4	926	6.6	1.00	0.007				
	Not married (divorce/separate)	380	90.0	42	10.0	1.56					
Education	Low (<=Elementary School)	3,326	91.4	315	8.6	1.69	0.000	1,711	0.000	1.344 -	2,143
	Middle School (Junior High School-High School)	8,005	93.7	538	6.3	1.20		1,269	0,021	1,096 -	1.443
	Higher education (Academy/ College)*	2,072	94.7	116	5.3	1.00		1.000			
Health insurance ownership	No	5,503	93.4	391	6.6	0.97	0.666				
	Yes*	7,900	93.2	578	6.8	1.00					
Wealth quintile	Low	5,024	92.2	426	7.8	1.35	0.000	1,301	0,002	1,197 -	1,324

	Medium	2,843	93.6	196	6.4	1.10		1,193	0,010	1,091 -	1,203
	High*	5,536	94.1	347	5.9	1.00		1,000			
Recent pregnancy status	Yes, wanted*	11,185	93.1	824	6.9	1.00	0.365				
	Wanted later	1,113	93.7	75	6.3	0.91					
	Unwanted	1,105	94.1	69	5.9	0.85					
Prenatal Care *Intermediate*)											
Number of ANC visits	< 4 kali	916	88,2	121	11,8	1,96	0,000	1,763	0,000	1,411 -	2,202
	≥4 kali *	12.488	93,6	847	6,3	1,00		1,000			
Biological and Midwifery (*Proximal*)											
Age of woman/mother	<20	815	92.0	71	8.0	1.23	0.292				
	20-35*	10,335	93.4	735	6.6	1.00					
	>35	2,254	93.3	163	6.7	1.01					
Pregnancy complications	No*	11,102	94.1	702	5.9	1.00	0.000	1,000			
	Yes	2,302	89.6	267	10.4	1.83		1,887	0,000	1,543 -	2,134
Consumption of iron tablets during pregnancy	No	1,619	91.0	161	9.0	1.45	0.000	1,316	0,008	1,109 -	1,623
	Yes*	11,784	93.6	808	6.4	1.00		1,000			
Smoking status of woman/mother	No*	13,195	93.2	957	6.8	1.00	0.301				
	Yes	209	95.0	11	5.0	0.73					
Child gender	Male*	6,868	93.6	471	6.4	1.00	0.113				
	Female	6,535	92.9	498	7.1	1.11					
Birth order	1	4,512	92.6	361	7.4	1.22	0.013	1.113	0,020	1,041 -	1,334
	2-3*	7,262	93.8	477	6.2	1.00		1.000			
	≥4	1,354	92.4	111	7.6	4.45		2.231	0,000	1,887 -	2,598
Birth type	Single*	13,372	93.7	898	6.3	1.00	0.000	1.000			
	Twins(>1)	31	31.0	70	69.0	33.16		22.087	0,000	18,344 -	26,194

Source: IDHS, 2017

This study evaluates the factors associated with low birth weight (LBW) infants in Indonesia. Our findings show that LBW is associated with babies born to mothers who self-declared the type of birth of twins, birth order of children 4 or more, experiencing pregnancy complications, number of incomplete ANC visits 1-3 times, low maternal education, households with low wealth quintile and did not take iron tablets during pregnancy. Twin pregnancy is the most risky variable for LBW in this study. The results showed that twin pregnancies had 22,087 times the chance of developing LBW compared to singleton pregnancies. In addition to being at risk for LBW, twins are at risk for neonatal death. The results of research conducted by (Bintang et al., 2018) showed that there was a significant relationship between multiple births and neonatal mortality, where multiple births had a 2.39 times chance of experiencing neonatal death compared to singleton births after controlling for parity factors and birth weight.

Another significant factor influencing the incidence of LBW is birth order. In the order of birth of children, the greater the number of birth orders of children, the greater the possibility of LBW. The chance of LBW births decreases in birth order 2-3, but in birth order 4 or more it can increase the chance of LBW birth 4.45 times greater than birth order 2-3 children. Children with the first birth order also have a greater chance of experiencing LBW than those in the 2-3 birth order (Zaveri et al., 2020). This may happen because mothers who are pregnant for the first time are not experienced in caring for their pregnancies. This condition is the same as what happened in India, the order of birth of more than two children actually reduces the risk of LBW (Khan, Mozumdar and Kaur, 2020). Testosterone levels are thought to affect LBW in the first child, while in the second child it will increase by 115 grams, but this trend decreases in the third and fourth order. The higher the age of the mother and the greater the number of children, the lower the testosterone level (Ghaemmaghami et al., 2013).

Another important predictor of low birth weight in this study is the occurrence of pregnancy complications. The results of the multivariate analysis in this study showed that there was a relationship between a history of complications during pregnancy and the incidence of LBW with p-value = 0.000 (<0.05), which was statistically significant. The adjusted odds ratio or AOR value obtained is 1.887 (95% CI: 1.543 - 2.134), meaning that mothers who have a history of complications during pregnancy are at 1.887 times greater risk than mothers who do not have a history of complications during pregnancy to give birth to children with low birth weight. This finding strengthens previous research that women who experience complications during pregnancy will increase the incidence of LBW (Mulu et al., 2020).

The estimated OR for LBW was found to increase with a decrease in the number of prenatal visits, indicating the importance of prenatal care. Less provision of prenatal care, characterized by a lower number of visits, has been associated with negative perinatal outcomes, such as low birth weight (Mahumud, Sultana and Sarker, 2017; Belfort et al., 2018; Falcão et al., 2020; Mulu et al., 2020; Bekalo et al., 2021). Mothers who perform ANC at least 4 times, tend to be less likely to experience LBW births. Research in India states that the incidence of women giving birth to LBW babies is lower in mothers who perform ANC 4 times (Zaveri et al., 2020). Furthermore, it is stated that routine pregnancy check-ups will affect the practice of maternal health for the fetus so that incomplete ANC visits have a significant effect on the incidence of LBW. Even incomplete ANC increases the risk of LBW up to 7 times greater (Mulu et al., 2020). This happens in several developing countries, inadequate ANC increases the risk of LBW occurrences than those who perform ANC according to standards, but this is greatly influenced by the frequency of standard ANC visits in each country (Mahumud, Sultana and Sarker, 2017) . Mothers who perform ANC will monitor hemoglobin levels more closely from the beginning of pregnancy until delivery, besides that the clinic can also monitor the condition of anemia, height and weight so that the mother's actual BMI is measured during pregnancy (Adam et al., 2019).

Our analysis shows that the incidence of LBW babies is inversely related to the mother's

level of education, i.e. the lower the mother's education level leads to a greater chance of giving birth to LBW babies. This finding corroborates other studies investigating factors associated with LBW, highlighting the importance of socioeconomic conditions, especially with regard to the education level of mothers or their families (Trisnawati, Salimo and Murti, 2018; Falcão et al., 2020; Mulu et al., 2020; Bekalo et al., 2021). Maternal education level is associated with better knowledge of nutrition and generally understanding and adhering to health professional recommendations during pregnancy (Falcão et al., 2020). Educational factors and good wealth quintiles are protective factors against the incidence of LBW. Other studies also show that educated women generally have more access to health facilities and are more exposed to information about the risks of inadequate health service utilization (Adam et al., 2019). Another finding also states that illiterate mothers have a high risk of experiencing LBW when compared to educated mothers, even mothers with low education have a 4 times greater risk of experiencing LBW than mothers with higher education (Mahumud, Sultana and Sarker, 2017; Mulu et al., 2020).

The proportion of LBW decreased along with the increasing level of household wealth of respondents. This finding is in line with other studies that the incidence of LBW is inversely related to wealth quintiles (Trisnawati, Salimo and Murti, 2018; Bekalo et al., 2021). In addition, it is stated that economically well-off families will go to better quality health facilities and be exposed to as much information as possible regarding adequate health during pregnancy, because rich women are easier to educate. In addition, rich families are able to consume appropriate and nutritious food during pregnancy so that the risk of experiencing low birth weight is lower than poor women (Adam et al., 2019). The richer the economic level, the lower the chance of experiencing LBW, one of the reasons is that mothers with poor economic conditions experience a greater level of stress which affects the condition of their pregnancy (Ghaemmaghami et al., 2013; Mahumud, Sultana and Sarker, 2017; Zaveri et al., 2020).

The incidence of LBW decreases along with behavior during pregnancy, namely the consumption of iron tablets. Prevention of LBW also depends on the fulfillment of nutrition and lifestyle during pregnancy, including the use of multivitamin supplements containing calcium, iron and folic acid, all essential micronutrients for proper fetal growth, in addition to preventing risky behaviors, for example: tobacco use (cigarettes), alcohol and drugs (Falcão et al., 2020). This finding is similar to a previous study which stated that not taking the required daily iron supplementation and mothers with first trimester hemoglobin below 11 g/dl were determinants of low birth weight (Adam et al., 2019). Another finding states that iron intake of less than 180 tablets during pregnancy is at risk of developing low birth weight (Anil, Basel and Singh, 2020).

Conclusion

Although the percentage is low, the continuous increase in the prevalence of babies born with low body weight must be watched out for. The closest variable (proximal) was statistically proven to have the greatest influence on low birth weight babies. However, the influence of other factors cannot be ignored, especially in the formulation of intervention strategies. The influence of distal variables, namely education and wealth status, on the knowledge and attitudes of the mother then greatly determines the mother's behavior in an effort to prevent her baby from being born with low weight. Therefore, policies to improve women's education are still very important. Not only affecting the level of knowledge about nutrition, pregnancy care, and reproductive health including family planning, improving women's education is also an effort to improve their welfare in the future. With a good level of welfare, it is hoped that nutritional fulfillment can be carried out in a sustainable manner in all phases of life. In addition, there needs to be a strategy for providing integrated communication, information, and education between the Family Planning Program (KB) and nutrition improvement that targets not only EFA but also teenagers..

The provision of communication, information, and education, family planning programs and nutrition education as early as possible is expected to prevent malnutrition

experienced by pregnant women which has an impact not only on the health of the mother but also the baby born. Improving health facilities that meet the ideal ANC examination standards supported by adequate resources, equipment, and affordable prices so that pregnant women can get quality ANC services. In addition, for health workers to provide counselling for pregnant women and their husbands on a regular basis to increase the knowledge of pregnant women about the importance of the ideal ANC examination so that mothers and babies are born healthy. Health facilities should be more active in providing counselling or communication, information, and education, putting up media posters, and providing leaflets related to iron (Fe) tablets and anemia to pregnant women and their husbands, so that they can motivate pregnant women to consume iron tablets. (Fe).

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Stakeholder Perception of Health Resources and Village-Funds Optimizing for Maternal and Child Health Program

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Abstract

The low support on cross-sectoral commitment of village stakeholders to health programs was one of factors contributed maternal and infant mortality in Tegal Regency. Although village funds have been rolled out since 2015, its implementation hadn't been optimal due to orientation focus on infrastructure development. The study aims to analyze perceptions and attitudes of village stakeholders towards village level resources and optimizing village funds for MCH programs based on 3 groups stakeholder (Decision Maker, Provider and Clients-Representatives). It's quantitative research, population of all village level stakeholders with 300 people as samples from 30 selected villages. Data collected with interview using questionnaire and being analyzed with frequency distribution and statistically using Kruskal-Wallis test. Most of three group stakeholders had good perception of their health resources and positive attitude towards MCH programs, but different results were seen for attitudes towards optimizing village funds. Decision Maker group and Clients-Representatives group showed tendency refusing, while Provider group tend to agree on village funds optimizing for MCH programs. Statistically, there were differences in attitudes towards optimizing village funds for MCH program between three groups. Attitude differences was mainly due to lack of understanding from external health stakeholders about health programs, especially village's MCH program.

Introduction

The high Maternal Mortality Ratio (MMR) and Infant Mortality Rate (IMR) were still major health problems in developing countries (Geller et al., 2018; Zureick-Brown et al., 2013). The main causes of maternal death were pregnancy complications, childbirth complications and medical history (Bauserman et al., 2015). Infant mortality was mainly due to asphyxia, respiratory disorders, prematurity and low birth weight (Abdullah et al., 2016; Anggondowati et al., 2017; O'Hare et al., 2013). The MMR and IMR reflected health development level and quality of life of community (Ignacio Ruiz et al., 2015) and at the same time as means to monitor and evaluate health programs and policies (Yugistyowati, 2020). One of determinants that affected difficulty reducing maternal and infant mortality was the low stakeholder support, especially for cross-sectoral commitments even though their involvement has increased (Harbianto et al., 2016; Jati et al., 2020; Nurani; et al., 2018), in addition of socioeconomic

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factors (poverty), inequity and unfairness access of services (Abbasi & Younas, 2015; Ignacio Ruiz et al., 2015).

The stakeholder role is important in successful health programs implementation, including MCH program (Ignacio Ruiz et al., 2015; Sombie et al., 2017). Through tiered collaboration from center to village level, it is necessary to strive for strengthening stakeholder role in a comprehensive network. The stakeholder roles are very varied in form of policy support, facilities and financing, as well as in community mobilizing for using health services and supporting their active role in UKBM (Posyandu, Poskesdes, etc.), as well as support in form of guidance and counselling, including support for facilitation of infrastructure. The form of stakeholder support covers many aspects, from policy, managerial to operational aspects, including monitoring and evaluation mechanism (Douthard et al., 2021).

Study of Harbianto et-al showed one of capacities that must be improved in reducing maternal and child mortality at regional level was through strengthening cross-sectoral planning and budgeting. It was proven that failure achieving targets of MCH program was due to blockage of unsystematic planning mechanism (Harbianto et al., 2016). Through Law No. 6 of 2014 concerning Villages, national government had allocated village funds as source of financing and implementation of local village-scale activity programs. The aim is not only equalizing financial capacity between villages, but also improving rural community welfare and quality of life of community, as well as efforts reducing poverty. Villages had authority to regulate its finances according to needs of local area and in preparing program plans and budgeting involving all relevant sectors. Improved rural health infrastructure could increases the demand and utilization of ANC services for poor families in India (Gupta et al., 2017).

Tegal Regency is one of 35 regencies in Central Java province that have been affected by Covid-19 pandemic. In last three years there has been increasing in cases of maternal and infant mortality. In 2019 there were 12 cases of maternal death, increasing to 28 cases in 2020 and until November 2021 were 27 cases. The main causes of death were eclampsia by 46% (in 2020) and due to Covid-19 by 44.4% in 2021. From 27 maternal deaths, 13 cases (48.2%) occurred during postpartum period, 10 cases (37%) during pregnancy and 4 cases (14.8%) during delivery. The IMR also increased from 5.95 per 1000 KH (in 2019) to 6.9 per 1000 KH (in 2020) with 152 deaths. Until October 2021 were 113 cases of infant mortality. Total 61.9% of infant deaths occurred at age of 0-6 days, 20.9% at age of 7-28 days and 17.2% at age of 29 days-11 months. Asphyxia, LBW and ARI (acute respiratory infection) were main causes of infant mortality.

Although village funds have been rolled out by national government since 2015, the implementation in health programs was still not optimal (Suarsih et al., 2017). So far, focus of village fund financing have been on infrastructure development, although starting in 2019 it had begun to be directed at strengthening community empowerment. Study of Tumaji & Putro provided evidence of low utilization of village funds for health in Pasuruan and Sampang districts, which was on average 4.17% and was mostly used for infrastructure and non-health development (Tumaji & Putro, 2018). It was recognized that policy actor, especially Village Head and village officials had important role in every development process in village including in village funds managerial, because they were the compilers and implementers of development in village. Suarsih et al. stated that low level of health development was due to village government's assumption that the responsibility for health development was the Health Office and PHC (Suarsih et al., 2017). On the other hand, study of Ismawati et-al showed the role of Village Head as a decision maker, although he often did not understand the program technically because it tends not to involve integrated service post (Posyandu) cadres in preparation of village budget (Ismawati et al., 2017).

Based on description above, this study aims to analyze perceptions and attitudes of

village level stakeholders towards village level health resources and village funds optimizing for maternal and child health programs based on different three stakeholder categories, include Decision Maker (DM) group, Providers (P) and Clients & Representatives (CR). Regarding ethical feasibility, this research had been declared having passed ethical review from Commission of Health Research Ethics (KEPK) from Public Health Faculty, Diponegoro University with Number: 71/EA/KEPK-FKM/2021.

Method

This study uses a quantitative survey research with cross-sectional approach. Population were all village level stakeholders related to MCH programs implementation in village, including: Village Head, Village Secretary, BPD, other village officials, FKD/FKK, PKK/Pokja-4, regional apparatus (RT/RW/Dukuh/Dusun), religious leaders, community leaders, youth organizations, village associations, village midwives, health cadres and so on. Sampling determination was carried out by purposive sampling technique based on villages criteria that had cases of maternal and child mortality in last year so 30 villages were selected. Total respondents were 300 people because 10 stakeholders were taken from each village and they divided into three categories of roles, namely; Decision Maker include: Village Head, Secretary and other village officials, BPD and FKD. Provider group include: Village Midwives and Health Cadres, and group of Client & Representatives were sub local officer, religious leaders, community leaders, PKK/Pokja-4, Youth Organizations, community organizations and village associations.

Data was collected by interview using structured questionnaire. Because it was still in pandemic situation, interview was carried out while still complying with "health protocols" after previously respondent stated willing to be interviewed and making an appointment in advance. Validity and reliability tests have been carried out and the results were valid and reliable. The research variables include: perceptions of village health resources, attitudes towards MCH program and attitudes towards optimizing village funds for MCH. Analysis was carried out descriptively and statistically. Based on results of Kolmogorov-Smirnov test, it is known that data was not normally distributed, so variable categorization uses median value as cut off point. If score value < median was declared unfavorable, if score ≥ median was declared good. Furthermore, data were analyzed univariately with frequency distribution and analysis of the difference test for three groups using Kruskal Wallis test which was non-parametric test. If p value<0.05 on the statistical test results, it could be concluded there was significant differences.

