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RESEARCH

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Sensory Evaluation and Nutritional Quality of Corn Tortilla Enriched with Moringa Seed Flour

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Abstract

One of the agricultural product processing industries currently being developed in East Nusa Tenggara is corn. Corn has a relatively high nutritional content, thus it possesses economic value for the community. One of the snack products from corn is tortilla. The tortillas can be modified with other food ingredients that contain good nutrition to increase its nutritional value. Moringa seeds contain carbohydrates, fats and proteins. Hence, moringa seeds can be an alternative food source of a new protein which is able to overcome protein deficiency, particularly in East Nusa Tenggara. The experiment was designed by Completely Randomized Design (CRD) with several formulas for substitution of corn flour with moringa seed flour, which were: P1 (100%: 0%), P2 (95%:5%), P3 (90%:10%), and P4 (85%:15%). An organoleptic test was administered to determine the panelists' preference for tortilla formulas and a proximate test to examine the nutritional value of tortillas. The results of the organoleptic test revealed that corn tortilla substituted with moringa seed flour up to 20% owned a significant effect on the color, aroma, taste and texture of the tortilla with a p-value <0.05. The proximate test results presented that tortillas with moringa seed flour substitution possessed a significant effect on protein, fat, carbohydrate, water, ash and fibre content of tortilla with a p-value <0.05.

Keywords: Tortilla, Corn, Moringa Seed Flour.

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1. INTRODUCTION

The development of nutritional problems in Indonesia is currently increasingly complex. Furthermore, overnutrition is also a problem that needs to be taken into account seriously. Unfortunately, East Nusa Tenggara has the highest prevalence of nutritional problems (malnutrition, stunting, wasting, and also chronic energy deficiency in pregnant women) compared to other districts in Indonesia (Kementerian Kesehatan Republik Indonesia, 2018). Food diversification is one of efforts to overcome food and nutrition problems which can be performed by reviewing new food ingredients or developing existing food ingredients (Arif, et al., 2020). One agricultural commodity developing in East Nusa Tenggara is corn process. Corn in East Nusa Tenggara is one of the investment opportunities in the farming sector (Adu, et al., 2020). Corn is a food with high nutritional content, mainly carbohydrates. Yellow corn contains rich carotenoids (up to 823 μ g/100 g DW corn) including lutein (50%), zeaxanthin (40%), β -cryptoxanthin (3%), β -carotene (4%), and α -carotene (2%). High amylose corn is rich in amylose (up to 70% of all carbohydrates) (Siyuan, et al., 2018).

Corn can be processed for a variety of foods, including tortillas. The tortilla is a food in flattened form. It is made with the mass of cooked corn obtained through the nixtamalization procedure (Guzmán-Soria, et al., 2019). To increase the nutritional value, corn flour in tortillas is substituted with other food ingredients which contain good nutritional value. Hence, moringa seeds contain carbohydrates, fats, and proteins that are able to be the additional ingredients. The total range of carbohydrates in Moringa seeds is 11-15%, fat 30-43%, and protein is around 29-38% (Compaoré, et al., 2011) (Olagbemide, et al., 2014). It makes moringa seeds potential as an alternative food source of a new protein that can be developed to overcome nutritional problems, particularly in East Nusa Tenggara.

Compared to tortillas which is made from corn flour, the addition of moringa seeds flour in tortillas is expected to increase the nutritional value and public acceptance. The use of moringa seed flour and leaves in making tortillas is beneficial because the nutritional content of the two complements each other. Therefore, the objective of this study is to determine the use of moringa seeds flour in the production of corn tortillas.

2. RESEARCH METHOD

The experiment was designed by Completely Randomized Design (CRD) by performing 4 treatments and 3 replications. Several formulas for substitution of corn flour with moringa seed flour (table 1) were also applied. Ethical approval for this study was obtained from the Health Research Ethics Committee, Health Polytechnic Ministry of Health, Kupang (LB.02.03/1/0061/2020).

Table 1. Tortila Formulation with Moringa Seed Flour.

Substitution of Flour	P1	P2	P3	P4
Corn flour	100	95	90	85
Moringa seed flour	0	5	10	15

Moringa seeds were obtained from the city of Kupang. Moringa seeds used were old moringa seeds. Moringa seed flour and tortillas were manufactured in the Food Technology Laboratory, Department of Nutrition, Health Polytechnic Ministry of Health, Kupang. Proximate test was administered at the Laboratory of Center for Excellence in Science and Technology, Health Polytechnic Ministry of Health, Malang. This research was conducted for three months (July-September) 2020.

The process of making tortillas consists of several stages. The first stage is making moringa seed flour. Making moringa seed flour was by sorting the Moringa fruit, then boiling for at least 35 minutes, and draining. Then, it was dried in an oven at 80°C for 8 hours. The dried moringa seeds were blended and sieved using an 80 mesh sieve to obtain a fine flour (Ogunsina, & Radha, 2010) (Ogunsina, et al., 2010). The second step is making the tortilla. The process of making tortillas starts with preparing the dough. The preparation of the dough involves mixing the ingredients in the form of corn flour and moringa seed flour in accordance with the predetermined formula. It is then added 1% salt and 5% garlic. The next step is mixing the dough and covering it with plastic. After that, the dough is flattened using a rolling pin to a thickness of 1 mm. When the dough is thin enough, it is continued by steaming the dough for 10 minutes. Then the dough is printed into a square with a side of 3 cm. After boiling, it is continued by drying the sun for approximately 8-10 hours. The final step is to fry the tortillas at 170-180°C until they are brown. The third stage is organoleptic test. The organoleptic/hedonic test was administered to determine the panellists preference for taste, color, aroma, and texture. In this test, the formula was examined on 30 semi-trained panellists. Panellists are individuals or groups who subjectively assess the organoleptic quality of the product in accordance with the procedure. This panellist is a student of the Nutrition Program, Health Polytechnic Ministry of Health, Kupang, who operates 30 women and is 20 years old. Panellist tastes all types of tortilla formulas which are then assessed according to their level of preference for taste, color, aroma, and texture. The testing method used in this standard is a rating scale ranging from strongly dislike (1), dislike (2), somewhat like (3), like (4), and strongly like (5) (Rahmawati, et al., 2018). The final step is conducting proximate test. After the organoleptic/hedonic test was performed to determine the panellists preference for the tortilla formula, a comparative test was conducted to determine the nutritional content, including carbohydrates, protein, fat, water content, ash content, and fibre.

The results of the organoleptic and proximate tests in this study were examined descriptively based on the average value and the percentage of panellists acceptance of each treatment level. To determine the type of formula on the level of preference (organoleptic) of the panellists on tortilla products, statistical analysis was administered using the ANOVA General Linear Model (GLM) method with a 95% confidence interval level (α : 0,05)). Likewise, with the results of the proximate test to identify if there is a difference in the nutritional value of the tortilla formula, an ANOVA test was applied. If the ANOVA test results show a significant difference or effect, the Duncan test is continued. The data were processed by employing Microsoft Excel 2010 program and Statistical Product and Service Solution (SPSS 26).

3. RESULTS AND DISCUSSION

The acceptability of tortillas for color, aroma/flavor, taste and texture parameters were obtained through organoleptic tests conducted by 30 semi-trained panellists. Each component of the sensory tests in each formula was examined for variance (ANOVA). The organoleptic test (preference test) is an extensively applied method for determining food product preferences. The organoleptic scale can be converted to a numerical scale in facilitating statistical analysis. This study investigated the color, texture, taste, and aroma of tortillas made with a combination of maize flour and moringa seed flour. Table 2 presents that the combination of corn flour and moringa seed flours treatment owned a significant effect on the color, texture, taste, and aroma score of tortillas when analyzed at the 5% significance level.

Table 2. Results of organoleptic tests on tortilla.

Treatment	Average			
	Color	Flavor	Taste	Texture
P1 (0% Moringa seed flour:100% corn flour)	4.07 ^b	3.70 ^{ab}	3.63 ^b	4.07 ^c
P2 (5% Moringa seed flour: 95% corn flour)	4.03 ^b	3.92 ^b	4.10 ^c	4.20 ^c
P3 (10% Moringa seed flour: 90% corn flour)	3.83 ^b	3.37 ^a	3.43 ^{ab}	3.67 ^b
P4 (15% Moringa seed flour: 85% corn flour)	3.43 ^a	3.40 ^a	3.10 ^a	3.23 ^a

Note: Average (1 = Strongly dislike, 2 = dislike, 3 = somewhat like, 4 = like, 5 = Strongly like).

^{a,b,c} : means values marked by different letters in verses, differ significantly at $p < 0,05$.

The average value of the panellist's preference level on the color parameter of tortilla chips with moringa seed flour substitution ranges from 3.43 to 4.07 (somewhat like to like). The results of the variance test (ANOVA) revealed that the difference in the percentage comparison of moringa seed flour possessed a significant effect on the color preference of tortilla chips ($p < 0.05$). Meanwhile, Duncan's further test was conducted, and it was found that P4 was significantly different from P3, P2, and P1. P1 is the most preferred formula by panellists.

Food considered nutritious, delicious, and has good texture will not be eaten if the color is not pleasing to the eye. Based on organoleptic tests conducted by 30 panellists of the four tortilla samples, P1 had the highest score of 4.07 (like) compared to other formulas. The difference in the color of the tortillas is due to the different concentrations of moringa seed flour. Corn flour is frequently yellow, and moringa seed powder is white, thus, the more substitutes for moringa seed flour, the whiter the tortilla will be, and the more the yellowness of the corn will fade. Panellists like the color of the corn tortilla with formula P1 because it is yellowish-brown, resembling the original product, formula P1 is 100% corn. It is not substituted with moringa seed flour. The color of food owns a significant impact on its quality. The color can be used to examine the severity and predict the nutritional quality degradation of materials from the process treatment (Nurhayati, et al., 2019).

The average value of the panellists' preference level on the aroma parameter of tortilla chips with moringa seed flour substitution ranges from 3.37 to 3.92 (somewhat like). The results of the variance test (ANOVA) presented that the difference in the percentage comparison of moringa seed flour owned a significant effect on the preference for the aroma of tortilla chips ($p < 0.05$). Meanwhile, Duncan's further test was conducted, and it was identified that P3 was significantly different from P2. P2 is the most preferred formula by panellists.

Whether or not consumers accept the aroma of the product influences a food product. The smell is one of the parameters of the food quality. The scent also determines the food delicacy. The smell is difficult to examine because everyone possesses a different preference for making judgments. Everyone owns a distinct smell and a diverse aroma selection (Muchtadi, & Ayustaningwarno, 2010). Aroma determines the delicacy of food, thus, smell is one factor which determines the food quality. The scent is difficult to assess, hence, there is frequently a different opinion when evaluating it. This difference in opinion is because every individual possesses a different smell. Although they can distinguish smells, every person has other preferences. Panellists like the aroma of corn tortillas with formula P1 because the tortillas are yellowish-brown, resembling the original product, formula P2, with a score of 3.92 compared to other formulas. In accordance with research conducted by Meliza, et al, 2019, it is explained that the panelists preferred tortillas with more grits. However, after frying, the color of the

resulting tortillas changed. The resulting tortillas were brownish in color. It was caused by the interaction of amino acids with carbohydrates, hence, it caused a change in color for the tortilla (Meliza, et al., 2019). The constituent ingredients, in general, create the aroma of food products. High frying, boiling, and dry temperatures are able to reduce flavor throughout the manufacturing process. Dehydration owns a number of drawbacks, one of which being the loss of aroma (Nurhayati, et al., 2019).

The average value of the panellists' preference level on the taste parameters of tortilla chips with moringa seed flour substitution ranges from 3.10 to 4.10 (somewhat like to like). The results of the variance test (ANOVA) revealed that the difference in the percentage comparison of moringa seed flour possessed a significant effect on the taste preferences of tortilla chips ($p < 0.05$). Meanwhile, Duncan's further test was conducted, and it was discovered that P4 was significantly different from P2. P2 is the most preferred formula by panellists.

The sensory responses to the taste, aroma, color, and texture of foods determine the food preferences and the eating habits of the consumers (Pires, et al., 2020). The taste makes food preferred by consumers because, with bite, consumers are able to identify and judge whether or not a food tastes good. Panellists liked the taste of corn tortillas with P2 formula with a score of 4.10 compared to other formulas. P2 is a tortilla substituted with 5% moringa seed flour. Although there is an addition of moringa seed flour, the panellists liked the taste, and it was not found bitter taste at all on the tongue. It is because moringa seeds were removed from the bitter taste according to the procedure for making moringa seed flour DBMS (Debittered Moringa Seed)(Ogunsina, & Radha, 2010)(Ogunsina, et al., 2011).

The average value of the panellists' preference level on the texture parameter of tortilla chips with moringa seed flour substitution ranges from 3.23 to 4.20 (somewhat like). The results of the variance test (ANOVA) revealed that the difference in the percentage comparison of Moringa seed flour possessed a significant effect on the texture preference of tortilla chips ($p < 0.05$). Meanwhile, Duncan's further test was conducted, and it was discovered that P4 and P3 were significantly different from P1 and P2. P2 is the most preferred formula by panellists.

The excellent surface is influenced by the essential ingredients employed. The texture of the food influences consumer interest in a portion of food. The texture of dry foods like tortillas is more crunchy. The crispness of a dry food product is a factor causing consumers to like the food because it displays the quality of the product (Muchtadi, & Ayustaningwarno, 2010). The texture is affected by the moisture content in foodstuffs. Water activity owns a great influence on product storage stability and may cause changes in texture. The more water coming out of the material, the more space existing in the network, the more crunchy the product will be (Tu, et al., 2021). Panellists liked the taste of corn tortilla with P2 formula with a score of 4.20 compared to other procedures. The more substitution of moringa seed flour reduces the preference of the panellists in terms of texture because the resulting tortilla is less crunchy.

After the organoleptic test was administered, an analysis of the nutritional value (proximate test) of each formula including the protein, fat, carbohydrates, water content, ash content, and fibre content, is presented in table 2.

Table 2. Average proximate composition (%) of tortilla containing different ground of moringa seed flour levels.

Proximate composition	Sample			
	P1	P2	P3	P4
Protein content	4,00 ^a	4,55 ^b	5,33 ^c	7,42 ^d
Fat content	24,35 ^a	26,09 ^b	27,12 ^c	27,3 ^d
Carbohydrate content	66,05 ^d	64,81 ^c	63,54 ^b	59,4 ^a
Water content	2,28 ^a	2,82 ^b	2,85 ^c	3,68 ^d
Ash content	3,02 ^d	2,27 ^c	2,01 ^b	0,59 ^a
Fibre content	2,63 ^a	2,79 ^b	3,63 ^c	4,49 ^d

^{a,b,c,d}: means values marked by different letters in verses, differ significantly at $p < 0,05$.

Based on the variance test (ANOVA), it is unveiled that the difference in the percentage of moringa flour possessed a significant effect on protein content ($p < 0.001$), fat ($p < 0.001$), carbohydrates ($p < 0.001$), water ($p < 0.001$), ash ($p < 0.001$), and tortilla fibre ($p < 0.001$). Then, a follow-up test was performed, that was Duncan's test on each parameter, and the results presented that there were differences in all treatments.

The results of the ANOVA test unveiled that the treatment of corn tortilla substituted with moringa seed flour possessed a significant effect on carbohydrate content, ash content, water content, protein content, fat content, and fibre content.

The protein content of corn tortilla substituted with moringa seed flour varies. Protein content ranges from 4.00-7.42%. The higher the number of substitute materials, the higher the protein. It is because moringa seed flour possesses a high protein content. Corn itself also contains 9.8% protein content. Protein in corn consists of five fractions, which are albumin, globulin, prolamin, glutelin and non-protein nitrogen. Furthermore, corn kernels generally contain 8–11% protein with 0.05% of the amino acid lysine and 0.225% tryptophan (Karneta, et al., 2018).

The fat content of corn tortilla substituted with moringa seed flour also varies. The fat content ranges from 24.3-27.3%. The higher the number of substitute ingredients, the higher the fat content of the tortilla. It is because moringa seed flour also has a high fat content.

Meanwhile, the carbohydrate content ranges from 59.4-66.05%. The higher the substitution of moringa seed flour, the fewer carbohydrates tortilla. It is caused as the concentration of corn flour is also reduced, in which the most nutritional content in corn flour is carbohydrates.

The moisture content of corn tortilla substituted with moringa seed flour ranges from 2.28 to 3.68%. These results were then compared with the water content based on the Indonesian National Standard for marning corn, which is a dry product with SNI 01-4300-1996 (Badan Standarisasi Nasional, 1996), and the Indonesian National Standard for Tempe chips which is also a dry food product SNI 012602-1992 in which the maximum moisture content of a chip is 1.5-3% (Badan Standarisasi Nasional, 1992). The water content of corn tortilla substituted with moringa seed flour varies. After being compared with the water content according to SNI, P1, P2, and P3, it meets the requirements in terms of water content as it is not up to 3%. At the same time, P4 is more than 3% which is 3.68%. Hence, the higher the amount of substitute material, the higher the water content. The more substitutions of moringa seeds, the higher the water content of the tortilla. It is due to the high crude fibre content in moringa seed flour. The physiological properties of dietary fibre bind water to a material, and the bound water is challenging to evaporate again (Istiqomaturrosyidah, & Murtini, 2021). Moisture content

is an essential part of food ingredients because water content affects food's appearance, texture, and taste. The water content in foodstuffs also determines the acceptability, freshness, and durability of these ingredients (Lubis, et al., 2021)

The ash content ranges from 0.59-3.02%. The higher the substitution of Moringa seed flour, the lower the ash content of the tortilla. This is because the concentration of corn flour is also reduced so that the ash content is also reduced.