Result and Discussion

From 300 respondents, based on their role in village, 135 people (45%) belonged to Decision Makers group, 60 people (20%) to Providers group and 105 people (35%) to Clients and Representatives group. Table 1 showed characteristics of respondents based on stakeholder groups were dominated by adults at age range 31-60 years old. In DM group, the largest proportion was in age range 41-50 years old (45.9%), male sex (70.4%), while CR group of 43.8% was in age range 41-50 years old and was male gender (50.5%). For P group, as 36.7% were in age range of 31-40 years old, followed by age range 41-50 years old (35%), with the largest proportion being female (93.3%). Most of respondents have middle level education with the largest proportion being passed high-school/equivalent for all stakeholder groups.

Table 1. Distribution of Respondents' Characteristics Based on Village Stakeholder Groups in Tegal Regency

Characteristic	Category	Decision Maker		Provider		Client & Representatives	
		n	%	n	%	n	%
Age	a. 21-30 years old	7	5.2	4	6.7	2	1.9
	b. 31-40 years old	22	16.3	22	36.7	30	28.6
	c. 41-50 years old	62	45.9	21	35.0	46	43.8
	d. 51-60 years old	37	27.4	12	20.0	20	19.0
	e. > 60 years old	7	5.2	1	1.7	7	6.7
Gender	a. Male	95	70.4	4	6.7	53	50.5
	b. Female	40	29.6	56	93.3	52	49.5
Education	a. Elementary/equivalent	1	0.7	2	3.3	6	5.7
	b. Junior high school/equivalent	11	8.1	9	15.0	19	18.1
	c. Senior high school/	74	54.8	28	46.7	55	52.4
	equivalent	14	10.4	20	33.3	9	8.6
	d. Academy/Diploma-3	35	25.9	1	1.7	16	17.3
	e. Undergraduate (S1)						
	Total	135	45.0	60	20.0	105	35.0

Source: Primary Data, 2021

Total of 54.2% of respondents from all stakeholder groups stated that their village had no maternal deaths in last 3 years, 19.3% said there were deaths and 26% said they did not know. For infant mortality in last 3 years, 39% said they had never, 29.7% said they had and 31.3% said they did not know. Table 2 described stakeholders' understanding of health resources available in their villages and most of three stakeholder groups stated their villages were Siaga Village and UCI Village (Universal Coverage of Immunization), although there were still did not know what Siaga Village was, as many as 11.9% from DM group, 16.7% from Provider group and 11.4% from CR group. For stakeholders who didn't know what UCI Village was, 33.3% were from DM group, 25% from Provider group and 38.1% from CR group.

Table 2 also showed that most of respondents from all groups stated that their village currently did not have a village ambulance, although there was small proportion who state that they have a village ambulance in form of loan cars belonging to local residents. Most of respondents from all groups stated their village had many Posyandu (>5) and health cadres that numbered >20 people and they were very active. Most of respondents also stated that their village already had Village Health Unit (Poskesdes), although there were 13.4% respondents from Provider group who stated that they did not know and did not have Poskesdes. This description showed all stakeholder groups generally had positive perceptions and understandings regarding health village resources.

Table 2. Distribution of Village Stakeholder Perception about Village Health Resources in Tegal Regency

Health Village Resources	Category	Decision Maker		Provider		Client & Representatives	
		n	%	n	%	n	%
Siaga village	a. Do not know	16	11.9	10	16.7	12	11.4
	b. No	22	16.3	8	13.3	18	17.1
	c. Yes	97	71.9	42	70.0	75	71.4
UCI village	a. Do not know	45	33.3	15	25.0	40	38.1
	b. No	29	21.5	7	11.7	15	14.3
	c. Yes	61	45.2	38	63.3	50	47.6
Village ambulance	a. Do not know	8	5.9	5	8.3	6	5.7
	b. Do not have	80	59.3	35	58.3	60	57.1
	c. Have but borrow a car	3	2.2	4	6.7	1	1.0
	d. Have own ambulance	44	32.6	16	26.7	38	36.2
Integrated Service Post (*Posyandu*)	a. Do not know	0	0	0	0	4	3.8
	b. Have (≤5)	44	32.6	19	31.7	29	27.6
	c. Have (>5)	91	67.4	41	68.3	72	68.6
Number of health cadres	a. Do not know	0	0	3	5.0	6	5.7
	b. Have (≤20)	2	1.5	0	0	3	2.9
	c. Have (>20)	133	98.5	57	95.0	95	90.5
Number of active health cadres	a. All cadres inactive	1	0.7	0	0	3	2.9
	b. Few cadres active	0	0	0	0	1	1.0
	c. Most cadres active	24	17.8	14	23.3	18	17.1
	d. All cadres active	110	81.5	46	76.7	83	79.0
Health Village Post (*Poskesdes*)	a. Do not know	0	0	4	6.7	4	3.8
	b. Do not have	3	2.2	4	6.7	3	2.9
	c. Have	132	97.8	52	86.7	98	93.3

Source: Primary Data, 2021

Table 3 showed the frequency distribution of stakeholder groups attitudes about MCH program, where the largest percentage of DM group was in poor category (57%) and this was greater than Provider group which was also in poor category (50%). The results were different in CR group because the proportion in good category was greater (55.2%). Regarding attitudes about optimizing village funds for MCH program, the DM and CR groups both indicated that proportion of those with poor perception was greater than those with good perceptions. As many as 63% of respondents from DM group and 53.3% from CR group. On the other hand, from Provider group, the largest percentage had a good perception of optimizing village funds for MCH program (61.7%). There was a tendency for lack support in optimizing village funds for MCH program in village, especially in DM and CR groups. Strong support comes from the service provider group (P). Furthermore, regarding perception of health resources, three groups showed linear result, where most of them had a good perception and understanding of health resources currently owned by their village, although it was recognized that the proportion of the Provider group was higher than other two groups, namely 60% versus 56.3% and 52.4%.

Table 3 Distribution of Attitudes and Understandings Based on Differences in Village Stakeholder Groups in Tegal Regency

Research variables	Category	Decision Maker		Provider		Clients & Representatives	
		n	%	n	%	n	%
Perception of Village Health Resources	a. Poor	59	43.7	24	40.0	50	47.6
	b. Good	76	56.3	36	60.0	55	52.4
Attitude to MCH Program	a. Poor	77	57.0	30	50.0	47	44.8
	b. Good	58	43.0	30	50.0	58	55.2
Attitude to Village Funds Optimizing	a. Poor	85	63.0	23	38.3	56	53.3
	b. Good	50	37.0	37	61.7	49	46.7

Source: Primary Data, 2021

Table 4. Difference Analysis of Attitudes and Understanding Based on Village Stakeholder Groups in Tegal Regency

Research variables	Decision Maker (DM)		Provider (P)		Client & Reprv (CR)		Sig. (*p-value*)
	n	*Mean rank*	n	*Mean rank*	n	*Mean rank*	
Perception of Village Health Resources	135	152.36	60	153.22	105	146.56	0.841
Attitude to MCH Program	135	138.88	60	162.93	105	158.34	0.102
Attitude to Village Funds Optimizing	135	135.94	60	178.93	105	152.98	**0.005***

*Significant at p<0.05 in *Kruskal Wallis* non-parametric test
Source: Primary Data, 2021

Because data was abnormal and wanted to know difference between >2 groups, so Kruskal Wallis non-parametric test was used. Table 4 showed attitude variable towards village funds optimizing was statistically proven to be different between three stakeholder groups because of p-value=0.005 was far below the threshold p<0.05 while for attitude variable towards MCH program and perception of village health resources there was no difference between groups. The DM group was more likely disagree with optimizing village funds for MCH program, while the Provider group was very supportive. Meanwhile, the CR groups were divided in almost equal proportions between those who agree and disagree. These results also proved that an understanding of MCH program, especially in rural areas would determine their attitude towards the program. Understanding of MCH program influenced the attitudes and perceptions of stakeholders' roles towards these program (Chol et al., 2018; George & Branchini, 2017).

Village funds were funds sourced from APBN that were given by national government to villages and were mandated by Law No. 6 of 2014 concerning Villages. Increasing village income through village funds was aimed at improving community service facilities in meeting basic needs, strengthening village institutions and empowering communities. The allocation and distribution of using village funds was decided through Village Musrenbang which sees all stakeholders at village level. In accordance with the provisions, 70% allocation of village funds was used for community empowerment in form of developing village economic infrastructure, empowerment in fields of education, health and village economic empowerment according to village potential. Optimizing local potential had been proven to improve nutritional status in community which at the same time indicated effectiveness criteria of nutrition program was 60% as study by Handayani et-al (Handayani et al., 2018). Priority of financing village funds was implementing local scale programs and activities with the aim of improving community welfare and quality of life.

It must be admitted that the use of village funds had not been effective because of insufficient capacity and capability of village government, nor had active involvement of community in managing village funds been optimal (Azizi, 2016). In addition, quality of activity planning was still considered low and weaknesses of Health Office advocacy. In some areas, it's proven that allocation of village funds for health sector was often not a top priority (Tumaji & Putro, 2018) and even allocation of village funds for community empowerment in health sector does not even exist (Hill et al., 2014). According to Tumaji & Putro, for villages that do not yet have health facilities in village such as Poskesdes/Polindes or when Posyandu and Posbindu activities were not running optimal, village funds should be prioritized for the construction and development of health service facilities, including for maternal and child health programs (Tumaji & Putro, 2018).

With regard to management of development budget, study of Harbianto et-al. proved that involvement of relevant cross-sectors in planning and budgeting of MCH program had positive impact on the workplan and budgeting. His study in Papua showed increasing in allocation of funds for MCH

sector through strengthening the increasingly positive role of Local government revenue agency (BAPPEDA) (Harbianto et al., 2016). This condition could be implemented in management of village funds too, where all village stakeholders must be involved and their roles strengthened so the allocation for health programs funding and village community empowerment for health was also getting better through indicators of increasing budget allocations provided by village. Conceptually it was understood that each stakeholder had different influences and interests, so how to unite the same perception and understanding becomes a very crucial need (Kumar et al., 2018) which also includes multi-sectoral collaboration (Das et al., 2018). Study in Ethiopia proved strengthening health system's roles in multisectoral approach affected its success in achieving MDGs targets (Assefa et al., 2017). Study on nutrition program in Bangladesh also gave the same result (Kar, 2014).

Different characters of stakeholders made different contributions, including their different perspectives on health problems in their village. The study conducted by Sriatmi et-al regarding the role of stakeholders in the nutrition strengthening program in 1000 HPK (first day of life) illustrate that Decision Making group had power to influence programs, but did not really understand health programs. Stakeholders belonging to Provider group or service providers had better ability handling technical problems, but could not build collaboration with other stakeholders. On the other hand, it turns out that Client and Representatives (CR) group tend to be passive in building cooperation and did not regard this movement as important and tends to be ignored. The impact occur from different perspectives on each stakeholder would creating gaps in program implementation (Sriatmi et al., 2021), including to ensure its sustainability (Chol et al., 2018; Teychenne et al., 2021)

Another study by Buccini et-al which aim to map the influence of stakeholders involved in breastfeeding promotion policies and programs in Mexico and identify opportunities for strengthening breastfeeding-friendly environment could identify four important influence domains for stakeholders include: instruction, dissemination, funding and assistance technical, where strongest factor was dissemination aspect (Buccini et al., 2020). Each stakeholder will look at these four elements when faced with their role in various programs, including health programs. These results indicate that perception and strengthening of stakeholder role could be improved through how dissemination of program was carried out, through socialization and a clear, structured and routine communication mechanism. Furthermore, how technical assistance was provided through a model of assistance by related parties and local governments. Regulatory support and clear work system were the third important elements that must be considered, including finance ability. This result in line with study by Yugistyowati et-al which stated that facilitation to all stakeholders was needed through effective communication in order to accelerate neonatal health targets achievement, while increasing participatory empowerment principal (Yugistyowati, 2020).

Generally, this study showed perception of village stakeholders regarding sustainability of MCH program was quite good, although there were some things that need to be improved because as many as 35.5% of respondents apparently consider the MCH program fully the Public health center responsibility. This perception was not completely wrong when they did not understand the program. Although they were willing to be involved and participate in its implementation, it was only limited to supporting it. One of these conditions was evidenced by lacking of village ambulances as a form of village government facilitation support. This result in line with Suarsih's study in Malinau Regency which showed that village government considered that responsibility for health development rests was the Health Office and Public health center (Suarsih et al., 2017). Iswarno et-al study also showed that local government's political commitment to MCH program was still low, as evidenced by the minimal budget allocation MCH program (Iswarno et al., 2013).

Regarding to optimizing of village funds, it was known by this research that although most stakeholder support and agree on the need to optimize village funds for maternal and

child health programs, there were still some who said otherwise. It was known that 21.3% tend to agree that village funds were prioritized for village infrastructure development because the results were faster and clearly visible to community. As many as 15.3% respondents thought that Integrated Healthcare Center and Antenatal Class activities could not be financed from the village funds because it was government responsibility. As many as 54% respondents turned out to agree that village funds budgeted for health sector allocator were maximum 5% of total village fund budget and that was very good and was considered more than sufficient. Totally 13.7% also tend state all rules and regulations related to mechanism for budgeting health programs for villages were unclear and had not been properly understood by village officials. These results proved that there were different perceptions commitment among respondents about MCH program in their area. Different points of view will produce different dimensions of understanding. Differences of perceptions between stakeholders have an impact on not optimal coordination and program failure as Meutia & Yuliyanti study which proved one of weaknesses intervention strategy for reduction stunting due to low capacity of cooperation among stakeholders (Meutia & Yulianti, 2019). Lack of perception and attitude affected how they implemented their roles (Memon et al., 2015).

The lack of decision maker commitment in village related to efforts village funds optimizing for strengthening maternal and child health programs could be influenced by several factors, especially their lack of knowledge and understanding regarding the benefits and interests of program for community health status and performance indicators in the health sector. In addition, the ignorance factor of village-level decision makers in describing and developing potential indicators in concept of strengthening community empowerment as stipulated in regulations issued by Ministry of Villages related to allocation of village funds. Based on commitment and active role of various stakeholder components in fostering and assisting community elements in various implementation processes and activities related to efforts reducing maternal and infant mortality, it was expected to increase understanding, capability, as well as facilitation support for optimizing the utilization of all village potentials, including village funds. The study of Jati et-al showed the commitment of local governments, private sector and other sectors was related to success of achieving minimum service standards (MSS) for health, especially maternal and child health (Jati et al., 2020). Continuous strengthening of accountability and advocacy at all governmental levels through civil society involvement played an important role achieving the success of MCH programs (Hoope-Bender et al., 2016). Collaboration and partnership between public and private sectors were key indicators, as studies result in Hawaii (Hayes et al., 2016) and California (Main et al., 2018).

One of key factors for this weakness was mainly because of the low stakeholder role and their involvement in planning and budgeting mechanism for village fund allocations had not been optimal. Coordination of village government officials with stakeholders was not going well so there were often differences in understanding and opinions about the program. Weak coordination between stakeholders had proven to be an obstacle in planning financing for maternal and child health programs in Central Lombok district (Erpan et al., 2012). On the other hand, external stakeholders generally also tend to be passive and leave decisions entirely in the hands of Village Head and its officials who were considered having authority to decide, even though they were technically not understanding program. It was accordance with the results study which proved there were significant differences in attitudes from DM group, Provider group and CR group towards their perceptions of optimizing village funds for maternal and child health, where the DM group tends to disagree and the P group tends to agree. The CR group was relatively equally divided between those who agree and those who disagree. Although all stakeholders agree and support MCH program, there were still different opinion regarding the optimization of village funds for budgeting MCH program in village. Differences of opinion could occur due to the low involvement of health technical sector (health cadres) in planning and budgeting

process in the village as studied by Ismawati et-al in Blitar Regency (Ismawati et al., 2017).

This description indicate that village stakeholders tend to be seen only as supporting elements for implementation of various health programs. These result in line with study of Namazzi et-al in Uganda that supporting of district and community level stakeholders was very high in intervention of care for pregnant women, mothers in labor and newborns, but they were not a driving factor. High support was illustrated by their opinion that intervention provides positive benefits for community (Namazzi et al., 2013). One of efforts that could be done overcoming these obstacles was through strengthening collaboration between stakeholders which was proven to be still quite weak at this time. The practice of collaboration in health services emphasizes optimizing multi-stakeholder role and joint responsibility to overcome various health problems (Ramaswamy et al., 2016). It must be admitted that the role and involvement of stakeholders in implementation of health programs was still relatively weak, especially the local government stakeholders even though their attitudes and perceptions were positive and supportive (Iswarno et al., 2013). Need a comprehensive policy that was able strengthening proactive health system and could policies design according to regional needs through leadership roles at local, regional and national levels, as studies in Bangladesh (Islam & Biswas, 2014), Ethiopia (Assefa et al., 2017), Pakistan (Abbasi & Younas, 2015) and China (Liu et al., 2020). Therefore the commitment of all stakeholders was critical aspects to gain successfully (Hlongwane et al., 2021).

Conclusion

The three village stakeholder groups had relatively same perception of village health resources and attitudes towards maternal and child health programs, but different results were seen for attitudes towards optimizing village funds. The Decision Maker group and Clients & Representatives group showed tendency to refuse, although the proportion of rejection was greater in the Decision Maker group, while the Provider group tended to agree on the need to optimize village funds for maternal and child health particularly. The difference in attitude was mainly due to a lack of understanding from external health stakeholders about health programs, especially maternal and child health at village level. It was necessary to actively involve all stakeholders in every stage of village level health program activities, including the planning and budgeting mechanisms. Strengthening coordination also need to be done through clarity of form and time of scheduled regular meetings, as well as improving interpersonal communication to improve understanding and positive attitudes towards health programs, including maternal and child health.