The fibre content of corn tortilla substituted with moringa seed flour also varies. Fibre content ranges from 2.63-4.49%. The higher the number of substitute ingredients, the higher the fibre content of the tortilla. It is because moringa seed flour also possesses a high fibre content. Moringa oleifera seeds have been the subject of many research activities. Moringa seeds are sources of proteins, lipids, fats, soluble vitamins, and antioxidants (Saa, et al., 2019).

These results are in agreement with (Rabie, et al., 2020) which made cookies from moringa oleifera leaves and powdered seeds in different proportions that could increase the nutritional value of bakery products and into a significantly higher proportion of nutrients important to human health such as fiber, minerals (Fe, Ca, K, and Zn), protein and fats). Adding moringa oleifera leave sand powdered seeds to cookies is able to increase essential and non-essential amino acids such as leucine, isoleucine, glutamic acid, proline, and lysine, which possess great nutritional benefits for developing countries and help reduce malnutrition diseases (Rabie, et al., 2020) (Nour, et al., 2018).

4. CONCLUSION

The organoleptic (hedonic) test results presented that corn tortilla substituted with moringa seed flour up to 20% owned a significant effect on the color, aroma, taste, and texture of the tortilla with $p < 0.05$. In terms of color, the panellists' favorite tortilla was P1. In terms of aroma, the panellist's favorite tortilla was P2. In terms of taste, the panellists' favorite tortilla was P2. In terms of texture, the panellists' favorite tortilla was P2. The proximate test results presented that tortillas with moringa seed flour substitution possessed a significant effect on protein, fat, carbohydrate, water, ash and fibre content of tortilla with a p-value < 0.05 .

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DOI: [10.31965/infokes.Vol20Iss1.588](https://doi.org/10.31965/infokes.Vol20Iss1.588)Journal homepage: <http://jurnal.poltekkeskupang.ac.id/index.php/infokes>**RESEARCH****Open Access****Public Trust in the Effectiveness of the Covid-19 Vaccine in Liliba Village, Oebobo District, Kupang City****Yoany M. V. B. Aty^{1a*}, Pius Selasa^{1b}, Marselina Bende Molina^{1c}, Rohana Mochsen^{1d}, Nantiya Pupuh^{2e}, Panyada Cholsakhon^{3f}**¹ Department of Nursing, Poltekkes Kemenkes Kupang, Kupang, East Nusa Tenggara, Indonesia² Department of Nursing, Akademi Kesehatan Rustida, Banyuwangi, East Java, Indonesia³ Department of Pediatric Nursing, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Nakhon Pathom, Thailand^a Email address: vivi_aty@yahoo.co.id^b Email address: piusselasa@gmail.com^c Email address: marselinamolina6@gmail.com^d Email address: rohanamochsen@yahoo.com^e Email address: nantiyapupuh@yahoo.com^f Email address: panyada.chl@mahidol.ac.th

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Abstract

The Covid-19 pandemic has continued to develop in Indonesia since the beginning of 2020. The incidence and death rates continue to increase from day to day. Various efforts were made to stop the spread of the deadly Covid-19. One way to prevent and suppress the spread of infection with the virus is to vaccinate. The role of the vaccine is to provide immunity. Many people in the city of Kupang do not believe in the effectiveness of the Covid-19 vaccine, so they do not want to be vaccinated. The objective of this study is to describe the level of public confidence in the effectiveness of the Covid-19 vaccine in Liliba Village, Oebobo District, Kupang City. The research method is quantitative with a descriptive study research design. The population is people who live in the Liliba sub-district, Oebobo district, Kupang City. The sample was 106 people who were taken using the Cluster Simple Random Sampling technique. The results showed that the level of public confidence in the susceptibility of the Covid-19 vaccine was (89.6%), the seriousness of the vaccine's effectiveness (90.6%), the benefits of the vaccine (54.7%), and the perceived barriers (88.7%). This study revealed that the level of public confidence in the effectiveness of the Covid-19 vaccine in Liliba Village, Oebobo District, Kupang City is high.

Keywords: Effectiveness, Vaccine, Covid-19, Trust.***Corresponding Author:**

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1. INTRODUCTION

The Covid-19 outbreak has spread between humans since 2019. This disease is very deadly and attacks the human respiratory system. The rate of spread of the Covid-19 virus is fast and widespread (Kementerian Kesehatan Republik Indonesia, 2020). As a result of the Covid-19 virus attack, symptoms are acute. People experience fever, cough, shortness of breath, loss of sense of smell and sense of taste that are mild, moderate and severe. Severe cases can cause pneumonia, acute respiratory syndrome, kidney failure and even death (Kementerian Kesehatan Republik Indonesia, 2020).

The number of confirmed COVID-19 cases as of March 29, 2021 is 126, 890,642 people, the number of new cases is 518,201, and the number of people who died is 2,778,619 (WHO, 2021). WHO data explains that Indonesia is in the 20th position of confirmed cases of covid 19. The number of confirmed cases is 1,501,083 people, 1,336,818 people recovered, 40,581 people died (Kementerian Kesehatan Republik Indonesia, 2021). The number of confirmed cases of Covid in East Nusa Tenggara is 12,181 people, the number of people who died is 330 and 9,847 people have recovered (Kementerian Kesehatan Republik Indonesia, 2021).

In East Nusa Tenggara, there are 12,066 confirmed cases of Covid-19 with a total death of 327 people. In Kupang City, the number of confirmed cases of Covid-19 is 6.00093 people with a total death of 164 people. In Liliba Village, there are 365 confirmed cases of Covid-19 with a total death of 7 people. In Oebobo District, there are 1,713 confirmed cases of Covid-19 with a total death of 46 people (Dinas Kesehatan Kota Kupang, 2020).

The high number of cases of Covid-19 is due to the lack of compliance of the public in following the health protocols recommended by the government and health workers such as social distancing, washing hands, and wearing masks. The presence of a congenital disease (comorbid) accelerates a person being infected with the Covid-19 virus. In addition, the distribution time of the Covid-19 vaccine is longer than the speed of the spread of the Covid-19 virus (Akbar, 2021).

The number of cases of Covid-19 will continue to increase if it is not handled quickly and appropriately. The danger posed will threaten all aspects of life. The way to prevent and suppress the spread of being infected with Covid-19 is by vaccination. The government has decided to start a vaccination program. This program is estimated to last for 15 months with first priority given to 1.3 million health workers spread across 34 provinces. However, the vaccination program is still not accepted and rejected by the community (Simanjuntak, et al., 2021). The role of vaccines is to provide immunity against disease and cause mild symptoms if infected. Vaccination can increase herd immunity so that it can reduce the spread of disease in the population (Rachman, & Pramana, 2020).

The Government of Indonesia has issued Presidential Regulation of the Republic of Indonesia No. 99 of 2020 concerning the procurement of vaccines and the implementation of the Covid-19 vaccination in order to overcome the Covid-19 pandemic (Rachman, & Pramana, 2020). Research conducted by Polack, et al., 2020, showed that 43,448 received injections of 21,720 with the Covid-19 vaccine candidate type BNT162b2 and 21,728 with a placebo. Vaccine efficacy reaches 90 to 100%. The effectiveness of the vaccine given age, sex, race, ethnicity, basic body mass index. The side effects encountered were short-term, mild to moderate pain at the injection site, fatigue, and headache (Polack, et al., 2020). The doubts of most people in the world about the Covid-19 vaccine do not only occur in Indonesia but occur throughout the world. The

distrust of the Covid-19 vaccine is a barrier to global efforts in controlling the pandemic (Alfreda, 2021).