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Transovarial Infection of Dengue Virus in *Aedes aegypti* and *Aedes albopictus*

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Abstract

Nowadays, Dengue Haemorrhagic Fever (DHF) is still a significant health problem. Including in Kupang City. The existence of transovarial infection of Dengue virus is essential to know to support the prevention to be more effective and efficient. This study aimed to determine the existence of transovarial infectious and the serotypes variability of Dengue virus in Aedes sp in Kupang City. This observational research took place in nine villages in Kupang City in 2017. Where 20 houses in each village are observed to collect Aedes sp eggs. Cluster sampling was conducted to choose houses with DHF cases and surrounding areas 100 m from the cases. Ovitrap and Ovistrip were used to collect Aedes sp eggs, then Aedes sp eggs are reared in Parasitology Laboratory UGM. Adults mosquitoes from rearing were observed the transovarial Infection and Dengue Virus Serotype by One Step RT-PCR followed by nested PCR. This research found a transovarial infection in Aedes aegypti and Aedes albopictus and for Denvir-2 and Denvir-3. This finding is a change from previous findings in the same place where only Denvir-1 was transmitted transovarially in Aedes sp.

Introduction

Dengue Haemorrhagic Fever (DHF) is a mosquito-borne viral disease that is still a significant problem globally in public health (Murray, Quam, & Wilder-Smith, 2013; Yan et al., 2018). As a global problem, Dengue cases are found mostly in tropical and subtropical areas (Ali, Asha, & Aneesh, 2014). The DHF is a significant disease transmitted by the Aedes sp vectors (Harapan, Michie, Mudatsir, Sasmono, & Imrie, 2019). High mortality, poverty, and social burdens are still problems caused by DHF (Harapan et al., 2019).

Dengue has become a threat to global health, and it is estimated that about half of the population in the world is at risk to get Dengue virus infection (Deng et al., 2020). Since DHF was founded in 1968 in Indonesia, DHF cases were getting higher and caused an irregular pattern of DHF outbreaks (Harapan et al., 2019). The incidence of DHF in Indonesia in 2018 was 24.75 per 100.000 population. The data is different from Kota Kupang, where IR in 1999-2015 ranged from 11.1 to 266.5 cases per 100,000. This figure was always the highest in NTT and always higher than the national average from 2000 to 2015 (Kemenkes RI, 2019).

The DHF prevention and control activities in Kupang City have been done every year including eradicating mosquito nests, epidemiological investigations, focus fogging, and counseling (Kemenkes RI, 2019). However, the DBF incidence rate is always high and exceeds the national figure. The larva-free rate is always low (<95%). Outbreaks often also occur in several cities/regencies in NTT province, including in Kupang City. The prevention and control of DHF in Kupang City have not been sufficient to the decreasing of cases of DHF, so DHF cases getting higher and always can be found mortality of DHF cases every year.

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It is known that DHF incidence is related to the environmental condition, season, high mobilization, density in the house and also in the community, housing development, and also community behavior (Kemenkes RI, 2019). Dengue virus as agent and mosquito as DHF vector are also essential factors in DHF incidence. Disease incidence will continue to occur if only taking the medication without controlling the risk factors according to existing nodes. This interaction varies from place to place and causes the degree of endemicity to differ between places and times. The DHF agents, namely the dominant dengue virus (Denvir), can be differ from one region to another (Martín et al., 2010). Dengue viruses have four serotypes (Denvir-1, Denvir-2, Denvir-3, and Denvir-4). They can be found in the DHF patient and Aedes sp mosquito. The high number of dengue cases, including in Indonesia, is also supported because all four serotypes can be found. The mode of transmission of the dengue virus also affects the increase in dengue cases, where dengue can also be transmitted vertically and horizontally. The transovarial infection in Aedes sp is essential because it causes the Aedes sp mosquito (Aedes aegypti and Aedes albopictus) can transmit the virus throughout its life and its descendants (Esteva & Vargas, 2000). No specific medicine recently for dengue treatments. So prevention needs to focus on vaccine development and vector control (Deng et al., 2020; Yan et al., 2018). For this reason, this study aims to determine the existence of transovarial infections and serotypes variability of Dengue virus in Aedes sp mosquitoes in Kupang City.

Methods

This research is an observational descriptive with a cross-sectional design conducted in Kupang City. Research samples were from nine villages in Kupang City. They consisted of 3 villages as the sporadic area of DHF, and six villages are DHF endemics. Variables in this research are the existence of transovarial infection and Dengue serotype variability in Aedes sp. This research's subject was eggs of Aedes sp in houses with dengue cases and surrounding dengue fever sufferers with a radius of 100 meters. Eggs of Aedes sp were collected from 20 houses in each village so that the total number surveyed was 180 houses from 9 sub-districts. The houses surveyed were taken using cluster sampling since few DHF cases spread across several urban villages (Medical Research Institute & Dengue Coordination Unit, 2011; Usman & Akbar, 2009). Research is carried out in 2017 in the field or community in Kupang City to collect Aedes sp eggs and the parasitology laboratory UGM to observe the Dengue virus's existence in Aedes sp mosquitoes.

Aedes sp egg collected using ovitrap and ovistrip after one week installed inside and outside the dark and humid house, thought to have the potential to become the nesting place for the Aedes sp. Dengue virus examination was conducted in adult mosquitoes that emerged from Aedes sp eggs after rearing around one week. The mosquitoes that come out of the pupa are given a sugar-water solution. Then all adult mosquitoes at least two days old are checked for the existence of transovarial infections and any Dengue virus serotypes.

Isolation of Dengue Virus RNA in Adult Mosquitoes aims to obtain pure RNA, which will be used for RT-PCR examination. Dengue Virus Serotype Determination by One Step RT-PCR followed by nested PCR. Serotype determination is to detect the presence of Dengue virus genetic material using RT-PCR. The next step is electrophoresis. The electrophoresis result is said to be positive for Dengue virus one if it shows a diagnostic band at 483bp, positive for Dengue 2 if the diagnostic band is 119bp, positive for Dengue 3 if the diagnostic band is at 290bp, and positive for Dengue 4 if the diagnostic band is at 392bp (Lanciotti, Calisher, Gubler, Chang, & Vorndamt, 1992).

Collected data are shown in the simple distribution table, figure, and map. It will then be analyzed descriptively to find the transovarial infection of Dengue Virus in Aedes sp. It also shows the serotype of the Dengue virus in Aedes Mosquitoes. The transovarial infection existence is also shown in Minimum Infection Rate (MIR) with the formula: one per total mosquitoes in one pool with a constant of 1000.

Results and Discussion

This study was conducted by rearing Aedes sp eggs into adult mosquitoes. The rearing results show that Aedes albopictus mosquitoes hatched from eggs more than Aedes aegypti. 70 Aedes albopictus can be found in eight villages, while Aedes aegypti can be found in one village. Table 1 also shows that transovarial infection of Dengue virus in Aedes aegypti can be found in one village (Oetete) and Aedes albopictus in 4 villages (Manulai II, Maulafa, Naimata, and TDM).

Table 1. The Transovarial Infection Existence of Dengue Virus in Aedes sp Mosquitoes in Kupang City

Villages	Aedes aegypti		Dengue virus	Aedes albopictus		Dengue virus
	n	%		n	%	
Pasir Panjang	0	0	-	9	100	-
Manulai II	0	0	-	10	100	+
Sikumana	0	0	-	5	100	-
Maulafa	0	0	-	8	100	+
Naimata	0	0	-	11	100	+
Kolhua	0	0	-	14	100	-
Lasiana	0	0	-	9	100	-
TDM	0	0	-	4	100	+
Oetete	5	100	+	0	0	-
Total	5	7	-	70	93	-

Notes: (+) means there is Dengue virus in mosquitoes; (-) means there is no Dengue virus
Source: Primary Data, 2017

Based on the mosquito species, MIR on Aedes aegypti is 200‰. While in Aedes albopictus, it is 90 - 250‰, as shown in Table 2. The MIR for Denvir-2 was 100– 125‰, while for Denvir-3, it was 90–250‰. Table 2 also indicates that transovarial infection can be found in the serotype of Denvir-3 for Aedes aegypti. On the other hand, Denvir-2 and Denvir-3 also can be found in Aedes albopictus. In adult Aedes sp, the presence of transovarial infection of Denvir-2 from rearing eggs was detected in two of nine villages observed in Kupang City (22.2%). Meanwhile, Denvir-3 can be found in three villages (33.3%). In contrast, from 4 urban villages (44, 5%), no dengue virus was found, as shown in Table 2.

Table 2. Minimum Infection Rate and Denvir Serotype in Aedes sp in Kupang City

Villages	Serotypes		Mosquitoes / pool	MIR (‰)
	Ae. aegypti	*Ae. albopictus*		
Pasir Panjang	-	-	9	100
Manulai II	-	Denvir-2	10	-
Sikumana	-	-	5	125
Maulafa	-	Denvir-2	8	90.9
Naimata	-	Denvir-3	11	-
Kolhua	-	-	14	-
Lasiana	-	-	9	250
TDM	-	Denvir-3	4	200
Oetete	Denvir-3	-	5	131.6

Source: Primary Data, 2017

Figure 1 shows the DNA band appears at the 119bp position in the Maulafa and Manulai II Villages, which means positive Denvir-2, and the 290bp position in the Tuak Daun Merah, Naimata, and Oetete Villages, which means positive Denvir-3. Dengue virus was not found in Pasir Panjang, Sikumana, Kolhua, and Lasiana Villages. It means that the Dengue virus has not been distributed in all villages.

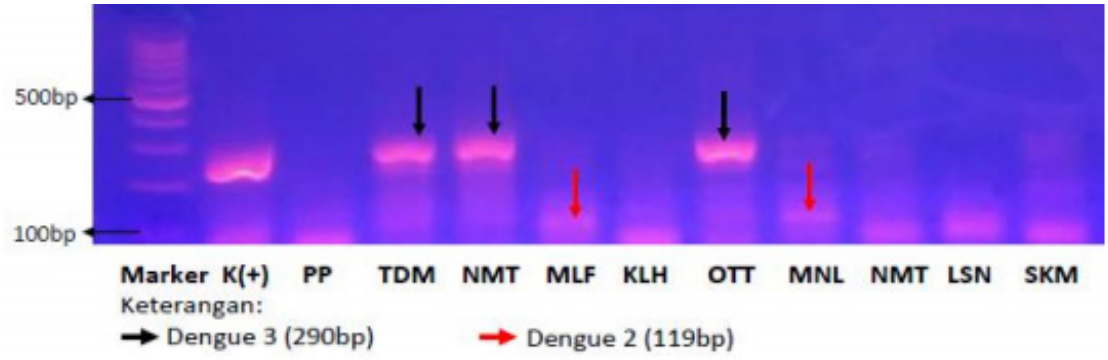
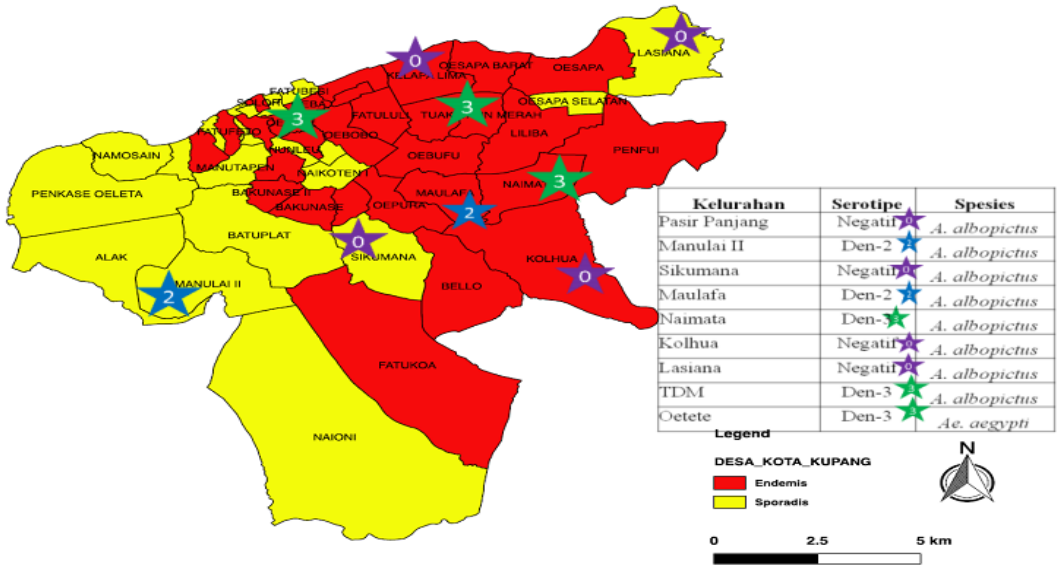


Figure 1. RT-PCR Dengue Virus on Adult Aedes sp Mosquitoes in Kupang City

This research finds the presence of transovarial infection of Dengue virus in Aedes sp is not only in DHF endemic areas but also in sporadic areas. However, viruses are found mainly in dengue-endemic areas. Figure 1 also shows that Denvir-3 was founded only in an endemic area, and Denvir-2 was founded in the endemic and sporadic area.



Kelurahan	Serotipe	Spesies
Pasir Panjang	Negatif	*A. albopictus*
Manulai II	Den-2	*A. albopictus*
Sikumana	Negatif	*A. albopictus*
Maulafa	Den-2	*A. albopictus*
Naimata	Den-3	*A. albopictus*
Kolhua	Negatif	*A. albopictus*
Lasiana	Negatif	*A. albopictus*
TDM	Den-3	*A. albopictus*
Oetete	Den-3	*Ae. aegypti*

Figure 2. Distribution of Transovarial Infection of Dengue virus in Aedes sp Mosquitoes in Kupang City Year 2017

The rearing results showed that Aedes albopictus mosquitoes hatched from eggs compared to Aedes aegypti. Many things can cause why the eggs cannot hatch at all. The ovistrips are storing too long and in conditions that are not completely dry and still damp, causing mold and damage to mosquito eggs. The research is conducted in the rainy season. The air is more humid than in the dry season. The humid conditions can also make small animals live comfortably on the ovistrip and possibly eat the mosquito eggs in the ovistrip. So in the study, the number of mosquitoes obtained was also very small and possibly did not follow the actual mosquito density at the research location.

This research can prove the existence of transovarial infection of Dengue virus in Aedes sp in Kupang City, that is, one village for Aedes aegypti and four villages for Aedes albopictus. It means that Aedes albopictus is also vital as a DHF vector, even though just known as a secondary vector. Based on the mosquito species, the MIR on Aedes aegypti is 200‰, while in Aedes albopictus is 90‰ - 250‰, which means that transovarial infection can be found

in 200 from 1,000 Aedes aegypti mosquitoes and in 90-250 from 1,000 Aedes albopictus mosquitoes. It means the transovarial infection in Aedes aegypti is higher than in Aedes albopictus. Even though Aedes albopictus also can transmit the Dengue virus, thus result showed that Aedes aegypti is more potential as a vector of DHF than Aedes albopictus. Other research also proved that the Dengue virus is also can transmit venerially by male Aedes aegypti with the potency of their behavior of polygamy (Putri, Widya, Sugeng, & Sitti, 2018). Infected male mosquitoes can transmit the virus to female mosquitoes through infected sperm cells during mating.

This MIR figure in Kota Kupang is higher than in Malaysia's previous study. Which found for Aedes aegypti is 36.5‰ and Aedes albopictus is 6.66‰ (Rohani et al., 2014). It is also higher than in Delhi, India, with 5.8‰ (Vikram et al., 2015). The more MIR, the more density of the virus. It can indicate the transovarial infection rate. The higher rate of transovarial infection can contribute to the high cases of DHF because makes Aedes sp mosquito can transmit the dengue virus for its life to humans and its offspring. This transovarial infection allows the dengue virus to maintain its presence in the mosquito's body if nature conditions do not allow it to breed (Angel & Joshi, 2008). The transovarial transmission presence is not only found in adult Aedes mosquitoes. But can also be found in the larval stage. A study in Brazil found that from 54 pools of Aedes sp larvae, 4 pools were found to be positive for dengue virus (Cecílio et al., 2015).

This study also found that Denvir-2 and Denvir-3 viruses can be transmitted transovarially in Aedes sp, which previous research in the same location only Denvir-1 confirmed in the Aedes sp mosquito (Wanti, Sila, Irfan, & Sinaga, 2016). Study in Mexico also found that Denvir-1 can transmitted transovarially (Martínez et al., 2014), but like in Kupang City that now maybe already changed not only Denvir-1 but also Denvir-2, Denvir-3 and Denvir-4. This research shows that Denvir-1, Denvir-2, and Denvir-3 can be transmitted by transovarial in both Aedes aegypti and Aedes albopictus. The change and the addition of virus serotypes that infect Kupang City could be due to increased population mobility due to easier transportation facilities between districts and between islands. This has an impact on increasing the risk of dengue virus transmission from outside the area brought into Kupang City. Other study in Malaysia show there were closely related of strain and genotype from Denvir-1 dan Denvir-2 to strain and genotype in other countries around Malaysia. This is predicted because of the human movement of people from abroad and this change of strain and genotype can increase possibility in Dengue cases outbreak (Chew, Rahman, & Hussin, 2015).