The perception of Indonesian people about the Covid-19 vaccine is very diverse. During September 2020, Ministry of Health Republic Indonesia, conducted an online survey of more than 115,000 respondents in 34 provinces in Indonesia to measure public acceptance of the COVID-19 vaccine (Kementerian Kesehatan Republik Indonesia, 2020). The survey shows that more than 70% of the public are aware of the government's discourse to conduct national vaccinations in an effort to reduce the rate of COVID-19 cases. The majority of the community (around 65%) are willing to accept the COVID-19 vaccine if it is provided by the government, while around 27% feel doubtful and a small proportion (8%) refuse. Aceh and West Sumatra are the provinces with the lowest revenues (below 50%). Meanwhile, the regions with the highest revenues were West Papua with 74% and the Nusa Tenggara Islands with 70%. Various reasons for refusing or doubting the vaccine were conveyed by the community in the study. Most of the people who refuse vaccines are because they still doubt its safety (30%) and do not believe that vaccination will be effective (22%). Meanwhile, a small proportion stated that they did not believe in vaccines (13%), fear of side effects (12%), religious reasons (8%), and other reasons (15%) (Kementerian Kesehatan Republik Indonesia, 2021). The negative opinion given by the public about the Covid-19 vaccination is that they are worried about the safety and effectiveness of the Covid-19 vaccine (Rachman, & Pramana, 2020).

The results of a preliminary study through interviews with 20 people about Covid-19 vaccination in Liliba Village, Oebobo District, Kupang City, presented that 7 people accepted and 13 people refused vaccination on the grounds of not believing in the effectiveness of vaccines that can prevent Covid-19 transmission. The objective of this study is to determine the level of public trust in the effectiveness of the Covid-19 vaccine in Oebobo District, Liliba Village, Kupang City.

2. RESEARCH METHOD

The type of research used is quantitative research with a descriptive study design. The population is adults (18-≤60 years) with a total of 2,514 people in Liliba Village, Oebobo District, Kupang City. This study employed the Cluster Simple Random Sampling technique, which is the grouping of samples based on the area of residence permanently in the Oebobo District, Liliba Village, Kupang City. The sample size is taken using the following formula: $f_i = N_i/N$ then obtained the sample size per cluster, using the following formula: $N_i = f_i \times n$

Information:

F_i = Sample cluster fraction

N_i = Number of individuals in the cluster

N = Total population

n = Number of members included in the sample

Table 1. Distribution of population and research samples in the Liliba Village, Oebobo District, Kupang City.

No	RW	Population	Sample
1.	RW 10	918	39
2.	RW 1	641	27
3.	RW 3	478	20
4.	RW 16	477	20
Total		2.514	106

The number of research samples needed in the study were 106 respondents/sample. The sample inclusion criteria were adults aged 18-≤0 years, domiciled in Liliba Village, Oebobo District, Kupang City, had received or had not been vaccinated. The sample exclusion criteria were having a mental disorder, refusing to participate. The research site is in Liliba Village, Oebobo District, Kupang City in May – June 2021.

The instrument used is a questionnaire to determine the level of public confidence in the effectiveness of the Covid-19 vaccine in Liliba Village, Oebobo District, Kupang City, there are 24 statements for trust using (Likert scale), with 12 negative statements and 12 positive statements, each variable has 6 statements. (perceived vulnerability), 6 (perceived seriousness), 6 (perceived benefits), 6 (perceived barriers), the number of positive statements with a value of trust (3), lack of trust (2) do not believe (1), for statements negative with a value of trust (1), lack of trust (2), do not believe (3).

The questionnaire used previously has been examined for validity and reliability on 30 respondents who have the same criteria as respondents who will be used as research samples. The validity test was conducted by determining the product moment correlation and reliability testing with Cronbach's alpha on the SPSS program with the test results obtained by the Cronbach Alpha value > 0.6, and the product moment correlation value > 0.5 meaning that the questionnaire was feasible to be used in research. Analysis of research data was performed by descriptive analysis. This research has passed the ethics committee of the Health Research Ethics Committee of the Ministry of Health Kupang Number LB.02.03/1/0118/202.

3. RESULTS AND DISCUSSION

Table 2. Distribution of Characteristics of Respondents in Liliba Village, Oebobo District, Kupang City.

Variable	n	%	
Age	18-28 Years	54	50,9
	29-39 Years	26	24,5
	40-50 Years	16	15,1
	51-60 Years	9	8,5
	> 60	1	9
Gender	Female	72	67,9
	Male	34	30,2
Education	Not going to school	4	3,8
	Primary School	8	7,5
	Junior High School	15	14,2
	Senior High School	46	43,4
	University	33	31,1
	Total	106	100
Profession	Not working	64	60,4
	Farmer-labor-driver	9	8,5
	Trader-entrepreneur	17	16,0
	Entrepreneur	15	14,2
	Civil Servant-Indonsian Army-Indonesian Policeman	1	9
	Retired	106	100

Table 2 shows that most of the respondents aged between 18-28 years were 54 people (50.9%), female 72 people (67.9%), high school educated 46 people (43.4%), and not working as many as 64 people (60.4%).

Table 3. Distribution of Respondents' Confidence in the Vulnerability of the Covid-19 Vaccine in Liliba Village, Oebobo District, Kupang City.

Category	n	%
Lack of trust	11	10,4%
Believe	95	89,6%
Total	106	100%

The table shows that 95 respondents (89.6%) believe in vulnerability if they do not get the Covid-19 vaccine.

Table 4. Distribution of respondents' confidence level on the severity of the Covid-19 vaccine in Liliba Village, Oebobo District, Kupang City.

Category	n	%
Lack of trust	10	9,4%
Believe	96	90,6%
Total	106	100%

Table 4 shows that respondents believe in the severity they feel if they do not get the Covid-19 vaccine, which is 96 (90.6%).

Table 5. Distribution of respondents' confidence in the benefits of the Covid-19 vaccine in Liliba Village, Oebobo District, Kupang City.

Category	n	%
Lack of trust	48	45,3%
Believe	58	54,7%
Total	106	100%

Table 5 shows that 58 respondents (54.7%) believe in the benefits of the Covid-19 vaccine.

Table 6. Distribution of respondents' confidence levels in the Covid-19 vaccine barriers in Liliba Village, Oebobo District, Kupang City.

Category	n	%
Lack of trust	12	11,3%
Believe	94	88,7%
Total	106	100%

Table 6 explains that 94 respondents (88.7%) believe in barriers to the effectiveness of the Covid-19 vaccine.

1. The level of confidence in the perceived vulnerability of the Covid-19 vaccine.

The results showed that most people believe in the susceptibility caused if they do not get the Covid-19 vaccine. Vulnerability to be exposed to Covid-19 will occur if having low immunity. This immunity is formed from within and outside. Vaccination is one form of immunity that comes from outside. Chen's, et al., research (2021) shows that respondents are hesitant to receive the vaccine due to the very high perceived susceptibility to the vaccine. This opinion is different from Erawan, et al., (2021) who stated that perceived susceptibility had a positive impact on interest in receiving the Covid-19 vaccine. The perceived vulnerability has a positive and significant effect on

interest in Covid-19 vaccination. This certainly identifies that a high interest in vaccinating Covid-19 is associated with the vulnerability felt by the community. The vulnerabilities felt when the vaccine was administered were nausea, cramps and even frequent drowsiness. There are concerns that if one has been vaccinated, but he or she may still be exposed to the Covid-19 virus (Tiana, & Amalia, 2021).

Research by Berg, and Lin, (2021) presents that people do not intend to get vaccinated because of doubts about the effectiveness of the vaccine after reading the literature describing the effects felt after the vaccine. However, the results of his research explain that most respondents have the intention to be vaccinated after receiving a detailed explanation of the susceptibility caused by the vaccine (Berg, & Lin, 2021). Research conducted by Wong, et al., (2020) explains that people feel confident about getting vaccinated because they believe it can reduce their susceptibility to being exposed to Covid-19, so they try to get it even if they pay. A survey conducted on 788 adults found that they were worried about the possibility of contracting Covid-19 if they did not participate in the vaccination program. The results showed that the perception of vulnerability was high. However, this study explains that black people are at risk for exposure to Covid because there are doubts about the effectiveness of the Covid-19 vaccine (Guidry, et al., 2021). Research conducted by Wong in 2020, it was revealed that respondents had the opportunity to contract Covid-19 and believed in the severity of the infection (Wong, et al., 2020).

Vaccines can reduce susceptibility to COVID-19. Someone who has been vaccinated and exposed to this virus, the effects felt will not be as severe as when they have not been vaccinated. This illustrates that the people of Liliba are very aware of the benefits of vaccination and their vulnerability to being exposed to COVID-19 if they are not vaccinated.