Transovarial infection of Dengue virus in this study occurred in Aedes aegypti as the primary vector of DHF and Aedes albopictus. It has been known as a secondary vector of DHF in Indonesia. It showed Aedes albopictus also have competency as a dengue vector because it can transmit the virus Dengue-2 and Dengue-3 transovarially. It has been found that Aedes albopictus density, either in the house or outside, is lower than Aedes aegypti density (Wanti et al., 2017). But since Aedes albopictus can transmit Dengue virus transovarially, research on a competency DHF vector needs to be examined further. The evaluation of local mosquito populations for their competence in transmitting the Dengue virus is vital and will help program managers in pointing specific vector populations for vector control programs (Richards, Anderson, & Alto, 2012). Similar to the study in Caribean that both Aedes aegypti and also Aedes mediovittaus are competent to transmit Denvir-1, Denvir-2, Denvir-3 and also Denvir-4 (Poole-Smith et al., 2015).

Further research in Kupang City should prove whether the Dengue virus can transmit biologically by reaching the mosquito proboscis and be released to humans when it is sucking human blood. If the virus cannot reach the proboscis and cannot release to humans, thus this vector is not competent as a vector of DHF. Research in Taiwan found that Aedes aegypti was more competent in transmitting Denvir-1 than Aedes albopictus. The Dengue virus never infected that statement, evidenced by proboscis tissue in Aedes albopictus than Aedes aegypti was frequently infected (Chen, Wei, Hsu, & Chen, 1993).

The existence of transovarial infection in Kupang is one of the causes of DHF cases throughout the year. The incidence is always high every year dan the cases are found even in the dry season when the mosquito density is low. Transovarial infection in Aedes sp makes mosquitoes can be infected with Dengue virus for their whole life. Dengue virus in egg embryos can last a long time in dry conditions, and when exposed to water, the eggs can still hatch, and adult mosquitoes that come out will transmit the dengue virus when they suck blood for the first time.

Kupang City in 2013 only found Denvir-1 that can be transmitted transovarially, but it changed based on the discovery in this research. It found out that Denvir-2 also could be transmitted transovarially in Aedes aegypti and Denvir-3 in Aedes albopictus. Other found that Denvir-3 also can be transmitted through venereal from male to female Aedes aegypti (Putri et al., 2018). These two modes of transmission lead to increased transmission of the Dengue virus between mosquitoes and between mosquitoes and humans. The existence of vertical transmission of the dengue virus in Aedes sp can make the circulation of arboviruses sustainable in nature (Ferreira-de-Lima & Lima-Camara, 2018). Several studies has proven that the dengue virus can be transmitted by transovarial transmissions, such as in Brazil, Trinidad, Tobago, Peru, Bolivia, Argentina, Costa Rica, Mexico, India, Myanmar, Thailand, Malaysia, Philippines, Singapore, and Indonesia (Ferreira-de-Lima & Lima-Camara, 2018). Transovarial transmission makes mosquitoes infected with the Dengue virus do not have to suck the blood of people who have the virus in their blood because mosquitoes infected with the virus will still be found with the virus throughout their life and will be able to reduce them to their offspring.

This existence of transovarial infection of the Dengue virus in Kupang City can be used as an early warning in Kupang City about new cases of DHF and outbreaks of DBD. People who have had primary dengue infection may only have immunity to Denvir-1, so if there is secondary infection with dengue with different serotypes, for example, by Denvir-2 and Denvir-3, the community will still get DHF again. With the discovery of the transovarial of Denvir-3, it is necessary to be aware of severe cases because Denvir-3 infection has the highest disease severity level, followed by Denvir-2, Denvir-1 follow it, and Denvir-4. Besides, if you have had a primary infection with serotypes that are different from secondary infections, the chances of getting a more severe dengue infection are more significant. A study in Singapore also has found that infecting dengue by different serotypes and genotypes may have a vital role in disease severity among dengue patients (Yung et al., 2015).

Infection by the Dengue virus of any serotype will affect body to produce active immunity against specific serotype. The body immunity generated from primary dengue virus infection is lifelong (long life immunity), but it cannot prevent secondary infection by different virus serotypes. The chances of getting a more severe dengue infection are more significant if other serotypes infect people. Considering Dengue virus's transovarial transmission in the Aedes sp mosquito, the Denvir-2 and Denvir-3 in Aedes aegypti and Aedes albopictus mosquitoes in Kupang City, it is necessary to take measures to prevent dengue transmission and control the dengue mosquitoes more intensively. The peak of transovarial infection in mosquitoes is estimated to occur four months before the DHF transmission peak (Thongrungkiat, Maneekan, Wasinpiyamongkol, & Prummongkol, 2011), so this requires more intensive vector control from the primary stage to prevent a high increase in case outbreaks. Further research is needed on the benefits of recognizing transovarial infections in predicting of increased incidence and occurrence of outbreaks.

The recognition of this transovarial infection indicates the need for vector control to be carried out from the primary stage before the virus multiplies in adult mosquitoes before it can transmit to humans. Draining activities, such as cleaning water reservoirs by brushing the inside part of the reservoir and also replacing water with a new water; tightly closing the water reservoir; burying or eliminating water storage places that are no longer used, and monitoring activities at least once a week for other controlling activities dengue mosquitoes. Drums have been proven to be related to the

incidence of dengue fever in Kupang City (Wanti et al., 2019), so the action of cleaning and eliminating mosquito breeding places is also focused on drum-type landfills, in addition to general types. This monitoring is necessary to eradicate eggs, larvae, and mosquitoes found in each water storage. Here, the intervention is for water reservoirs and dengue mosquitoes, both in the imago and pre-imago stages. For this reason, it is suggested to the health office or primary health center to improve entomological surveillance and laboratory surveillance to be alert to the presence of primary and secondary infections of dengue and dengue outbreaks due to the presence of new Denvir-2 and Denvir-3 serotypes. It is also necessary to strengthen the DHF program by carrying out advocacy and outreach about dengue disease to related agencies such as education, tourism, and public relations office.

Conclusions

This research found a transovarial infection not only in Aedes aegypti mosquitoes but also in Aedes albopictus. It also found that Denvir-2 can be transmitted transovarially in Aedes aegypti and Aedes albopictus in Kupang City. Besides Denvir-3, it can be transmitted transovarially in Aedes albopictus. It is an improvement from previous findings in the same place where only Denvir-1 was transmitted transovarially in Aedes sp.

Further research is needed on the benefits of recognizing transovarial infections in predicting of increased incidence and occurrence of outbreaks. It is suggested to the health office or primary health center to improve entomological surveillance and laboratory surveillance to be alert to the presence of primary and secondary infections of dengue and dengue outbreaks. It is also necessary to strengthen the DHF program by carrying out advocacy and outreach about dengue disease to related agencies.

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The Effect of Competence on Health Promotors Performance in Central Java Indonesia

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Abstract

Health Promoter is one of the health professionals in all health institutions. Different educational backgrounds, educational levels, competencies and functional positions can affect performance in the field. This study aims to analyze competence and its effect on the performance of health promoters. This type of research is an exploratory survey with a quantitative approach. The research population is health promoters in Central Java. The research sample was 114 people and selected by simple random sampling technique. Data analysis used simple linear regression. The results showed that there was a strong positive correlation between competence and performance (r = 0.712), the coefficient of determination (R square) was 0.507. This explains that 46.3% of performance is influenced by competence.

Introduction

Health Promotion as stated in the Regulation of the Minister of Health Number 1193/Menkes/SK/X/2004 concerning National Health Promotion Policy is an effort to increase community capacity through learning from, by, for, and with the community to help themselves, as well as developing community-based activities. in accordance with the local socio-cultural and supported by health oriented public policies. Health promotion is one of the essential health efforts and is a minimal program that must be implemented by every health service unit. The health promotion program is oriented towards improving the community's healthy living behavior through various activities to promote clean and healthy living behavior.

Regulation of the Minister of Health Number 74 of 2015 concerning Efforts to Improve Health and Disease Prevention also states that health promotion is a process of community empowerment by informing, influencing, and assisting the community to play an active role in supporting behavior and the environment, supporting change and maintenance and supporting health improvement towards optimal health status. To be able to carry out health promotion efforts at Puskesmas, Hospitals, District/City Health Offices, Provincial Health Offices, Ministry of Health, and other work units, health promotion and behavioral science personnel who have competence in these fields are needed.

Health promotion workers are located in health institutional units, both in health centers, hospitals, and health offices with various formal education ranging from diploma three, bachelor's and master's degree. However, the implementation of health promotion and community empowerment programs is considered not optimal. This is due to the uneven

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number and distribution of health promotion personnel in all regions. In addition, the capacity of health promotion personnel in the regions is still very limited.

Based on the 2019 Health Facility Research Report (RIFASKES), there are 4,144 health promotion workers spread across Puskesmas-Puskesmas in Indonesia. The average health promotion personnel at the Puskesmas was 0.46 per Puskesmas. This data shows that not all Puskesmas have professional health promotion personnel. RIFASKSES data also shows that only 1% of health promotion workers have a health promotion education or training base.

The number of health promotion workers in the province of Central Java is 643 people spread over 35 districts and cities. Of these, only a few have functional health promotion positions. Educational backgrounds are also very diverse, including nurses, midwives, sanitarian workers, and public health non-specialized in health promotion. This condition greatly affects the quality and ability to carry out their duties as health promoters.

Assessment of the performance of human resources in the health sector is based on knowledge, skills, and attitudes. The knowledge and skills of human resources in the health sector follow their respective expertise. While competence is a specific combination of knowledge, attitudes, and skills needed to perform certain activities. This competency must be understood and possessed by health promotion officers, especially in Puskesmas or Community Health Services.

Competence is a person's underlying characteristics regarding the effectiveness of an individual's performance in their work or individual basic characteristics that are causally related to the criteria for effective performance in a particular workplace or situation. Lin et al., (2012), stated that knowledge, experience, and skills are the basis of one's competence. Competence is an underlying characteristic of people who exhibit a way of behaving or thinking, which generalizes across various situations and persists for long periods of time. Springer & Oleksa (2017), add that competence is treated as a collection of knowledge, skills, and attitudes, while personality traits or motivation are more of a condition for building and realizing competence.

Jasmine et al. (2015), explains that performance or work performance is part of human resource management and is an important criterion for the results and success of an organization.Muelleret al. (2013), work performance or performance can be defined as the degree of fulfillment of work demands (activities) in the current workplace (environment). Carlos andRodrigues (2017), defines job performance as a periodic evaluation of the behavior of individuals displayed in their tasks and work, where it is the result of a combination of cognitive abilities, personality and learning experiences that form trust in the organization.

Public health experts have competence as professional public health workers, self-development abilities, skills in effective communication, and have good self-skills in the field of public health. These competencies are also owned by public health experts with a concentration in the fields of health promotion and behavioral science(C. Jongen et al., 2018). With these competencies, it is hoped that health promotion personnel can carry out their main duties and functions in public health promotion programs both at health centers, hospitals, and health offices.(CS Jongen et al., 2017). Based on this, with the diversity of educational resources, professional positions, and competencies of health workers, it is necessary to conduct research to analyze the public health competencies of health workers in Central Java Province.

Method

This research was designed quantitatively with an exploratory survey method. This research goes through 5 dimensions and indicators of competence. This design is built on a two-variable relationship framework, where public health competence is the independent variable while the performance of health promoters is the dependent variable. The population of this study were all health promotion workers in Central Java Province who had carried out the professional oath of health workers in 2020, which were 643 people. The research sample was 114 people who were

selected by simple random sampling technique. The research data was collected by using documentation study techniques for secondary data collection and questionnaires via google form to obtain primary data.

Results and Discussion

The development and quality control of health workers is aimed at improving the quality of health workers in accordance with the competencies expected in supporting the implementation of health services for all Indonesian people. The development and quality control of health workers is carried out through increasing the commitment and coordination of all stakeholders in the development of health workers and legislation, including professional certification, namely through competency tests, registration, licensing, and rights of health workers.(Liang et al., 2019). Frequency distribution of the characteristics of Health Promoter respondents in Central Java Province

Table 1. Frequency distribution of the characteristics of Health Promoter respondents in Central Java Province

Variable	n	%
Gender		
Man	23	20.2
Woman	91	79.8
Age		
23-30	56	49.1
31-40	32	28.1
41-50	11	9.6
> 50	15	13.2
Job status		
civil servant	76	66.7
BOK Contract	34	29.8
BLU contract	4	3.5
Level of education		
D3/D4	8	7.0
S1 (Bachelor) Public Health	97	85.1
S1 (Bachelor) in another major	2	1.8
S2 (Post Bachelor/Master) Public Health	5	4.4
S2 (Post-Bachelor/Master) in another major	2	1.8
Years of service		
0.4 months - 1 year	20	17.5
1-3 years	50	43.9
3-10 years	26	22.8
>10 years	18	15.8

Source: Primary Data, 2021

Table 2 explains that most of the respondents are female, namely 79.8%. Respondents were dominated by young people, as many as 56 people (49.1%). Almost half of the sample are Civil Servants/PNS, as many as 76 people (66.7%). The highest level of education is Bachelor of Public Health graduates, with 1 to 3 years of service the highest is 50 people (43.9%). The average tenure of extension workers is relatively young to carry out their duties as agents of change. This can be seen from the time they carry out these tasks in the range of 1-10 years and some even reach a dozen years. Based on table 2, the regression value between the variables of the influence of competence on performance (R Square) is 0.712. These results

indicate that 71.2% of competencies affect performance.

Table 2. Analysis of the influence of competence on performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.712a	.507	.503	5,905

a. Predictors: (Constant), competence

Based on table 3, it is obtained that the calculated F is 114,346 with a significant level of 0.000 because p <0.05, the regression model can be used to predict the effect of competence on performance. The regression equation Y = 6.932 + 0.762 X means that if the X coefficient is considered zero, then the value of the Y variable is 6.932. The regression coefficient of 0.762 states that for each additional coefficient of the X variable of 1, there will be an additional value of the Y variable of 0.762. The value of t count is 10,693 > 1,658 (t table with df 110). In addition, the coefficient table shows that the significance is 0.000, so the hypothesis is accepted, and the significant regression coefficient means that competence has a significant effect on performance.

Table 3. Regression Equation

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3986,941	1	3986,941	114,346	.000b
	Remainder	3870.280	111	34,867		
	Total	7857,221	112			

a. Dependent Variable: Performance

b. Predictors: (Constant), Competence

	Model	Non-standard coefficient		Standard Coefficient		
	B	Std. Error	Beta		t	Signature
1	(Constant)	6,932	9.144		-.758	.450
	competence	.762	.071	0.712	10,693	.000

a. Dependent Variable: Performance

The results of this study indicate that the performance competence of health promotion personnel is generally quite good. This achievement is closely related to the factors that influence it, namely the professional level, self-development, effective communication, self-skills, and the foundation of public health. Professional Competence Enough with an average score of 5.98, competence. The significance value of the competence and capability variables p-value (0.000) < 0.05 and t count > t table so that H0 is rejected, which means that both variables partially or jointly have a positive and significant effect on the performance variable. Self development is quite good, with an average of 17.36. Effective Communication Competence is quite good with an average of 22.87, self-skill competence is quite good at 13.96.

The results of this study are in line with Jeffrey and Dinata (2017), Hutagalung (2020), which states that competence has a positive and significant effectaffect employee performance. The same thing was stated by Urtasun & Núñez (2012), states that competence can have a positive and significant influence on a person's performance. Within the scope of the organization, this research is also in line with (Vainieri et al, 2019), which states that managerial competence is positively related to organizational performance. Managerial competence is closely related to the process

of sharing information that is developed into an organization. In particular, managerial competence plays an important role on overall performance, and the results are mediated by the use of mature information sharing instruments such as benchmarking of performance results.

Employee competence in the quality of health services is highly dependent on the knowledge and skills of health workers. Therefore, health workers need to improve their competence (eg ethics, knowledge, and skills). So that the services provided are of the best quality (Bonesso et al., 2020). Educational facilities for related health workers play an important role in providing education and professional development in health facilities. Health workers hope that the place of education will be a place to gain knowledge, not only in theory but also in practice in the field (Christanti & Juliantini, 2020).

Health promotion workers are health workers who have the competence to study, research, analyze and prioritize health problems, as well as plan behavior change interventions through community empowerment which is strengthened by advocacy and creating a supportive and conducive environment based on the spirit of partnership by using appropriate and targeted media (Nawawi, 2012). Self-development or the level of respondent's ability is shown by the majority of respondents being able to analyze, determine and decide on actions to overcome health problems in the community through slide projectors, brochures, and posters in counseling once a year. Inviting, involving and using sponsors (company, product, private) for health promotion activities. 1-3 times a year inviting and involving relevant cross-sectors (agencies/institutions) for joint health promotion activities and internships for health students at the Puskesmas (Jongen et al., 2017).

Effective communication. The results of the study that describe effective communication show most respondents that a health promotion officer must be humble, polite, and respectful of the audience when conducting counseling. They do not involve personal feelings, need someone or family to help themselves and play an active role in realizing their health (Setyabudi & Dewi, 2017). Proud to be a health promotion worker and continue the counseling by holding back anger and hope that the counseling will end soon when facing an apathetic audience. Carry out advocacy activities, develop an atmosphere and movement for community empowerment, disseminate information, make media designs, conduct studies/research on public health behavior, and plan interventions in developing community behaviors that support health. In addition, public health promoters also have roles, functions, and competencies.

Self skills. The skill level of the respondents is still at the limit of mediocrity. Though in general it is quite good. This is illustrated by the number of respondents who have planned and prepared methods and media for counseling to anticipate conditions in the field, only able to make all health promotion media, mastering communication techniques. Skill is the ability to operate a job easily and carefully. Skill is an activity that requires practice or can be interpreted as an implication of the activity. Skills as the capacity needed to carry out several tasks which are the development of the results of training and experience gained. In addition to the training needed to develop skills (Grillich et al., 2016).