2. The level of confidence in the perceived severity of the Covid-19 vaccine.

The results of the study displayed that people believed in the severity they would feel if they were not vaccinated against Covid-19. Research conducted by Chen, et al., (2021) presented that respondents were hesitant to receive the vaccine because the perceived seriousness/severity of the vaccine was very high. People are afraid of being diagnosed with Covid-19 after receiving the vaccine. The perception of severity in receiving the Covid-19 vaccine is explained in 3 categories, which is Covid-19 causes serious complications, is afraid of being infected and will cause serious illness if infected with COVID-19. These three things can be implied that the perception of severity has a relationship with vaccine acceptance (Rizqillah, 2021). The perceived severity affects the motivation to get the vaccine. Threats to health conditions due to contracting Covid-19 result in a person trying to get the opportunity to be vaccinated (Erawan, et al., 2021).

The theory of health believe model explains that the perception of severity indicates the pain that a person will suffer if he is infected with a disease or if someone acts to threaten/endanger his health. The perception of the severity of COVID-19 from the perspective of residents tends to vary, it can be seen from the absence of a dominant pattern of behavior presented by the community. Some residents are relatively aware that the severity of this disease is relatively high, where they participate in socialization about COVID-19 and participate care about COVID-19 (Suryani, & Purwodiharjo, 2021).

In this study, the level of public trust in the Liliba Village, Kupang City towards the perceived severity was very high so that it affected interest in getting the COVID-19 vaccine. The more confident about the severity of being infected with Covid-19, the higher the desire to get a vaccine.

3. The level of confidence in the perceived benefits of the Covid-19 vaccine.

The results showed that most of the people in the Liliba Village, Oebobo District, Kupang City believed in the benefits of the Covid-19 vaccine. This result is in accordance with research conducted by Erawan, et al., in 2021 which explained that there was a positive influence on the perceived benefits of the vaccine. The effectiveness of the vaccine has a significant impact on increasing cases, deaths and recoveries of Covid-19, where the cure rate is higher than the impact on additional cases and deaths. The number of deaths from Covid-19 is relatively lower (Norman, & Pahlawati, 2021).

Perception of the benefits of vaccination, which is reducing infection/complications and vaccination reduces worry. These two things are considered to be significantly related. People who have a high perception of benefits will have a greater chance of being vaccinated (Puspasari, & Achadi., 2021). Other views on the benefits of the COVID-19 vaccine appear to vary. Some of the people feel that they have benefited from being vaccinated and have participated in government programs aimed at breaking the chain of spread of Covid-19. People are more aware of the importance of vaccines in order to get immunity. Some other people have doubts about the accuracy of the Covid-19 program's targeting, and believe that there is an error in the content and composition of the vaccine (Laili, & Tanoto, 2021). Public confidence in the benefits of vaccines continues to be increased. The government in collaboration with various parties continues to provide positive information through social media and electronic media. Advocacy continues to be performed by building good communication so that people believe in the effectiveness of the vaccine.

Communication to the public needs to be prepared accurately, thoroughly, and with a mature strategy. Continuous monitoring and evaluation activities will have a positive impact on the level of knowledge, understanding, and community participation. Clear and accurate information is conveyed to the community so that they are confident in their decision to get vaccinated (Dewi, 2021). The impact that occurs when people do not trust the Covid-19 vaccine is the occurrence of various social and economic problems that are increasingly out of control. Poverty, unemployment, the problem of malnutrition, the death of the population continues to increase. Various sectors of human life will decline drastically (Astuti, et al., 2021). The covid-19 vaccine can prevent the transmission of the covid-19 disease to other people. If someone believes that the covid-19 vaccine is very useful, that person's desire to perform a complete covid vaccine.

The community in the Liliba Village realizes that by being vaccinated, the community can avoid the Covid-19 infection and it will be easy to mobilize, to be able to meet their daily needs.

4. Level of confidence in perceived barriers to the Covid-19 vaccine.

The results unveiled that the community in Liliba Village, Oebobo District, Kupang City believed in the obstacles to the Covid-19 vaccine. The obstacle felt by the community in the Liliba village is the inadequate availability of vaccines. The perceived barriers are primarily as a result of perceptions about vaccine safety. Concerns about vaccine safety may hinder the promotion of vaccine use. People are afraid of the side effects of the vaccine, still doubt the results, feel afraid of being injected, the family who is not allowing it, and reasons for trust (Ginting, et al., 2021). Another obstacle that is felt is doubts about the halalness of vaccines.

This condition is in accordance with research results from Chen, et al., (2021) which argued that respondents were hesitant to receive the vaccine because of the very high perceived barriers to vaccines, which are jobs with solid working hours, finding it difficult to participate in vaccines because they were afraid of the side effects of vaccines that

would affect their work. Wong, et al., in 2020 explained that the majority of people have a high perception of barriers, most of the people studied will make a decision to be vaccinated if they have received clear information. This barrier occurs due to concerns about the side effects, efficacy and safety of the vaccine (Wong, et al., 2020). The research conducted by Lin, et al., in 2020, the majority of the community has a high perception of barriers. The public opinion is that the covid 19 vaccine will be accepted if most people get the vaccine and get information about the benefits, side effects after taking vaccinations (Lin, et al., 2020). The rejection of the Covid-19 vaccine is an obstacle that should be prevented, so that the vaccine coverage rate continues to increase. People with knowledge deficits need to be given a detailed understanding. One of the perceived obstacles is the lack of internet access, which is one of the important information channels about the Covid-19 vaccine program (Puspasari, & Achadi, 2021)(Woisiri, & Hutapea, 2021).

These barriers can be overcome by instilling public confidence in regulatory agency reviews of vaccine safety and effectiveness. Credible and culturally insightful health communication is an important point to be able to influence health behavior specifically for adaptation to Covid-19 vaccination. Furthermore, the public also needs to be given clear information, so that they can increase knowledge about the benefits of the Covid-19 vaccine. Knowledge greatly influences a person's perception and behavior when receiving the Covid-19 vaccine. It is possible that there is a relationship between the level of education and knowledge. Knowledge is obtained from other people and friends who provide effective messages about the benefits of the Covid-19 vaccine, thus creating a positive perception of the Covid-19 vaccine (Azim, et al., 2021). The results of Coe's research revealed that access and clinical barriers are not factors that affect public confidence in the Covid-19 vaccine. It depends on each individual in responding to beliefs and the decision to get a vaccine (Coe, et al., 2022).

The government of Kupang city continues to strive to provide open information about the effectiveness of vaccines, campaign for vaccines, disseminate information about service schedules through social media and counseling activities. The perceived obstacles began to decrease after there was a provision that made vaccine certificates one of the requirements for travel outside the region as well as administering administrative documents in Kupang City.

4. CONCLUSION

The level of trust of the people of the Liliba Village, Oebobo District, Kupang City towards the Covid-19 vaccine is good. It is as a result of the disclosure of information about indications, contraindications and side effects, safety and efficacy of the Covid-19 vaccine that is already available. It is campaigned both through social media, as well as direct counseling. It is expected that the public will increasingly believe in the benefits of the Covid-19 vaccine, so that the coverage rate continues to increase and a Herd Immunity against Covid-19 will be formed. There is a need for continuous socialization about the effectiveness of the Covid-19 vaccine, so that people believe and can decide to be vaccinated against Covid-19.

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RESEARCH

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The Relationship of Mother's Role in Stimulation with Motor Development in Toddler

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Abstract

Toddler period is an important phase in the growth and development of children. The role of parents, especially mothers, is needed to help children develop motor skills so that children's development can be maximized. The objective of this study is to analyze the mother's role in stimulating the child's motor development. The research method is cross sectional. The population in this study were mothers who had children aged 1-3 years in the work area of the Mangasa Primary Health Center, Makassar, amounting to 45 people. The sample in this study was 45 people, taken with a saturated sampling technique or the total population. The statistical test used the chi square test. The results presented that 95.7% of mothers who played a role in stimulating children's motor development had children whose development was appropriate. The results of the chi square test obtained p value <0.001. The conclusion is that there is a relationship between mother's role in stimulation and the motor development of toddler. It is expected that the Primary Health Center or midwives will provide training to mothers about providing developmental stimulation so that mothers can independently assess their child's development and pay attention to their child's development according to age.

Keywords: Role of Mother, Stimulation, Motor Development.

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1. INTRODUCTION

Globally, 52.9 million children under 5 years (54% boys) had a developmental disability in 2016 compared to 53.0 million in 1990 (Olusanya et al., 2018). The 2018 World Health Organization report states that the prevalence of children under five with growth and development disorders is 28.7%, or more than 200 million children aged under 5 years in the world do not fulfill their development potential and most of them are children who live in Continent of Asia and Africa (Yunita, et al., 2020), and Indonesia is included in the third country with the highest prevalence in the Southeast Asia region (Rumahorbo et al., 2020). According to 2015 UNICEF data, it was found that the incidence of growth and development disorders in toddlers, especially motor development disorders (27.5%) or 3 million children were impaired. According to national data from the Indonesian Ministry of Health, 11.5% of Indonesian children under the age of five experience growth and development disorders (Kementerian Kesehatan Republik Indonesia, 2016).