Basic public health. The function of public health is to provide Community Health Efforts (UKM) services at the community level. Personnel needed to carry out public health functions in health centers, hospitals, and health services. Public health workers, especially those with competence to carry out health promotion, have been included in the Puskesmas staffing standards (PMK-75/2014). The performance of our respondents can be concluded that the higher the competence, the higher the performance of health promotion personnel. The correlation between competence and performance shows a strong relationship and has a positive pattern ($r = 0.712$). The coefficient of determination (R square) is 0.507. This explains that 46.3% of performance is influenced by competence and the rest by other factors (Krijgsheld et al., 2022). The performance of public health promoters in the practice of promoting Puskesmas in Puskesmas, Health Offices, and Hospitals. Several things related to performance that respondents did not do were standard operating procedures (SOPs) that were available, written, and complete.

There is no planning and implementation of training for health cadres, formulating problems based on the priority of the main problems. Making media leaflets and posters in planning to formulate interventions to be carried out. Conduct performance evaluations every six months. Conduct an assessment of the resources owned by the community (Bindels et al., 2021).

The education level of respondents with good performance at the Diploma III level is 7%. Meanwhile, 85.1% of respondents holding S1 in Public Health performed well, other S1 holders were 1.8%, Masters in Public Health were 4.4%, and other Masters were 1.8%. The relationship between the respondent's education level and the performance of health workers in health promotion practices. This shows that differences in education levels have a significant effect on the performance of Public Health Extension Officers in Health Promotion Practices. The results are in line with Lawrence Green's theory that a person's level of education is a convenient factor for behavior change. The education level of S1 Public Health achieved can affect the quality of work (Anderson & Green, 2018).

Conclusion

Monitoring and evaluation is carried out periodically to monitor the success of the health promoter itself and as a tool to make further planning. The health promoter's competence in the activity should be reviewed after completion to improve and make it better. Performance evaluation is a continuous process and has targets. Its purpose is to monitor and evaluate competence and performance to see the progress of each activity. Public health workers, especially those with competence to carry out health promotion, have been included in the Puskesmas staffing standard (PMK-75/2014).

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Incidence of Stroke and Associated Risk Factors in Bogor, Indonesia: A Nested Case-Control Study

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Abstract

The increasing number of stroke cases and their risk factors is a crisis that needs to be addressed. This study aimed to determine the number of new stroke cases in Bogor, Indonesia, and its risk factors. We conducted a nested case-control study from the Study of Non-Communicable Disease (NCD) Risk Factors of the National Health Institute of Research and Development, Ministry of Health, Indonesia, in 2018. A deep analysis was conducted on 1.210 respondents based on the subset of baseline this data. Data was collected by interview method on permanent residents in Bogor City, Indonesia in 2018. Diagnosis of stroke was based on the anamnesis of a neurologist and a neurological examination. Independent variables include sociodemographic characteristics, metabolic syndrome, and risky behaviors. The data was analyzed with a dual logistic regression test. The incidence of stroke during 2018 amounted to 48 cases (3.9%). The main determinants of stroke in this population include diabetes mellitus and systolic blood pressure being the main factors for stroke, with each p-value, AOR, and (95% CI) being 0,000, 0.222 (0.122-0.405), 0.003, 0.291 (0.128-0.662). There was no significant difference in metabolic syndrome outcomes one year before the diagnosis of stroke and the year when the stroke was diagnosed. Special attention is needed in DM patients with high blood pressure to prevent stroke.

Introduction

The cause-specific death rate of stroke reaches 5.5 million deaths, and more than 116 million stroke patients with complications including disability each year(Kim et al., 2020; Lindsay et al., 2019; World Stroke Organization, 2019). More than 80 million people had a history of stroke in 2016, and more than 13.7 million new cases each year (Kim et al., 2020). Globally, it is estimated that one in four people over the age of 25 will have a stroke during their lifetime. Over the past four decades, the incidence of stroke in lower-middle-income countries has more than doubled (Johnson et al., 2016), worldwide stroke deaths have most occurred in developing countries, such as Indonesia, which contributes 75.2% of all deaths (Feigin et al., 2014; Kim et al., 2020; Thomas et al., 2018).

The prevalence of Stroke in Indonesia increased from 7% in 2013 to 10.9% or estimated as many as 2,120,362 people had strokes in 2018 (Badan Penelitian dan Pengembangan Kesehatan, 2018). It is becoming the first cause of death in Indonesia [8,9], with 21.1% of deaths in Indonesia caused by stroke. The non-communicable diseases (NCD) cohort study in Kebon Kelapa, Bogor, showed that stroke became a disease with the first fatality rate (Kemenkes RI, 2018). Despite its enormous impact on the socio-economic development of the country, this growing crisis, stroke has lack of attention to date (Johnson et al., 2016).

The metabolic risk factors of stroke are hypertension, obesity, and diabetes mellitus

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(Boehme et al., 2017; Hasnah, 2020; Lee et al., 2018; Setyopranoto et al., 2019; WHO, 2018). Indonesia's basic health research (riset kesehatan dasar=RISKESDAS) report shows that the prevalence of these risk factors has increased. The prevalence of hypertension for people aged >18-years-old increases from 25.8% to 34.1%. The prevalence of obesity in the >18-year-old increases from 14.8% to 21.8%. And diabetes mellitus in the ≥ 15-year-old increases from 6.9% to 10.9% (Badan Penelitian dan Pengembangan Kesehatan, 2018). This study aimed to find the number of new cases during 2018 and their risk factors based on the data from NCD risk factors cohorts conducted by the National Health Institute of Research and Development, the Ministry of Health of the Republic of Indonesia (MoH RI).

Methods

This study was a secondary data analysis that used research data of the NCD Risk Factor Cohort Study in Bogor City in 2017-2018 from the Ministry of Health of the Republic of Indonesia and was a community-based prospective cohort study. Respondents registered in the cohort study in 2017-2018 amounted to 3,784 respondents. Of it, 1,210 respondents had carried out stroke confirmation examinations. Dependent variables are strokes categorized into strokes and not strokes based on the results of neurological studies and confirmation of stroke by a neurologist. The independent variables that were potentially associated with stroke were age, gender, and education level (categorized into low education for junior school or lower, and higher education for high school up to college). Type of job by private employees/entrepreneurs and civil servants. Respondents' incomes are categorized as < CMW and ≥ CMW. Health insurance has and does not. Smoking status in the past year as smoking and not smoking; The age of smoking started by ≤ 15 years and > 15 years. Alcohol consumption. Physical activity by strenuous and light. Diabetes Mellitus. Emotional distress status (stress) was classified as stress if the respondents experienced at least 6 out of 20 symptoms in the Instrument Self Reporting Questionnaire (SRQ). Metabolic syndrome factors include fasting blood glucose levels, post-loading blood glucose, total cholesterol, LDL, HDL, triglyceride, systolic blood pressure, diastolic blood pressure, and body mass index (BMI). Risk categories include fasting blood glucose ≥ 125 mg/dL, postprandial blood glucose ≥ 180 mg/dL, total cholesterol ≥ 200 mg/dL, LDL ≥ 100 mg/dL, HDL < 40 for men and < 50 for women and triglycerides ≥ 150 mg/dL, systolic blood pressure ≤ 120 mmHg, diastolic blood pressure ≤ 80 mmHg, and BMI classified as normal and obese (≥ 27).

Data were presented as frequencies and percentages based on variable categories. Bivariate analysis is used to identify risk factors associated with stroke incidence. In the absence of collinearity, all variables were included in the logistic regression model using a gradual method to determine the associated variable (p 0.05). Odds ratio (OR) with a confidence interval of 95% (CI) was calculated as a measure of association. In addition, the Mann-Whitney test was conducted to find out the difference in risk factors for metabolic syndrome years before the stroke was diagnosed with the year of the stroke diagnosis. All analyses were conducted by SPSS 22.0 (IBM Corporation, NY, USA). This cohort data source had received updated ethical approval every year from the Health Research Ethics Commission, Health Research and Development Agency, Ministry of Health of the Republic of Indonesia. Research ethics permit in 2017 number LB.02.01/5.2/KE.108/ 2017. No further ethical permission was required for the analysis of secondary data.

Results and Discussion

Based on the research that has been done, the following results were obtained:

Table 1. Characteristics of Research Respondents

Variable	Frequency	Percent
Age (mean; SD)	43.3; 10.14	
Gender		
Male	419	34.6
Female	791	65.4
Education		
Low (Not School - Junior school)	734	60.7
High (high school - college)	476	39.3
Type of work		
Private employee/entrepreneur	1182	97.7
Civil Servants	28	2.3
Income (CMW = Rp 3. 557. 146)		
< city minimum wage	1154	95.4
≥ city minimum wage	56	4.6
Ownership of Health Insurance		
It doesn't have	424	35.0
Have	786	65.0
Smoking Status		
Smoke	665	55.0
No smoking	545	45.0
Age to Start Smoking		
≤ 15 years	267	22.1
> 15 years	943	77.9
Alcohol Consumption		
Yes	255	21.1
Not	955	78.9
Physical Activity		
Heavy	64	5.3
Light	1146	94.7
Diabetes Mellitus		
Positive	181	15.0
Negative	1029	85.0
Emotional Mental Disorders		
Annoyed	160	13.2
Normal	1050	86.8
Fasting Blood Sugar Levels		
Risky	271	22.4
Normal	939	77.6
Fasting Blood Sugar Levels **Post-Loading**		
Risky	460	38.0
Normal	750	62.0
Total Cholesterol Levels		
Risky	565	46.7
Normal	645	53.3
Triglyceride Levels		
Risky	295	24.4
Normal	915	75.6
LDL levels		
Risky	935	77.3
Normal	275	22.7

Variable	Frequency	Percent
HDL levels		
Risky	424	35.0
Normal	786	65.0
Systolic Blood Pressure		
Risky	715	59.1
Normal	495	40.9
Diastolic Blood Pressure		
Risky	687	56.8
Normal	523	43.2
BMI		
Obesity	429	35.5
Normal	781	64.5

Source: Secondary Data of the NCD Risk Factor Cohort Study in Bogor City in 2017-2018 from the MoH RI

Table 1 shows that the average age of respondents was 43.3 years. The majority of respondents were female (65.4%) with low level of education (60.7%) and income below the city minimum wage in Bogor City (95.4%). The majority of respondents had normal metabolic syndrome test results, only on systolic blood pressure measurements (59.1%) and diastolic (56.8%) with risky outcomes.

Table 2. Associated Risk Factors of Stroke

Variable	Stroke		Not		P-Value	OR	CI 95%
	n	%	n	%			
Gender							
Male	18	4.30	401	95.70	0.670	1.139	0.627 – 2.068
Female	30	3.79	761	96.21			
Education							
Low (Not School - Junior school)	35	4.77	699	95.23	0.076	1.783	0.933 – 3.407
High (high school - college)	13	2.73	463	97.27			
Type of work							
Private employee/entrepreneur	46	3.89	1136	96.11	0.384	0.526	0.121 – 2.285
Civil Servants	2	7.14	26	92.86			
Income							
(City minimum wage = Rp 3,557,146)							
< city minimum wage	45	3.90	1109	96.10	0.585	0.717	0.216 – 2.382
≥ city minimum wage	3	5.36	53	94.64			
Ownership of Health Insurance							
It doesn't have	15	3.54	409	96.46	0.574	0.837	0.449 – 1.559
Have	33	4.20	753	95.80			
Smoking Status							
Smoke	32	4.81	633	95.19	0.096	1.6771	0.907 – 3.080
No smoking	16	2.94	529	97.06			
Age to Start Smoking							
≤ 15 years	9	3.37	258	96.63	0.572	0.809	0.387 – 1.691
> 15 years	39	4.14	904	95.86			
Alcohol Consumption							
Yes	13	5.10	242	94.90	0.298	1.412	0.736 – 2.711
Not	35	3.66	920	96.34			
Physical Activity							

Variable	Stroke		Not		P-Value	OR	CI 95%
	n	%	n	%			
Heavy	3	4.69	61	95.31	0.762	1.203	0.364 – 0.364
Light	45	3.93	1101	96.07			
Diabetes Mellitus							
Positive	22	12.15	159	87.85	0.000	5.338	2.953 – 9.647
Negative	26	2.53	1003	97.47			
Emotional Mental Disorders							
Annoyed	6	3.75	154	96.25	0.880	0.935	0.391 – 2.236
Usual	42	4.00	1008	96.00			
Fasting Blood Sugar Levels							
Risky	19	7.01	252	92.99	0.004	2.366	1.305 – 4.290
Usual	29	3.09	910	96.91			
Fasting Blood Sugar Levels Post-Loading							
Risky	23	5.00	437	95.00	0.149	1.526	0.856 – 2.722
Usual	25	3.33	725	96.67			
Total Cholesterol Levels							
Risky	31	5.49	534	94.51	0.011	2.145	1.174 – 3.918
Usual	17	2.64	628	97.36			
Triglyceride Levels							
Risky	17	5.76	278	94.24	0.069	1.744	0.951 – 3.199
Usual	31	3.39	884	96.61			
LDL levels							
Risky	42	4.49	893	95.51	0.084	2.109	0.887 – 5.014
Usual	6	2.18	269	97.82			
HDL levels							
Risky	15	3.54	409	96.46	0.574	0.837	0.449 – 1.559
Usual	33	4.20	753	95.80			
Systolic Blood Pressure							
Risky	41	5.73	674	94.27	0.000	4.241	1.887 – 9.533
Usual	7	1.41	488	98.59			
Diastolic Blood Pressure							
Risky	36	5.24	651	94.76	0.009	2.355	1.213 – 4.572
Usual	12	2.29	511	97.71			
BMI							
Obesity	22	5.13	407	94.87	0.125	1.570	0.878 – 2.805
Usual	26	3.33	755	96.67			

Source: Secondary Data of the NCD Risk Factor Cohort Study in Bogor City in 2017-2018 from the MoH RI

Table 2 shows the results of crosstabulation of stroke factors with the incidence of stroke that diabetes mellitus (p = 0.000; OR=5,338; CI 95%=2,953–9,647), systolic blood pressure (p=0.000; OR=4.241; CI 95%=1,887–9,533), total cholesterol (p=0.011; OR=2,145, CI 95%=1,174–3,918), diastolic blood pressure (p=0.009; OR=2,355; CI 95%=1,213–4,572), and fasting blood sugar levels (P=0.149; OR=1,526, CI 95%=0.856–2,722) is a variable related to stroke incidence in Bogor City in 2018.

Table 3. Logistic Regression Risk Factors of Stroke

Risk Factors	P	Model 1 AOR (95% C.I)	P	Model 2 AOR (95% C.I)	P	Model 3 AOR (95% C.I)	P	Model 4 AOR (95% C.I)
Diabetes Mellitus	0,000	0.249 (0.124-0.502)	0.000	0.237 (0.129-0.435)	0.000	0.238 (0.130-0.436)	0.000	0.222 (0.122-0.405)
Systolic Blood Pressure	0.333	0.333 (0.127-0.876)	0.025	0.331 (0.126-0.868)	0.005	0.308 (0.135-0.702)	0.003	0.291 (0.128-0.662)
Total Cholesterol	0.116	0.608 (0.327-1.131)	0.114	0.606 (0.326-1.127)	0.110	0.604 (0.325-1.122)		
Diastolic Blood Pressure	0.883	0.333 0.397-1.962)	0.782	0.894 (0.404-1.978)				
Fasting Blood Sugar Levels	0.774	0.901 (0.443-1.833)						
Constant	0.000	117.326	0.000	115.277	0.000	112.855	0.000	90.648

Notes. Model 4: Hosmer and Lemeshow test: $\chi 2$ = 38,281, P = 0.000, Nagelkerke ^{R2} = 11%;
Source: Secondary Data of the NCD Risk Factor Cohort Study in Bogor City in 2017-2018 from the MoH RI

The results of the logistic regression test in table 4 showed that diabetes mellitus and systolic blood pressure were the main factors for stroke with p-value, AOR, and (95% C.I) respectively at 0.000, 0.222. (0.122-0.405), 0.003, 0.291 (0.128-0.662).

Table 4. Differences in Biomarkers of Metabolic Syndrome a Year Before Being Diagnosed with Stroke

Biomarkers of Metabolic Syndrome	2017 Mean; ± SD	2018 Mean; ± SD	Z; p-value
Fasting blood sugar levels (mg/dL)	101.13; ± 10:70 p.m.	129.08; ± 68.52	-2,163; 0.031
Post-loading blood sugar levels (mg/dL)	146.69; ± 67.98	183.08; ± 110.17	-1.07; 0.285
Total Cholesterol Levels (mg/dL)	211.77; ± 37.22	216.88; ± 40.02	-0.612; 0.541
Triglyceride Levels (mg/dL)	119.02; ± 61.25	159.21; ± 106.14	-1.8; 0.058
LDL (mg/dL)	142.67; ± 32.74	138.58; ± 35.64	-0.608; 0.543
HDL (mg/dL)	49.19; ± 11.95	49.83; ± 11:00	-0.458; 0.647
Systolic Blood Pressure (mmHg)	157.31; ± 36.12	140.69; ± 10:15 p.m.	-2,177; 0.029
Diastolic Blood Pressure (mmHg)	95.19; ± 6:57 p.m.	90.31; ± 13.78	-1,389; 0.165
IMT	27.13; ± 4.09	27.42; ± 4.66	-0.166; 0.869

Mann-Whitney Test
Source: Secondary Data of the NCD Risk Factor Cohort Study in Bogor City in 2017-2018 from the MoH RI

The average biomarker of metabolic syndrome a year before the diagnosis of stroke and the year when diagnosed with stroke showed results that did not differ significantly, only fasting blood sugar levels and systolic blood pressure, where fasting blood sugar levels in the year diagnosed stroke were higher than the year before the stroke was diagnosed, while the average systolic blood pressure in the year before diagnosis was higher, p-values 0.031, and 0.029, respectively.

The incidence of stroke during 2018 amounted to 48 cases (3.9%). Based on this study, the most vital risk factors for stroke in this population of diabetes mellitus and systolic blood pressure, especially in male patients with an average age of 43 years, a 2013 study in the same population showed that stroke was found at 49 (2. 6%) of the people from 1912 subjects studied (Riyadina & Rahajeng, 2013). It is a 1.3% increase over five years. While the incidence of stroke nationally in 2018 reached 10.9% (Badan Penelitian dan Pengembangan Kesehatan, 2018).

The proportion of strokes in this population was more common in men Zhang Y et al. (Y. Zhang et al., 2012). The incidence of Stroke in the United States, England, France,

Germany, Italy, and Spain increased with age, greater in men than women. Stroke is already present in the young age group of 15-24 years with a prevalence of 0.3% and 25 - 34 years by 0.4%, increasing sharply at 45 years and above. The National Health and Nutrition Examination Survey 2009-2012 in the United States found the prevalence of stroke in women ages 20-39 at 0.2% and men at 0.7% (Mozaffarian et al., 2015). Stroke was higher in groups with low education (not high school). It was closely related to less knowledge due to poor education, so less knowing the consequences of the improper lifestyle, such as eating high-fat and others will facilitate the onset of degenerative diseases (Meschia et al., 2014). It is necessary to counsel stroke prevention methods for a poorly educated specificity society. The appearance of stroke at a young age indicates that stroke prevention interventions should begin early.

The results show that DM was a significant factor in the occurrence of stroke, though statistically multivariate shows a negative direction, but some previous studies have proven a lot. DM increases the risk of stroke because excess glucose in the blood causes vasculopathy, making it more likely to develop hypertension and atherosclerosis. In addition, diabetes increases the risk of blood clots, which can lead to heart attacks and strokes (Azam et al., 2017; Sofiana et al., 2019). Excess sugar in the blood has a direct effect on the walls of blood vessels, binding to and changing the structure of proteins and molecules lining blood vessels, making it thicker, less elastic, and more likely to trigger thrombosis. Thicker, less elastic blood vessels mean that blood has a harder time flowing through narrower gaps and must do so at higher pressures. These changes cause tissue damage called final organ damage. A smaller space for blood to flow means a greater likelihood that clots can completely block blood vessels, causing a stroke or heart attack(Chaturvedi et al., 2020; Sofiana & Rahmawati, 2019; Sorgun et al., 2018). DM was a significant risk factor for cardiovascular disease, including stroke. It is also an independent risk factor in which 20% of diabetic patients will die from stroke(Lau et al., 2019; Mohiuddin, 2019; Shang et al., 2020).

Systolic blood pressure was shown to be a risk factor for stroke although an increase in systolic blood pressure had a higher effect on outcomes, both systolic and diastolic hypertension independently affected the risk of adverse cardiovascular events, regardless of the definition of hypertension (≥120 mmHg and ≥80 mmHg(Flint et al., 2019), including Recurrent Stroke (Ovbiagele et al., 2011), and is the leading cause of cardiovascular death(Itoga et al., 2021; Paultre & Mosca, 2005) The association of hypertension with stroke has been widely explained by many studies. One study by O'Donnell et al. (2010), identified as many as 3,000 cases of stroke with the results of an OR analysis of 2.64. These results can be concluded that people diagnosed with hypertension have a risk of 2.64 times the incidence of stroke compared to people who are not diagnosed with hypertension(O'Donnell et al., 2010). Research by Chen et al. (2014), showed Asians were at 2.84 times the risk of having a stroke with hypertension as a risk factor(Chen et al., 2014). Another study by Zhang et al. (2004), also stated that hypertension is the most dominant risk factor that causes stroke incidence in Asians(X.-F. Zhang et al., 2004). The significant association between stroke and other hypertension in the Asian region is evidenced in a study conducted by Burke and Venketasubramanian (2006), with OR 9.03 (95% CI, 5.25–15.5) in Taiwan(Burke & Venketasubramanian, 2006). Research related to isolated systolic blood pressure in Indonesia said that the prevalence of stroke in ISH reached 8.3%. Women with smoking habits, experiencing mental and physical stress, urban living, and being poorly educated were associated with stroke status in ISH subjects in Indonesia(Pamelasari et al., 2021).

Stroke prevention strategies in this population should include early detection and immediate treatment. It is vital to control risk factors to reduce the burden of stroke. Both primary prevention and secondary prevention. Such as quitting smoking, doing exercise at least 150 minutes/week, a high-fiber diet, fruit and vegetable intake and low in sugar and salt, regulating weight, and pharmacotherapy to control hypertension and blood glucose. This research has some drawbacks. This study only covers one city area in West Java Province, so it has not been able to represent other regions

with different characteristics; this study does not consider the subtypes of ischemic stroke, as well as several other risk factors such as other accompanying diseases not yet included. More research needs to be done to overcome these limitations. Hospital-based research on stroke and the risk factors associated with it should also be conducted in comparison to the results of this community-based study.

Conclusions

Strokes found in the community in the Kebon Kalapa village, Bogor City, based on the Study of NCD Risk Factors of the National Health Institute of Research and Development, MoH RI in 2018, amounted to 48 cases (3.9%). The main determinants of stroke in this population include diabetes mellitus and systolic blood pressure being the main factors for stroke, with each p-value, AOR, and (95% C.I.) being 0.000, 0.222 (0.122-0.405), 0.003, 0.291 (0.128-0.662). There was no significant difference in metabolic syndrome outcomes one year before the diagnosis of stroke and the year when the stroke was diagnosed. Special attention is needed in D.M. patients who have high blood pressure to prevent.

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What are the Appropriate Leadership Styles for Class C Hospital in National Health Insurance (JKN) Era?

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Abstract

The form of leadership is able to determine the success of an organization including hospitals, so a leader needs to think about the right leadership style, especially in the JKN era. This study aims to explore the appropriate leadership style in X General Hospital so that it can get full accreditation and the hospital's existence is still maintained until now. The study used a qualitative study design with a case study approach (case study) which was conducted at one of the Class C General Hospitals in Malang Regency which has collaborated with BPJS Kesehatan (Healthcare and Social Security Agency). The study involved employees who worked at General Hospital X and experienced hospital leadership during the JKN era during February-March 2020. Data collection techniques used three methods including interviews, observation, and document review. The results showed three major themes of leadership style including leadership style transformational, democratic leadership style, and moralist leadership style. The transformational leadership style is the core of the existence of General Hospital X in the JKN era, while the democratic and moral leadership style supports the existence of General Hospital X in the JKN era.

Introduction

In early 2014 the Indonesian Government implemented the National Health Insurance (JKN) program with the aim of providing guarantees to all Indonesians so they can access health services without being constrained by costs. (Irwandy and Sjaaf, 2018). The existence of the JKN policy in Indonesia has an impact on increasing access to public health services which is directly proportional to the increase in patient visits to health facilities including hospitals. The increase in the number of patient visits resulted in less than optimal service as evidenced by patient dissatisfaction, meanwhile, health services in the JKN era were demanded to remain high quality (Hadiyati et al., 2017). The HR aspect is one of the aspects that played an important role during the JKN era, because it is directly related to the behavior of hospital management and services (Rahmadani et al., 2019). One of the indicators to assess the quality of human resources is a form of leadership. The form of leadership is able to determine the success of an organization, including hospitals. So that a leader needs to think about the appropriate leadership style in achieving organizational goals (Dele et al., 2015). Leadership style is a method used by a leader to influence the behavior of others. Empirically, the transformational leadership style has a significant positive effect on employee job satisfaction so that leadership support is needed in shaping the work climate (Rahmadani et al., 2019). In 2018 East Java had the highest number of class C hospitals, namely 176 hospitals, 7 of which are located in Malang Regency. Based on BPJS Kesehatan data in 2019, the number of hospitals that have

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collaborated with BPJS Kesehatan (Healthcare and Social Security Agency) is 16 hospitals and 37.5% are class C hospitals (BPJS Kesehatan, 2019). General Hospital X is a class C hospital located in Malang Regency, led by a hospital leader with a relatively young age and has collaborated with BPJS Kesehatan since 2014 and has been accredited by KARS plenary since March 2019. According to the leader of General Hospital X, 90% of patients are BPJS Kesehatan card holders. X General Hospital has 290 employees with details of 10 doctors, 23 specialist doctors, 2 dentists, 65 nurses, 27 midwives, 45 other medical personnel, and 118 non-medical personnel. Based on the results of the preliminary study, employees described the leaders of General Hospital X as assertive, visionary, and realistic. When employees make mistakes, the leader never judges but guides and directs the truth. Thus, the research aims to explore the appropriate leadership style in X General Hospital so that it can get full accreditation and the existence of the hospital is still maintained today.

Method

The study used a qualitative study design with a case study approach. The research was conducted at one of the Class C Public Hospitals in Malang Regency which has collaborated with BPJS Kesehatan. This study takes the perspective of employee informants at General Hospital X. Therefore, an integrated and comprehensive experience is obtained and can gain an in-depth understanding of the existing leadership style at X General Hospital. Intensive research was carried out in February 2020 until March 2020. In this study, data source collection consisted of the results of informant interviews, observation, and data supporting documentation. Selection of prospective research informants has inclusion criteria as a determining indicator for informants who can become research respondents. The inclusion criteria for research informants were employees who worked at General Hospital X and experienced hospital leadership during the National Health Insurance (JKN) era.

There were 7 informants who were included in the inclusion criteria and interviewed in this study; consisting of 5 people who hold positions in structural, 1 executive, and head of the hospital. Another source of data is obtained from observations that can be observed from interactions between leaders and employees during meetings, during casual discussions, and when leaders assign tasks to employees. There are three ways to analyze the data, namely data reduction, data presentation and conclusion drawing. Data reduction was carried out on irrelevant interview transcripts by summarizing or removing things that were not important. The next step after data reduction is presenting the data. With the presentation of data, it serves to see the available data, whether it represents what is happening and what should be done based on the understanding in presenting the data. Drawing conclusions is the third stage in data analysis in qualitative research. The conclusions in this study are new and original findings. The validity and transferability of research data was carried out by peer debriefing, inviting external auditors, and data triangulation.

Result and Discussion

General Hospital X is a class C hospital that was founded in 2010 and is located in Bululawang District, Malang Regency. The hospital has collaborated with BPJS Kesehatan since 2014 and has been fully accredited by SNARS since March 2019. According to the leader of X General Hospital, 90% of patients are BPJS Kesehatan card holders. X General Hospital has 290 employees with details of 10 doctors, 23 specialist doctors, 2 dentists, 65 nurses, 27 midwives, 45 other medical personnel, and 118 non-medical personnel. The hospital has five types of services including outpatient, inpatient, IGD (Emergency Room Installation), IKO (Operating Room Installation), and ICU (Intensive Care Unit). Hospital supporting facilities include laboratories, radiology, and pharmaceutical installations. Based on hospital

medical record data from 2016 to June 2019, the Bed Occupancy Rate (BOR) figure was 63%, the Average Length of Stay (ALOS) reached three days, and the total patient visits reached 6,069 patients with 79 beds.

The total number of participants was six people. Participants are employees who worked at General Hospital X and experienced hospital leadership during the National Health Insurance (JKN) era. The first informant was a 34 year old of midwife who worked at X General Hospital since before the hospital was launched, namely at the end of 2009 so that the participant's working period had reached more than 10 years. Currently, the participant is the Head of the PICU (Pediatric Intensive Care Unit). The second informant was a 24 year old of non-medical worker who served in the linen division and became the head of the linen division. The period of work of the participants reaches 5 years starting from graduating from school at the age of 18 when they join X General Hospital. The third informant was a 30 year old of male nurse who served in the ICU (Intensive Unit Care) and became the head of the ICU room. The period of work of the participants reached 9 years starting from 2011. When they first joined in 2011–2014, the participants experienced multiple jobs serving in the IGD (Emergency Room) unit, room, and poly. The fourth informant was a 29 year old of female nurse who served in the PPI (Infection Prevention and Control) unit as the head of the PPI unit. The work period of the participants is up to 7 years starting from 2013. The fifth informant was a 28 year old of female dentist. Currently the participant is assigned to be the deputy staffing director of General Hospital X with a working period of 2 years starting from March 2018. Before becoming deputy director of staffing, the participant was a functional doctor at a clinic adjacent to the hospital location. The sixth informant was a 37 year old of female non-medical worker who served as an officer in the linen division. The work period of the participants reaches 5 years starting from 2014. The seventh informant was the director of General Hospital X Malang Regency. The 34-year-old informant lives in Malang City served as hospital director since 2011 until now. Previously, the informant was a functional doctor at X General Hospital.

The transformational leadership style reflects the leader's personality in bringing changes to the hospital for the better in the JKN era. In general, the transformational leadership style refers more to providing motivation, attention to individuals, directing, and prioritizing the fulfillment of human rights in maximizing employee performance. A leader in applying this transformational style can also have an impact on raising the spirit of performance for employees in achieving goals. There are three sub-themes that reflect the leader's personality. The relationship between theme and sub-theme can be seen in Figure 1.

Transformational leadership style tends to emerge when the organization is developing and changes are needed (Gunawan et al., 2020). This is also a process to create conditions that are in accordance with the goals that have been set. Mei L, (2014) explains that the existence of a transformational leadership style can lead to innovation in an organization. The personality of the leader is a reflection of the leader in bringing about change for General Hospital X in the JKN (National Health Insurance) era which is known based on four dimensions in transformational leadership including 1) intellectual stimulation, 2) idealization, 3) inspirational motivation, and 4) consideration individual.

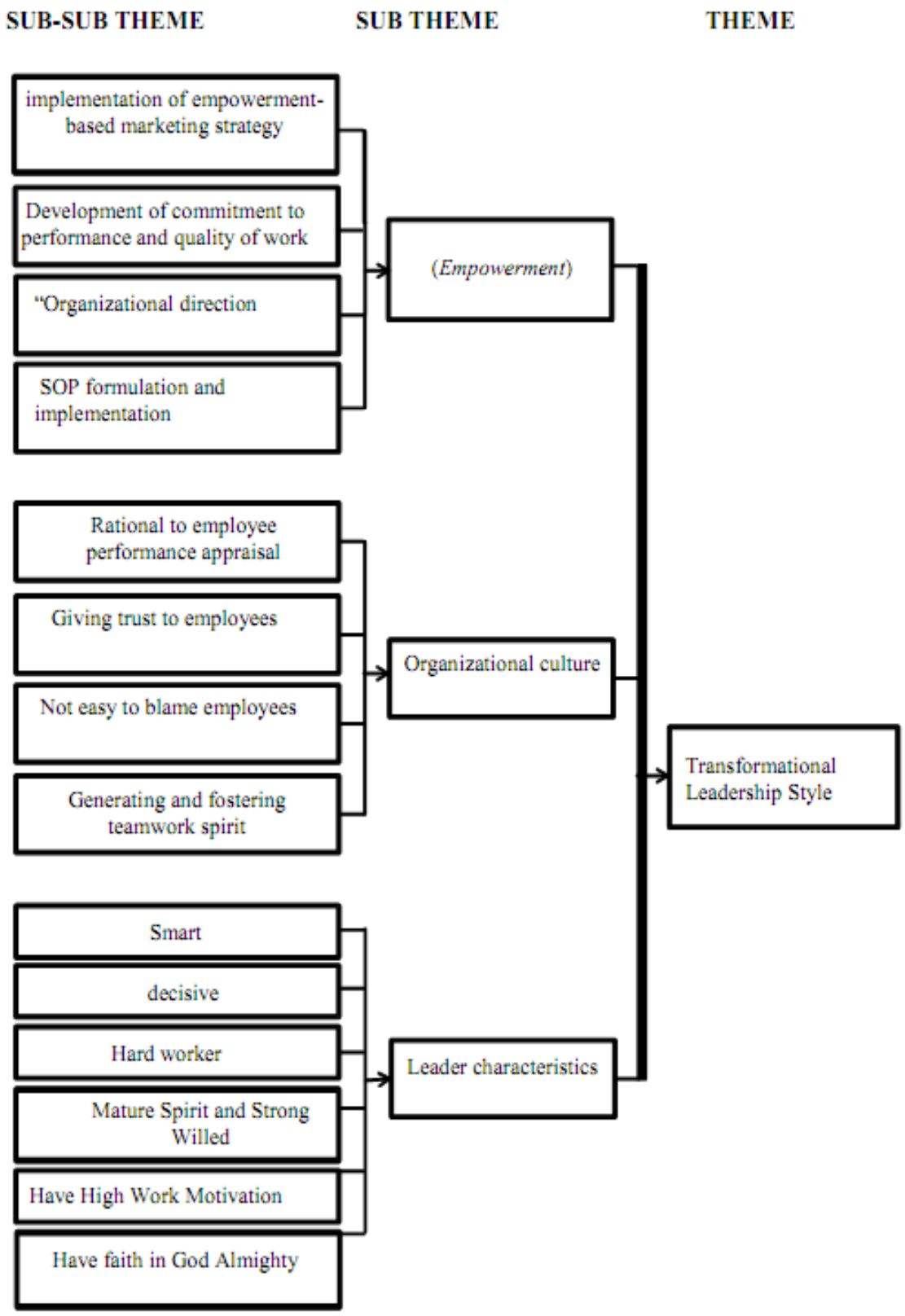

Figure 1. Transformational Leadership Style
Source: Primary Data (2020)

Empowerment Strategy

1.Implementation of Empowerment-Based Internal Marketing Strategy

During JKN, the leader implemented an internal marketing strategy by inviting all hospital employees to promote through social media. In addition, internal marketing is an advantage of the hospital.