Toddler period is a golden age, an important, sensitive, and critical period in which children grow and develop. At that age, children are in the process of self-formation to create a strong foundation for their growth and development. There are many ways parents can help their child develop fine and gross motor skills. If the various needs of children are ignored, the child is feared to experience less than optimal growth and development (Pregnancy Birth & Baby, 2020). At this time, the growth rate begins to decline and there is progress in motor development (Wauran, et al., 2016).

Growth and development begin at birth, so growth monitoring should begin as early as possible. Each child follows a general pattern of weight gain, where size and growth rate may vary. During this period, health and nutrition interventions must be performed optimally to ensure the survival and development of the child (Yuliana, 2006). Stimulation is an important condition for the growth and development of young children. Children who receive a lot of directional stimulation develop faster than those who receive less stimulation. Suryanto, et al., research (2011) shows that the role of parents in stimulating children's growth and development is proven to increase the developmental score of early childhood.

The role of parents, especially mothers, plays an important role in optimizing children's growth and development (Astarani & Werdiningsih, 2012; Labir et al., 2016). Parents should always provide stimulation to their children in terms of language development, general motor skills, social and fine motor skills which must be continuously stimulated with love, game methods and other methods on a regular basis.

Stimulation is significantly important for maximum child development. Children who receive a lot of directed stimulation will develop faster than children who do not (Labir et al, 2016). Children who are stimulated repeatedly and continuously in each development means that they have provided opportunities for children to become intelligent children, develop and grow optimally, independent, have normal emotions and are easy to adapt, because development requires stimulation, especially from the family (Maulina, et al., 2014) (Nurrahmi & Isfaizah, 2021).

The results of the researcher's preliminary study of most families with toddler in the work area of the Primary Health Center Mangasa showed that the knowledge, roles, and functions of families in providing stimulation were still low. Even mothers still do not understand the benefits and how to motivate toddlers (1-3 years). Child development that is not stimulated properly will result in impaired child development and have a very detrimental impact and hinder the birth of quality human resources in the future (Soetjningsih & Ranuh, 2014). The objective of the study is to analyze the mother's role

in providing stimulation for children's motor development in toddler in the Mangasa Primary Health Center Work Area.

2. RESEARCH METHOD

This type of research is an analytic survey with a cross-sectional research design. The research was conducted in the Work Area of Mangasa Primary Health Center of Makassar from April to June 2021. The population in the study were all mothers who had toddlers aged 1-3 years as many as 45 people. Samples were taken using the total population.

The instruments used were the Prescreening Developmental Questionnaire (PDQ) for assessing children's motor development, and observation sheets to assess the mother's role in stimulating child development. Indicators of the mother's role in stimulating child development include; 1) gross motor skills which involve training children to stand alone, step and walk, bend over, kick a ball, climb stairs without assistance, jump, stand on one leg, teaching children to throw and catch a ball, introducing children to bicycles three, and 2) fine motor skills which teach children to arrange towers, pick up small objects such as beads, put objects in containers, give children pencils and paper for children to doodle, imitate vertical lines. The role of the mother is categorized into two, which are 1) role: if the mother plays a role in providing stimulation to the child's development, and 2) no role: if the mother does not play a role in providing stimulation to the child's development. Children's motor development is grouped into three comprising of 1) appropriate child development if the answer score is 9-10, 2) suspect child development if the answer score is 7-8, and 3) deviant child development if the answer score is < 6 (Kementerian Kesehatan Republik Indonesia, 2016). The research data were analyzed by Pearson Chi Square test with a significance value of $p < 0.05$. The research data were analyzed by Pearson Chi Square test with a significance value of $p < 0.05$. Ethical approval for this study was obtained from Health Research Ethics Committee Health Polytechnic Makassar with approval number: 0095/KEPK-PTKMKS/IV/2021.

3. RESULTS AND DISCUSSION

Table 1. Distribution of Characteristics of Research Respondents in the Work Area of the Mangasa Primary Health Center, Makassar (N=45).

Characteristics of Respondents	Category	n	%
Respondent's Age	<20 years old	5	11,1
	20-35 years old	32	71,1
	>35 years old	8	17,8
Level of education	Elementary School	4	8,9
	Junior High School	11	24,4
	Senior High School	18	40,0
	University	12	26,7
Occupation	Housewives	33	73,3
	Working	12	26,7
Child Gender	Male	31	68,9
	Female	14	31,1

Characteristics of Respondents	Category	n	%
Child Age	24 months old	31	68,9
	30 months old	8	17,8
	36 months old	6	13,3
Total		45	100,0

Table 1 shows that most of the respondents were mothers aged 20-35 years as many as 32 people (71.1%), high school/vocational education as many as 18 people (40.0%), and not working as many as 33 people (73.3%). The gender of the most children is male with a total of 31 people (68.9%) with the most age 24 months, which are 31 people (68.9%).

Table 2. Distribution of Mother's Role in Stimulating Children's Motor Development in the Work Area of the Mangasa Primary Health Center, Makassar (N=45).

Mother's Role	n	%
Role	23	51,1
No role	22	48,9
Total	45	100,0

Table 2 shows that there are 23 mothers (51.1%) who play a role in stimulating the development of their children and 22 mothers who do not play a role in giving stimulation to their children (48.9%).

Table 3. Distribution of the Motoric Development of Toddlers in the Work Area of the Makassar Primary Health Center, Mangasa (N=45).

Motor Development	n	%
Appropriate	29	64,4
Suspect	12	26,7
Deviant	4	8,9
Total	45	100,0

Table 3 shows that the appropriate motor development of children is 29 people (64.4%), the child's motor development is suspect as many as 12 people (26.7%), and the motor development of children who deviates as much as 4 people (8.9%).

Table 4. Bivariate Analysis of Toddlers' Motor Development in the Work Area of the Mangasa Primary Health Center, Makassar (N=45).

Variable	Child development					
	Appropriate		Suspect		Deviant	
	n (29)	% (64,4)	n (12)	% (26,7)	n (4)	% (8,9)
Age						
<20 years old	3	60,0	2	40,0	0	0
20 – 35 years old	21	65,6	8	25,0	3	9,4
>35 years old	5	62,5	2	25,0	1	12,5
Education						
Elementary School	2	50,0	1	25,0	1	25,0
Junior High School	6	54,5	5	45,5	0	0,0
Senior High School	11	61,1	5	27,8	2	11,1

Variable	Child development					
	Appropriate		Suspect		Deviant	
	n (29)	% (64,4)	n (12)	% (26,7)	n (4)	% (8,9)
University	10	83,3	1	8,3	1	8,3
Occupation						
Housewives	20	60,6	11	33,3	2	6,1
Working	9	75,0	1	8,3	2	16,7
Child gender						
Male	21	67,7	8	25,8	2	6,5
Female	8	57,1	4	28,6	2	14,3
Child Age						
24 months old	18	58,1	10	32,3	3	9,7
30 months old	5	62,5	2	25,0	1	12,5
36 months old	6	100,0	0	0,0	0	0,0

Table 4 shows that the majority of mothers aging 20-35 years, college education, working mothers, gender of males, and children aged 36 months have appropriate child development.

Table 5. The Relationship of Mother's Role in Stimulation of Motor Development in Toddler in the Work Area of the Mangasa Primary Health Center, Makassar (N=45)

Role	Child's Motor Development						Total	p-value
	Appropriate		Suspect		Deviant			
	n	%	n	%	n	%		
Role	22	95,7	1	4,3	0	0	23	100,0
No role	7	31,8	11	50,0	4	18,2	22	100,0
Total	29	64,4	12	26,7	4	8,9	45	100,0

Table 5 shows that mothers who play a role in stimulation have 95.7% children with appropriate motor development status, while mothers who do not play a role in stimulation have 50.0% children with questionable motor development status and only 31.8% children with appropriate motor development status.

The results of the Pearson Chi Square statistical test obtained a p-value of <0.001, meaning that there is a significant relationship between the mother's role in stimulation and the motor development of toddler.

In this study, it was discovered that there was a relationship between the mother's role in providing stimulation and the motor development of toddler. Mothers have an important role in providing stimulation for their child's motor development. The better the stimulation given by the mother, the better the development experienced by the child (Ayuba, 2015; Nurrahmi & Isfaizah, 2021; Rukmini, 2019). The results of this study revealed that mothers who did not play a role in providing stimulation to children resulted in 4 children experiencing developmental deviations, 11 children suspect and only 7 children experiencing normal development.

The results of this study are in accordance with previous studies which showed that mothers who did not play a role in giving stimulation were able to have normal child development. It proves that there are other factors that can affect the development of fine and gross motor skills in children besides the stimulation provided by the mother (Ayuba, 2015), (Rukmini, 2019). Various factors that can cause inappropriate parenting include: knowledge, culture, environment, and family. Sufficient family knowledge about the child's development will be used by the family as a basis for proper treatment, including

by stimulating and early detection of developmental deviations (Namangdjabar & Saleh, 2020).

The results of the study also revealed that children whose development was appropriate because they had received early stimulation from their parents, especially mothers, were provided good parenting patterns and balanced nutritional intake. Meanwhile, children whose development deviates are because they are not given early stimulation by the mother and the mother's knowledge is minimal about the development of her child. Another study states that someone who has good knowledge about growth and development will lead to motivation and the importance of stimulation and early detection of growth and development in children under five so that the next generation does not experience growth and developmental delays (Namangdjabar & Saleh, 2020), (Yunita et al., 2020). The provision of health education regarding early detection of the development of children under five can increase the knowledge and skills of mothers in performing early detection of child development (Agustina & Betan, 2017).

The mother's role is very important in stimulating children, meaning that mothers provide exercises or games to stimulate children's motor development. If parents provide a fun stimulation pattern, then the child's motor development will be good (Santoso et al., 2020). The mother's role in development is very important because it is expected that child monitoring can be performed properly. Child development at an early age is really crucial because children will be able to adapt themselves to the environment (Labir et al., 2016; Maulina et al., 2014; Wahyuningsri, et al., 2017). Otherwise, if these developments experience problems, the child will have difficulty in the next learning stage.

Parents have an important role in the growth and development of their children, especially mothers (Entoh, et al., 2020). However, what happens in society in general is that many families become dual carrier families, where not only fathers work, but mothers are also busy working, so that the role of mothers in stimulating child development is different from that given by mothers who do not work (Labir et al., 2016).

This study discovered that the role of working mothers has children whose development is appropriate compared to mothers who do not work. It is not in accordance with several studies which show that mothers who do not work have a better role in providing stimulation to their children so that their development is appropriate (Dhingra & Keswani, 2019; Maulina et al., 2014). Other research shows that when mothers are able to balance work and family and are satisfied with their husband's help, the child's growth and development will be maximized (Handayani & Munawar, 2015). All policies that allow mothers to choose whether they will return to work or not should be encouraged, the ability to make choices that are appropriate for the individual who is important to women in one way or another will not enhance their child's development (Kühhirt & Klein, 2018). The need for parenting support from other people such as husbands is certainly very helpful for working mothers in performing their role in child development.

The implication in this study is that the motor development of a toddler is largely determined by the role of the mother. The support of all family members, especially fathers, is also very much needed. Previous research stated that father involvement in the process of early childhood care also gave positive results on children's motor development, including development in language. In some situations, there are also fathers who take on the role of single parent or stay-at-home fathers who conduct parenting activities while mothers work outside (Lerner, 2016; Parker & Wang, 2013; Yogman & Garfield, 2016). Monitoring children's motor development on a regular basis cannot be separated from the role of primary health unit cadres and midwives so that if a

child's development is suspect or deviant, it can be detected early (Namangdjabar & Saleh, 2020; Susanti & Sustini, 2017).

4. CONCLUSION

This study concludes that there is a relationship between the mother's role in providing stimulation with motor development in toddler. The better the role of the mother is, the more the motoric development of the child will be in accordance with his age. We suggest to the primary health center or midwives to provide training to mothers about providing developmental stimulation so that mothers can independently assess and pay attention to their child's development according to age.

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RESEARCH

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The Effect of Black Cumin (*Nigella Sativa*) on Breastfeeding Mothers

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Abstract

Breast milk is the best nutrient to reduce the pain in nursing mothers and death in infants. However, for nursing mothers, too little milk volume is the cause of problems occurring during the breastfeeding process. Thus, mothers who breastfeed should consume foods that can increase the breast milk volume. One food frequently consumed by mothers to increase breast milk is honey. In fact, natural honey is challenging to discover, and the price is also high which makes it as an obstacle. A more economical alternative is required, one of which is black cumin. It is easy to obtain and the price is also affordable. Black cumin also contains galactagogue to increase prolactin that influences breast milk production. The objective of this study is to identify the effect of black cumin on the volume of breast milk. The study was a randomized controlled trial involving 60 breastfeeding mothers divided into intervention groups and control groups. The intervention group was provided 15 grams of black cumin brewed with 1000C boiling water as much as 200 ml, and the control group was assigned 15 grams of pure honey brewed boiling 1000C as much as 200 ml. Intervention and control were administered on the second day to the day of completion after giving birth. They were measuring instruments which accustomed to measure breast milk pumps. Bivariate analysis employing the Wilcoxon and Mann Whitney tests presented a significant difference between the volume of breast milk ($p = 0.001$) of the control and intervention groups. This study recommends the application of black cumin as a strategy to increase the volume of breast milk in nursing mothers.

Keywords: Black cumin, Breastfeeding, *Nigella Sativa*.

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1. INTRODUCTION

Newborns need breast milk because it is the best source of nutrients for growth and it is able to increase their health status of newborns (Abbass-Dick et al., 2019). Global data displays that breast milk can save more than 800,000 lives each year, and the majority are children under the age of 6 months (Abd-elkareem et al., 2022). Breast milk is essential for babies in maintaining health and survival because babies who are breastfed own better endurance than those who are not (Adiyaman et al., 2022). Hence, babies who are provided with breast milk rarely suffer from diseases, and it is able to avoid nutritional problems (Alkhalaf et al., 2020). Lack of breast milk intake may unbalance the baby's dietary needs, thus, the volume of breast milk which does not meet the baby's needs will become a problem (Alkis et al., 2021). The imbalance of nutritional fulfilment in infants negatively impacts the quality of human resources identified from the inhibition of baby growth and development (Arbour et al., 2019).

Breast milk is beneficial for both baby and mothers who breastfeed their babies (Segura, 2022). Breastfeeding reduces a mother's risk of developing breast cancer, ovarian cancer, diabetes and heart disease, thus, it can be estimated that breastfeeding is one way to prevent 20.000 deaths each year from breast cancer (Beyene et al., 2022). In breastfeeding, there are many factors affecting the volume of breast milk, one of which is the food consumed by mothers (Branger et al., 2019).

One food that has been proven to increase the volume of breast milk is by consuming honey (Bucher & Spatz, 2019). The research results in Japan and several other drugs demonstrate that honey is able to ease the release of breast milk and the number of antibodies in breast milk (Buckingham et al., 2022). Furthermore, the baby's immunity to the disease also increases (Budiati & Setyowati, 2019). The efficacy of honey is also effective in dealing with swelling of the fungus in the baby's mouth (Ciesielska-figlon et al., 2021). Moreover, honey is also good for the stomach and blood (Cohen et al., 2018). Honey is frequently applied immediately after the mother gives birth, hence, when breastfeeding her baby, the amount of breast milk volume increases (Davra et al., 2022). However, pure honey is now complicated to discover, and the price is also hard to afford (Deniz, 2022). Recently, there are many processed honey which is able to reduce the efficacy and content required from the honey (Douglas & Geddes, 2018). As the matter of fact, moreover, many manufacturers add water of brown sugar as a mixture of honey. Therefore, a study is required to conduct in increasing the volume of breast milk by employing natural ingredients that are easy to obtain, affordable and cannot be faked.

Studies on the content of black cumin have been extensively performed. Moreover, black cumin is also easy to find at an affordable price (Esharkawy et al., 2022). Black cumin is also generally traded in an unprocessed form which influences on reducing the content and efficacy of black cumin. In previous studies, black cumin was employed as an antidiabetic by utilizing the scope of its compound in the form of thymoquinone (Esmail et al., 2021). In this study, innovation was conducted by utilizing the compound content of black cumin in the form of galactagogue. Thus, the objective of this study is to analyze the effect of black cumin on the breast milk volume of nursing mothers. The findings of this study are expected to increase the breastfeeding volume of the mothers.