> "Kelebihannya, rumah sakit ada di marketing e dok." (3.1)
> "(The advantage is that the hospital is in marketing, doc)" (3.1)
> "Kalau ada gitu, ayo di share ke grup masing-masing. Dan nanti bikin status podo kabeh." (3.1)
> "(If so, let's share it with each group. And later make a status for same all)" (3.1)

Internal marketing strategy is carried out in the form of notification of service times and doctor's practice schedule every day. Internal marketing in the hospital is highly giving contribute to creating a positive sense of satisfaction for customers seeking treatment services, so that play a role in increasing the effectiveness of the marketing strategy followed and to achieve its marketing objectives. It can be said that the success of marketing health service efforts at the hospital's internal level and organizations operating in the health sector depend on creating an appropriate marketing climate within it organization by its employees, the more consistent between workers and management in the hospital, the higher the degree of the hospital in providing services and maintaining the relationship between the patient and the employees (Nsour, 2013).

2.Development of a Commitment to Performance and Quality of Work

In the era of National Health Insurance (JKN) it also affected the health service system provided to the community. Health services provided to patients can be a community assessment of the hospital. Therefore, it is necessary to increase the quality of employee performance.

> "Iya di kumpulkan, kan itu disini pakek apa itu namanya tim dok ya. Jadi kayak berkas ruang ini yang maju akreditasi, di cepaki orangnya terus dilatih. Nah nanti yang ini nulari ke teman-temannya, seperti itu....." (3.1)
> "(Yes, they are collected, right here, sir, is that a team, doc? So it is like this space file which progresses for accreditation, in accelerating the people continue to be trained. So, later this one will transmit to his friends, like that ...)" (3.1)

The role of a leader in the aspect of developing commitment can also be done by creating a conducive work environment so that it will provide a sense of security to employees. If comfort is created, employee work activities can be effective (L.K., O. F, 2018). This will have an impact on high productivity and increased performance and quality of employee work.

3. Organizational Direction

One of the success factors in teamwork is the clarity of the direction the organization or team is headed for. The leader plays a role in setting the direction of the organization through increasing positive self-concept of organizational members. Thus the members of the organization will be able to overcome problems with their respective potentials without any pressure and can build a high commitment to the achievement of organizational goals.

> "Ya tetap diarahkan, tapi tetep tugasnya bawahannya (targetmu ini, ini, ini.. harus bisa,....evaluasi.) Kayak ada apa namanya, keliling gitu. Kan bu Dir sendiri biasanya keliling, mengawali assessor. Jadi bu Dir keliling dulu, yakpa sih hasilnya temen-temen." (3.1)
> "(Yes, it is still directed, but still the job of the subordinates (this is your target, this, this ... must be able, ... evaluation.) Like what is it called, around like that. Mrs. Dir herself usually goes around, starting the assessor. So Mrs. Dir went around first, what the result was my friends)" (3.1)

A leader plays a role in using his authority and leadership to direct the organization so as to achieve a goal. Leaders are an important element in managing human resources to work effectively and with direction.

4.Formulation and Implementation of SOP

The leader plays a role in setting the direction that an organization is headed by formulating and implementing an operational plan. At General Hospital X there is also an SOP that employees must comply with. If the employee does not comply with the applicable rules, he will be subject to strict sanctions.

> "Kalau nggak mau nurut aturan dari rumah sakit ya silahkan. (silahkan keluar dari RS)" (2.1)
> "(If you don't want to follow the rules of the hospital, please. (please leave the hospital))"
> "Juga ada SKnya juga, kayak kita ini kan harusnya sesuai dengan SPO...Tapi dari kita sendiri yang terkadang ya melenceng dari SPO." (2.1)
> "(There is also a decree too, like we should be in accordance with the SPO ... But from ourselves, sometimes we deviate from the SPO)"

Consistency of leaders in implementing applicable rules and consistency of employees in carrying out work procedures is a requirement to create a strong culture. Consistent employees will always be strongly guided by the values that apply at work and carry out their duties to provide good service to patients (Fitri et.al., 2019). The formulation and implementation of the SOP by the leader has a positive and significant impact on employee performance. Employees will have trust, admiration, loyalty, and respect for the leader. In addition, employees will also be motivated to carry out SOP better than before.

Organizational culture

1.Rational on Employee Performance Appraisal

One of the things that is important in realizing quality health services in hospitals is how the quality of Human Resources (HR). Assessment of employees is also carried out by the leaders of General Hospital X. With regular employee assessments, it can become the controlling leader to find out how employees are performing.

> "Ehmmm.. pas apa ya. Pas saya masih baru disini sih dokter, ada karyawan baru dikeluarkan dari rumah sakit ini. Awalnya saya bilang ada masalah gini-gini akhirnya sungkan to. Terus akhirnya dari direktur itu bilang, "saya nggak mau kalau pas waktu nanti penilaian kinerja karyawan, setiap bulannya, menilai anak-anaknya itu dengan batas nilai yang tinggi, tapi pas waktu di lapangan dia batasnya nggak segitu. Yang saya mau itu pas benar apa yang dikerjakan. Meskipun jelek nggak masalah, nanti biar di.. apa itu dikasih kesempatan selama tiga kali, ya kalau ngga bisa ya terpaksa harus dikeluarkan". Soalnya kan disini nggak mau kalau kita mengecewakan pasien. Yang utama itu, Dokter." (2.2)
> "(Uhmmm .. what fit. When I was just here, a doctor, a new employee was released from this hospital. At first I said there was a problem like this and finally I was reluctant to. Then finally the director said, "I don't want it when the employee performance appraisal, every month, assesses their employees with high value limits, but when they are in the field they don't have that limit. What I want is exactly what I do. Even though it's ugly it doesn't matter, let me give it three times, if I can't, I have to be expelled". The problem is that here we don't want to disappoint the patient. The main thing, Doctor)"

The rationality of the leader in addressing the results of employee performance appraisals is in accordance with the dimensions of intellectual stimulation in a transformational style. The results of the performance appraisal can help the hospital to see achievements and as an evaluation material for future planning. Purpose of performance appraisal is to improve the service quality of healthcare. With the help of an effective performance appraisal program, employee's performance can be monitored, and employee will be kept motivated (Jha et al., 2016).

2.Giving Trust in Employees

The leader of General X Hospital also gives confidence in his employees in carrying out activities at the hospital.

> "Ya beliau berusaha ngasih kepercayaan kepada kita sih, dok." (5.1)
> "(Yes, she's trying to give us confidence, doc)"

> "Ya tetap diarahkan dan diberi kepercayaan, tapi tetep tugasnya bawahan" (3.1)

"(Yes, it is still directed and given the trust, but the duties are still subordinate)"
In addition, the leadership of General X Hospital also has the principle that the success of the hospital is not far from the struggle of its employees.

"Keberhasilan rumah sakit merupakan keberhasilan dari karyawan semuanya. Rumah Sakit tidak akan bisa maju apabila tidak memiliki karyawan dan tim manajemen yang semangat. Tentunya hal tersebut juga di dukung oleh semua bagian dari rumah sakit termasuk dari owner rumah sakit juga." (7.1)
"(The success of the hospital is the success of all employees. Hospitals will not be able to progress if they do not have enthusiastic employees and management teams. Of course this is also supported by all parts of the hospital including the hospital owner as well)"

In transformational leadership, one of the characteristics of leaders is to foster trust in employees in carrying out activities that make them independent and foster creativity in achieving goals (Jahidi, 2020). The existence of trust given by the leader makes employees motivated to do something more than previously expected. Giving three opportunities to employees of General Hospital X shows the leadership's trust in employees to correct any mistakes they make. The leader believes that the success and success of the hospital is the result of the hard work and struggle of all its employees.

3.It's Not Easy to Blame Employees

The leader of General Hospital X in carrying out his leadership duties includes people who do not immediately blame their employees if someone is found to have made a mistake.

"Enggak.. kuat.. iyaa tegar.. orangnya itu tegar dokter.. meskipun dia banyak masalah tapi beliaunya itu masih.. masih.. mau menuntun.. gitu lho dokter.. dan ee.. dan nggak pernah menyalahkan.. mesti dia gini "memang itu salah dari saya" (3.1)
"(No .. strong .. yes tough .. the person is tough doctor .. even though he has a lot of problems but the young man is still .. still .. want to guide .. you know doctor .. and ee .. and never blame .. it must be "it was my fault)"

Leadership has an influence on organizational culture which explains that in organizational culture every individual is encouraged to carry out collaborative learning, eliminate the culture of blame, prioritize patient safety, and reward individuals who have identified mistakes (Diana et al., 2017)

4.Generating and Fostering Teamwork Spirit

The leader of General X Hospital will direct and guide employees coherently and with direction so that they can generate team spirit and can be an improvement in employee performance.

"Kemarin itu ya kayak misalnya buat proker itu, misalnya kan maju, ada asesor dan sebagainya, dia ngasih contohnya tugasnya ya, dia ngajari dulu itu 'aku te opo nek ngarani...kate mbimbing apa...mmm...' caranya aku menempatkan bukan sebagai asesor internal tapi aku surveyor gitu ya, aku akan tanya seperti ini...nah gitu.. Itu nanti bawahanya kan akan tau pertanyaannya itu kayak gimana... Nyontohin sampai 1 pokja penuh, sampe 1 pokja selesai nanti asesor2 internal kan jadi tau caranya." (1.1)
"(Yesterday it was like for example for the project program, for example, going forward, there were assessors and so on, she gave examples of her duties, she taught me first 'aku te opo nek ngarani...kate mbimbing apa...mmm...' how do I assigning not as an internal assessor but I am a surveyor like that, I will ask like this ... well so .. That later the subordinate will know the question like how ... Exemplify it until 1 working group is complete, until 1 working group is finished later will be internal assessors right? so know how.)"

"Nggak. Tapi lebih membimbing." (5.1)
"(Not. But more guiding.)"

In transformational leadership, the leader will provide energy in everything. With this it can be an experience that can lift the spirits of employees (Abbasi et al., 2014). In the work environment, leaders also direct employees to be active and have the courage

to speak out in front of the forum. The ability to communicate in issuing ideas, opinions and even receiving opinions and suggestions from others can be a success factor in carrying out a good task in working with team work or work groups. With the motivation and guidance by leaders in increasing the knowledge and enthusiasm of employees, it will also improve the quality of service (Mahmood, S & Khattak, M.A, 2017). This is evidenced by EK, K and Mukuru, E (2013) that there is a positive and significant influence between work motivation on employee performance, where work motivation is also an important predictor in improving employee performance.

Leader Characteristics

1.Smart

The leader's personality in bringing change to the hospital is due to his intelligence and ideas.

> "Jenius, selalu punya banyak cara dan selalu punya ide hehehe." (1.1)
> "(Genius, always has many ways and always has ideas hehehe.)"

Change occurs followed by the leader's action to develop the ideas he has. Organizations that are skilled by generating new ideas will get an edge in the competition and not be left behind by the rapid development of the marked. This also reflects the transformational leadership style, namely the leader must have the ability to improve the performance of his employees through his creative ideas so as to produce the value of harmony between leaders and employees (Givens, 2008). Thus, the idea developed by the leader made X General Hospital maintain its existence in the JKN era.

2.Decisive

Leaders are not only known as smart figures, but also as resolute.

> "Direktur itu.. tegas.. tegas, dok orangnya, dok.. tegas.. kadang juga ganas heheee.. tegas, ganas, tapi penyayang, dok beliau itu." (5.1)
> "The director is .. firm .. really firm, doc is the person, doc .. firm .. but sometimes also ferocious heheee .., ferocious, but compassionate, doc."

According to the fifth participant, the leader is known as someone who is sometimes ferocious. According to the Big Indonesian Dictionary (KBBI), malignant means fierce or angry. Skills as one of the supporting elements in showing effective leadership traits based on a trait approach (Yukl, 2013). With a firm leader, it can be one of the strengths in conveying the importance of the efforts made by employees and the contribution of employees in successfully achieving organizational goals (Iqbal et al., 2020). The assertiveness of the leader is shown through the provision of sanctions for employees who make mistakes, such as the results of employee performance appraisals that do not meet the standards will be deducted or postponed salary.

3.Hard worker

The leader is known as a hard worker who is known based on the persistence of the leader in fighting for hospital accreditation.

> "Emm ya itu sih.. kayak yo itu tadi..... yang ingin memperjuangkan.. kayak gitu.. contoh e ya pas akreditasi akreditasi itu." (4.1)
> "(Emm hmm .. like that as I said ..... those who want to fight for it .. like that .. example e right when accreditation established.)"
>
> The nature of wanting to fight for the director has an effect on employee performance.
>
> "Ya maksudnya kalau dari direktur sendiri ngga gelem ngoyo ngga mungkin sampai bawah-bawahnya seperti itu kan ya.." (3.1)
> "(Yes, that means if the director himself doesn't 'ngoyo', (complaining) it's impossible to get to the employer like that, right?)"

The meaning of the word "ngoyo" is the nature of forcing oneself to do something without considering abilities, conditions, and time. The success achieved by the hospital cannot be separated from the hard work of the leaders and employees. Thus, the hard work

produced by the leader makes employees follow the leader's spirit in realizing achievement. The dimension of idealization lies in the hard work of the leader in influencing the performance of employees at General Hospital X.

4.Mature and Strong-Willed

The personality of a leader who likes challenges has an effect on employee performance so that they always learn.

> "Iyaa.. oh nemen, dok kalau itu.. banyak yang diberikan tantangan-tantangan sama Direktur itu.. maksudnya beliau itu orangnya.. belajaro belajaro.. gitu lho.." (5.1)
> "(Yes .. oh of course, doc if so .. many were given challenges to the director .. he meant he was the person .. who suggest to study more and more .. you know ..)"

Giving challenges are not only done to one or two employees, but to many employees with the intention that employees continue to learn in providing services to patients at General Hospital X. This is in accordance with the research Usman et al. (2020), which explains that improving employee performance is the most difficult challenge to do in management because the success of achieving goals and survival depends on the quality of employees. In addition, the existence of challenges can bring progress for the organization in maintaining competition. Thus, the research conducted is linear with the use of the dimensions of inspirational motivation in achieving goals.

5. Have High Work Motivation

Changes in the hospital are accompanied by positive ambitions owned by the leader.

> "Ambisi yang positif, ya untuk kesejahteraan rumah sakit..." (3.1)
> "(Positive ambition, yes for hospital welfare ...)"

Work motivation is a process that directs and sustains the performance. Motivation encourages employees internally towards the actions which help them to achieve the goals or specific task which is assigned to him. Effectiveness of employees work can inspire them to their work and can bring more work motivation and more commitment of their jobs (Sohail et al., 2014).

6. Devote to God Almighty

Leaders are not only concerned with worldly hospital affairs. The leader is known as a religious figure by holding recitation every Friday and providing religious reading books.

> "Heem. Disini setiap hari jumat ada pengajian, kalau pengajian besar itu biasanya satu bulan dua kali sampai tiga kali di ruang pertemuan khusus untuk karyawan." (2.2)
> "(Yes. Here every Friday there is a recitation (Islamic speech), if the big recitation is usually one month or two times to three times in a special meeting room for employees.)"

> "Disini itu kayak itu dokter, disediakan buku-buku keagamaan, untuk orang kristen juga ada. Kalau misal keluarga pasien atau pasien mau pinjem gitu." (2.2)
> "(Here it is like that a doctor, religious books are provided, there are also for Christians. For example, the patient's family or patient wants to borrow it.)"

The application of spiritual needs in the hospital can optimize the productivity of employee performance (Grant and McGhee, 2012; Sureskiarti et al., 2017). In addition, spiritual needs will have a positive influence on the patient's health and psychology. With spiritual support can improve the patient's condition and also make the patient comfortable with critical illness (Laili et al., 2019). The religious personality of the leader also has an impact on visitors who can enjoy the religious book facilities provided by Hospital X.

The democratic leadership style describes the leadership system applied in the JKN era and the method of problem solving at Hospital X.. In democratic leadership there is coordination of internal responsibilities and good cooperation. The roles and contributions of staff are important. The leader will gather opinions, suggestions and feedback from staff before making decision or issuing instructions to the team. Thus, the direction of the team is influenced by the staff's involvement (Izidor & Iheriohanma, 2015). There are six sub-themes that describe the leadership system and problem

solving. The relationship between themes and sub-themes can be seen in Figure 2.

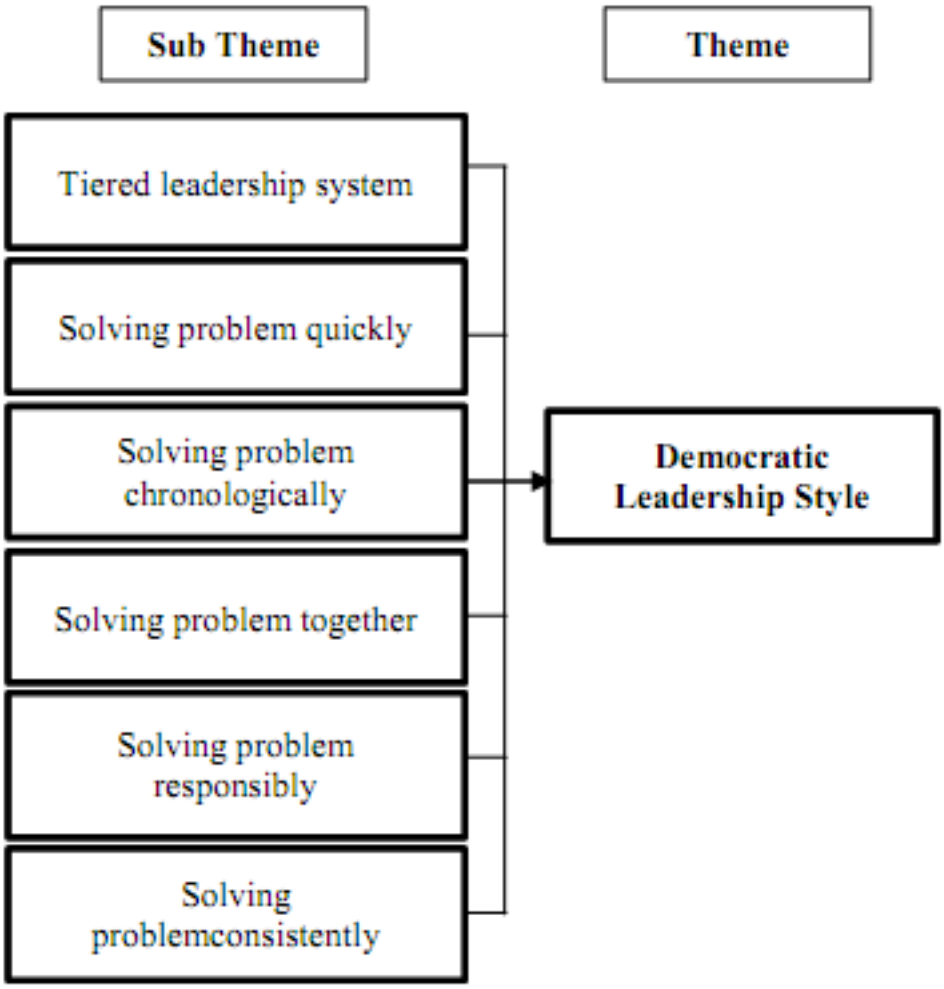

Figure 2 Democratic Leadership Style
Source: Primary Data (2020)

A democratic leadership style will be effective if the leader strives for a better direction and the leader has the spirit and democratic leadership style focuses more on people and there is greater interaction within the group (Dike, Ego & Madubueze, 2019). The democratic leadership style supports the existence of General Hospital X in the JKN era.

1.Tiered Leadership System

X General Hospital applies a tiered leadership system.

> "Ya berjenjang dokter, ya Karu-nya yang berperan. Baru nanti kalau Karunya nggak ngatasi, kasubag, terus Wadir, terus Direktur gitu, berjenjang jadinya." (3.1)
>
> "(Yes, a doctor, must be who plays a role. Only later if Karunya doesn't solve it, the head of the subdivision, then Deputy Director, then the Director is like that, there are stages.)"
>
> "Tapi misalnya kalau kayak ada masalah, kalau direktur penyelesaiannya dari Wadir, Kasub, baru beda." (6.1)
> "(But for example, if there is a problem, if the director of the solution is from the Deputy Head of Sub, then it is different.)"

The tiered leadership system shows the transfer of authority between leaders and subordinates. The delegation of authority shows the leader implementing the delegation function. The function of delegation is carried

out to show the leader's trust in his subordinate members so that the delegation of authority is carried out responsibly. In this case, the leader democratically delegates authority to others to encourage decision making in the organization (Purwanto et al., 2020).

2.Resolving Problems Quickly

The tiered leadership system makes it easy for the hospital to solve problems that are done quickly.

> "Terus, kalau ada masalah yawes pokoke pengen diselesaikan cepet-cepet gitu." (4.1)
> "(Then, if there is a problem , must be resolved it quickly.)"

The leader's speed in solving problems is the leader's initiative or initiative in applying a democratic leadership style (Mtikulu, D.S et al., 2014). In addition, the leader acts as a disturbance-handler role (Yukl, 2013) who is responsible for all problems that arise in the organization.

3.Rational and Objective

Fast problem solving remains chronological problems through root cause analysis (RCA).

> "Dan beliau itu tidak langsung nge-judge itu salah nggak, nggak pernah. Jadi, beliau itu selalu men RCA dulu gitu lho." (5.1)
> "(And she doesn't judge right away, it's wrong or not, never. So, she always served RCA first, you know)"

Every problem that has been sought is immediately discussed and given a solution by the leader of the X General Hospital through a forum. The data source for problem reporting can be said to be accurate (reliable) if it fits the flow and chronology of the problem so that the problem solving at General Hospital X is not only done quickly but also based on the chronology of the problem. This aims to supervise the attitudes, behavior and actions of subordinates.

4.Decision Making Involves Member Participation

If there is a problem at X General Hospital the leader does joint problem solving and the leader thinks of a solution to the problem.

> "Semuanya. Beliau juga bantu nyarikan (mencarikan data yang diperlukan). Jadi dipikir bersama gitu lhoo." (1.1)
> "(All. She also helped find (find the necessary data). So think about it together, you know.)"

Democratic leadership style involves subordinates in the decision-making process (Sanusi et al., 2020) . Democratic leaders are as people who share decision-making with other members. He asserts that democratic leadership is associated with higher morale in most situations (Choi, S, 2007). Collective problem solving can be done on ill-defined problems using a heuristic strategy.

5.Solving Problems Responsibly

Every problem that exists in X General Hospital is also resolved responsibly. Leaders teach hospital employees to be responsible for mistakes that have been done.

> "Berarti sekarang dokter M juga harus membenarkan ini, harus bertanggung jawab. Jadi gitu sih. Kalau sudah gitu, nanti gitu udah biasa lagi nggak akan seperti.." (5.1)
> "(Means that now doctor M also has to confirm this, must be responsible. So that's how it is. If it's like that, then it's normal again and it won't be like that anymore ...)"

Leaders teach employees to be responsible for problems committed by employees. X General Hospital uses an approach in teaching responsibility to employees through a situation and condition approach based on delegating behavior.

6.Resolve Problems Consistently

The leadership system at X General Hospital when submitting unit needs is not only carried out in stages but is also carried out consistently until the submission process is accepted by the hospital director.

> "Tapi kalo dari linen ya dokter, menurut saya sendiri...direktur itu enaknya kalo pas pengajuan kayak selimut atau apa gitu...dari

direktur itu memang apa ya harus konsisten gitu lho dokter...saya pengajuan kalau data saya belum lengkap, ndak bakal di acc....." (2.1)
"(But if it's from linen, doctor, in my opinion ... the director is good if the submission is like a blanket or something ... from the director what does it have to be consistent with you, doctor ... I submit if my data is not complete, nope will be accepted ...)"

According to the Big Indonesian Dictionary (KBBI), consistency has a fixed and appropriate meaning. The actions taken by the leaders of Hospital X reflect the order in which the goods are filed in the sense that the submission of goods also uses a tiered system. Resolving problems that are carried out consistently reflects the existence of firm orders in the application of a democratic leadership style. In addition, the consistency of leaders and employees shows the application of organizational culture at General Hospital X. Leader's consistency is shown through the application of applicable rules that make employees apply rules slowly without being seen by the leader, while employee consistency is shown through employee behavior in implementing guidelines or rules applies (Fitri et al., 2019a).

The moralist leadership style reflects the leader's personality in interacting with employees as well as the reward and punishment system at General Hospital X. There are five sub-themes that reflect the moralist leadership style. The relationship between the research theme and sub-theme can be seen in Figure 3.

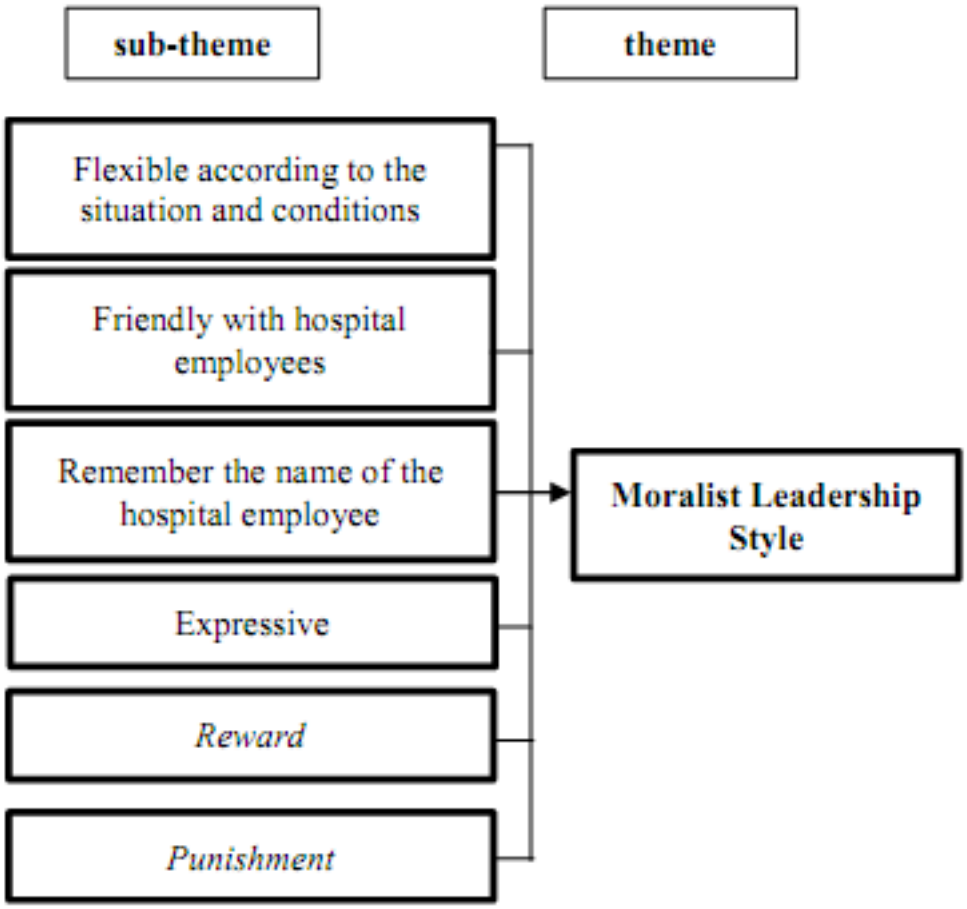

Figure 3. Moralist Leadership Style
Source: Primary Data (2020)

The strengths of the moralist leadership style lie in the warmth of the leader, a high empathy for every employee's problem, kind and honest. The weakness of people with moralist leadership styles lies in their emotions.

1.Flexible according to situations and conditions

Leaders are known as figures who can position themselves and by knowing when to become hospital directors and when to be friends to other employees.

> "Bisa, kadang itu kan koyok konco, pas apa... gimana ya, ya tergantung situasi se, mau mengkondisikan dirinya aku saiki direktur ya direktur, kalau sekarang jadi temen ya temen, yawes kayak gitu." (1.1)
> "(You can, sometimes it's just friends, what fit ... how do you do that, depending on the situation, I want to condition him, if now I'm a director as director, if now I'm as a friend, acting as friend, yeah like that (proportional))"

The term "koyok konco" is a term used by the first participant to describe a leader in positioning himself as a friend to other employees at General Hospital X. The strength of a moralist leader is an attitude of empathy towards other employees (Mattayang, 2019). Empathy makes leaders more flexible or able to adapt to situations and conditions at X General Hospital.

2. Friendly With Hospital Employees

A flexible leader's personality makes the leader known as a friendly person by his employees. The friendliness of the leader is shown through the style of greeting that is done.

> "Baik, ya enak se, enak. Kalau ketemu nyapa duluan." (6.1)
> "(Good, yes delicious. If we meet greeting first.)"

The warmth of a leader is one of the strengths of a moralist leader that makes it easy for the leader to be friendly to others (Mattayang, 2019). The warmth generated makes employees feel "uncomfortable" to interact with the leader.

3.Remember the Hospital Employee's Name

The leader has the advantage of a high memory supported by a style of greeting that makes the leader remember all the names of the employees at X General Hospital.

> "Hafal. Mayoritas tau. Kecuali yang sebulan dua bulan masih masuk lho ya." (1.1)
> "(Memorize. The majority know. Except for those that are still in for a month or two, you know.)"

Age has an influence on a person's memory or memory. The leader of General Hospital X has a relatively young age, in other words it is still classified as a productive age. The style of greeting the leader makes it easy for the leader to remember all the employees at X General Hospital, except for employees with a service period of 1–2 months.

4.Emotional

Three participants explained that emotional leaders manage hospital management. Emotional leaders are shown expressively through facial expressions including when mood swings (moody). An expressive leader's attitude can affect the performance of employees at X General Hospital so that employees must look at the situation and conditions first. Emotional intelligence can be a major contributor to leadership effectiveness (George, 2000). This is in accordance with the explanation that emotional instability expressed expressively is a challenge for a leader throughout his life.

5.Reward

The moralist leadership style is applied by the leader to present a reward system for employees of General Hospital X. The leader always provides rewards to employees with the aim of improving performance.

> "Reward?? Ada. Selalu ada reward, Dok." (5.1)
> "(Reward ?? There is. There's always a reward, Doc.)"

The rewards given vary, including gold, refreshing, chocolate, award certificates, and books.

> "Reward kemarin itu dikasih emas, dok." (1.1)
> "(Yesterday's reward was given gold, doc.)"

> "Pergi seh satu kali ke Jatim Park." (3.1)
> "(once went to Jatim Park.)"
> "Pas waktu ulang tahun rumah sakit kemarin

kayak dikasih piagam penghargaan karyawan teladan, karayawan terfavorit, gitu." (2.1)
"(At the hospital's Anniversary yesterday, it was like being given a certificate of appreciation for exemplary employees, favorite employees, like that.)"

"Dapet, meskipun reward-nya itu coklat gitu itu lho, Dok." (5.1)
"(Got it, even though the reward is chocolate, you know, Doc.)"

"Buku, buku-buku yang lucu-lucu.." (5.1)
"(Books, funny books ..)"

One of the factors that affect employee performance is the provision of rewards that can spur employees to improve performance and achievement in an organization (Munir et al., 2011). X General Hospital employees who have successfully completed their tasks are given gifts or awards by the leader so that the leader triggers employees to improve performance with the element of "reward power".

6. Punishment

The application of the moralist leadership style is not only in the form of reward, but also the provision of sanctions to employees as material for evaluating and improving employee performance at General Hospital X.

"Ada. Tapi potong gaji. Tapi potong gaji itu tidak dipotong untuk tidak diberikan lagi. Jadi di saving dok, sampai anak itu bertanggung jawab." (5.1)
"(There is. But cut wages. But the pay cut is not deducted from being given again. So in saving doc, until the person is responsible)."

"Ooo ituu aaa.... kalo kayak nametag nya ilang itu nanti ada sendiri anunya 100 ribu dendanya trus kalo opo itu...kan sekarang masih berjalan itu." (2.1)
"(Ooo thats aaa .... if it's like the nametag is lost, there will be 100 thousand fine for it, then if it's ... it's still running right now.)"

"Ada peringatan, nanti ada ranking rangkingnya juga. Perencanaan ke depan itu setiap karyawan ada raportnya." (3.1)
"(There is a warning, there will also be a ranking ranking. For the future planning, every employee has a report card.)"

The provision of rewards is also offset by the imposition of sanctions for employees who are not successful. This is intended to provide encouragement to employees in improving their performance. In giving punishment is also expected as an effort to increase discipline and awareness of employees about the rules of the organization (Maryjoan et al., 2017). According to (Bergen, 2012) examples of effective punishment given to employees can be done by reprimanding employees who are less than optimal in doing their work, recommending salary cuts to employees who do not meet targets, and giving some special tasks given by the leader as punishment for violating actions. rules in the organization.

7. High Empathy for Employee Problems

The good relationship that exists between leaders and employees will affect communication, making it easier to coordinate. The leaders of General X Hospital have a high sense of empathy for the problems that are owned by employees.

"Pernah.. sampek gagal.. kayak gitu.. itu juga sampe dr. X tau.. dr. X itu tau semuanya, dok.. karena kita nggak bisa menutupi, gitu lho.. beliau itu bisa membaca, ini masalahnya sedang di rumah, ini masalahnya sedang ada di rumah sakit.." (6.1)
"(Once .. until it failed .. like that .. that was also until dr. X knows .. dr. X knows everything, doc .. because we can't cover it, you know .. she can read, this is the problem being at home, this is the problem being in the hospital ..)" (6.1)

The presence of empathy in leaders can increase our understanding of placing leader support for follower psychology and security needs at the forefront. Such understanding helps we better acknowledge the emotional needs of employees. and increase follower innovation every day, activities with increasing relevance in the workplace (Ned Kock et al., 2019).

CONCLUSION

The study explains three major themes that explain the leadership style applied in the Class C X General Hospital during the JKN era. Three major themes include

transformational leadership styles, democratic leadership styles, and moralist leadership styles. The trans-formational leadership style reflects the personality of the leader in bringing change to General Hospital X in the JKN era. The democratic leadership style reflects the leadership and problem-solving systems applied at General Hospital X. The moralist leadership style reflects the leader's personality in interacting with employees at General Hospital X. General Hospital X class C during the JKN era. Transformational Leadership style is the main core (core) in bringing change to General Hospital X in the JKN era, while the democratic leadership style and moralist leadership style is a support for General Hospital X.

First, the leader of General Hospital X has succeeded in cultivating a culture of courage in public opinion among all of its employees, this can be supported by providing public speaking training to employees. Second, in an effort to maintain team morale, the leadership of RS X can make various efforts, including giving employees the right position according to their competence, providing opportunities for outstanding employees to develop themselves, cultivating feelings of security to employees in facing the future, providing incentives the right one with clear rules and provide work facilities that can support employee performance at work so as to arouse employee morale.

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