Based on Indonesia's 2018 health profile data, the exclusive breastfeeding coverage for infants is, on average, nationally at 65.16%. Gorontalo province is the fourth-lowest complete breastfeeding coverage based on 46.91%. Data from the Gorontalo Provincial Health Office presented that of the 11,975 breastfed babies, only 5,018 babies (46.9%). The lowest breast milk coverage in Gorontalo Province in 2018 was Bone Bolango Regency which was out of 675 infants, only 258 babies were breastfed (38.2%). This exposure clearly displays that breastfeeding achievement is still far from the national

target of 80%. The results of a survey conducted by researchers at the Puskesmas (Primary Health Center) in Bone Bolango Regency obtained the results that there were 3 Primary Health Centers with the lowest breast milk achievement in Puskesmas Tapa out of 68 babies who received breast milk only 2 (3.0%), in Puskesmas Bulawa from 46 babies who got breast milk only 2 (4.0%) and in Puskesmas Toto Utara from 81 babies who got breast milk only 4 (5.0%).

2. RESEARCH METHOD

This Randomized Controlled Trial (RCT) was conducted from July to November 2020 at the Puskesmas in the working area of Bone Bolango Regency of Gorontalo Province, Indonesia. Breastfeeding mothers were randomly divided into intervention and control groups. The process of randomizing nursing mothers with odd numbers was included in the intervention group, and breastfeeding mothers with even numbers were classified in the control group. After obtaining approval from the mothers, they were blinded by the intervention. The inclusion criteria for this study are mothers who gave birth to vaginal babies, did not suffer from severe infectious diseases (HIV, sepsis, and herpes simplex virus type 1 in their breasts), did not have breast disease (blistered nipples, mastitis, breast tumors, and breast cancer) and did not experience post-breast surgery. The exclusion criteria involve mothers not following the rules presented during the study. The number of samples administered by each group was 30 nursing mothers. This study has obtained ethical permission from research ethic committee (LB.01.01/KEPK/58/2020).

Before the researcher intervened, the researcher provided informed consent to the nursing mother, then was teaching on how to apply the breast milk pump and distributed a notebook of the breast milk volume. The procedure gave 15 grams of black cumin brewed with 2000C boiling water for 20 minutes, then filtered and placed in a bottle in the intervention group. In the control group, 15 grams of pure honey was brewed with 1000C boiling water for 200 minutes and then placed in a bottle. Six enumerators assisted researchers from the Puskesmas where the study was performed. The task of the enumerator in the survey was to distribute black cumin steeping water and honey-steeping water from researchers to nursing mothers. Furthermore, the enumerator's duty is also to ensure that nursing mothers drink steeping water. After confirming that the nursing mother drinks the enumerator, soaking water is required to check the milk volume notebook.

Breastfeeding mothers involved in the study were required to pump breast milk once a day for 30 minutes for each breast. The time to pump breast milk is between 01.00 to 06.00 because the time is the best moment to perform power pumping, and the baby is in a deep sleep. Thus, there is no breastfeeding activity on demand. After pumping breast milk, the mother writes the volume of breast milk pumped from the second day to the next day in the record book. The research instrument consisted of a questionnaire sheet characteristic of nursing mothers, a volume notebook and a breast milk pump.

Homogeneity tests were performed on the characteristic variables of respondents. Bivariate analysis is conducted on the second and the seventh day. Breast milk production data is not normally distributed. Therefore, nonparametric tests are implemented. After treatment, follow-up tests between the intervention and control groups displayed significant differences between breast milk production ($p = 0.0001$) in the intervention and control groups.

3. RESULTS AND DISCUSSION

Table 1. Respondent Characteristics (n=60).

Characteristics	Intervention		Control		p-value
	N	%	N	%	
Age					
Healthy Reproduction (20-35)	26	87	24	80	1,000
High Risk (<20/>35)	4	13	6	20	
Education					
Primary School	4	13	5	16	0,608
High School	26	87	25	84	
Parity					
Primipara	3	10	2	6	0,856
Multipara	27	90	28	94	

Table 1 displays that the homogeneity test presented no significant difference in the control and intervention groups ($p > 0.05$).

Table 2. The Breastmilk Volume of Control Group (n=60).

Breastmilk Volume	Control			p-value
	Median	Min-Max	95% CI	
Day 2 (Pre)	20	0-50	9,1-35,7	0,001
Day 3	48	10-80	70,4-123,1	
Day 4	65	25-325	84,2-156,3	
Day 5	72	38-368	92,7-168,2	
Day 6	94	45-375	102,3-175,6	
Day 7 (Post)	183	50-380	128,4-184,2	

Table 2 presents that the primary findings of this study displayed a significant volume of breastmilk in the control group by applying honey sobbed with hot water ($p=0.001$).

Table 3. The Breastmilk Volume of Intervention Group (n=60).

Breastmilk Volume	Intervention			p-value
	Median	Min-Max	95% CI	
Day 2 (Pre)	60	0-100	12,1-43,9	0,001
Day 3	122	10-220	90,4-132,4	
Day 4	187	25-325	114,2-163,2	
Day 5	192	38-368	172,6-184,5	
Day 6	211	45-375	192,1-215,3	
Day 7 (Post)	218	50-380	218,4-284,9	

Table 3 presents that the primary findings of this study displayed a significant volume of breastmilk in the intervention group by applying black cumin (*Nigella sativa*) sobbed with hot water ($p=0.001$).

Table 4. The difference in mean of breastmilk volume in the control group and intervention group.

Breastmilk Volume	Intervention	Control	p-value
Day 2 (Pre)	24	46	0,001
Day 7 (Post)	172	216	

Table 4 presents that the primary findings of this study revealed a significant difference in the volume of breastmilk between the intervention group (black cumin) and the control group (honey) ($p = 0.001$).

The most extensively distributed total respondents in this study were in the 20-35 age group which were 50 respondents (83%). Age is a very decisive maternal health and conditions associated with pregnancy, childbirth and postpartum, and how to care for and breastfeed the baby. Mothers less than 20 years old are still immature and unprepared in terms of physical and social skills in dealing with pregnancy and childbirth.

The highest education level of the respondents was at the higher education level, as much as 85% and other primary education was as much as 15% of the total respondents. The education of respondents is one of the essential elements which determines the nutritional situation of the family. People possessing higher education are easier to understand the information compared to people who are less educated (Essa et al., 2018). Maternal education is one reinforcing factors influencing a person's behavior (Fan et al., 2019). The determining educational factor is easy for a person to absorb and understand the knowledge they have gained (Fatimah et al., 2021). The level of respondents' education is one of the social aspects which generally affects human attitudes and behaviors (Flood et al., 2019). Respondents with a group of education also tend to own better and broader knowledge than respondents with low-level education.

Based on these results, the total number of respondents in multipara is as much as 92% of the total number of respondents. Parity refers to the number of live births a woman owns. Parity is also considered as the direction of information seeking about the respondent's knowledge. It is associated with the influence of one's or others' experience on the understanding that can affect current or later behavior (Forster et al., 2019). Parity is allegedly associated with search information about breastfeeding. The number of deliveries provides experience in breastfeeding for mothers and understands how to increase breast milk production. Hence, there will be no obstacles for the mother in breastfeeding. The first time mothers who give birth more than twice frequently find problems in breastfeeding (Gnanasekaran et al., 2021). Problems which generally arise are nipple blisters due to inexperience they possess or unreadiness for breastfeeding in psychological matter, and the changing of the shape and condition of the nipple which is not well (Habibi et al., 2018). More children born affects the productivity of breast milk because it is closely associated with the mother's health status, fatigue, and nutritional intake (Hamze et al., 2019). For mothers who give birth more than once, breast milk production is much higher than for mothers who give birth for the first time. The number of deliveries that the mother has undergone affects their baby experience (Hikmah et al., 2022).

Based on the data normality test, the significance value of black cumin is 0.006, and the significance value for pure honey is 0.011. As the significance value of both variables is <0.05 , it is implied that the volume of breast milk-fed with black cumin and pure honey is not distributed normally. Hence, the type of test administered to examine hypotheses is a nonparametric statistical test, the *Mann Whitney Test*. Based on the significance value (p -value) of 0.001 (<0.05), it is identified that there is a difference in the volume of breast milk in nursing mothers who consume black cumin and pure honey in which the average value of the importance of breast milk administered black cumin is higher than that provided with pure honey.

This randomized study revealed that black cumin (*Nigella sativa*) was better at increasing breast milk volume than honey, as was conducted in previous studies. It is because the volume of milk produced equals the amount of breast milk pumped or removed. Thus, it is implied that the more volume of breast milk released with the breast

pump, the more critical milk is produced by the breast. However, some explain that the volume of breast milk produced with a breast milk pump does not display a meaningful difference on the first day of postpartum motherhood (Zhang et al., 2022).

Black cumin contains galactagogue phytochemical compounds which are useful for increasing breast milk with the provision that nursing mothers should consume it regularly. Black cumin also unveiled an increase in the volume of breast milk more than the volume of breast milk in mothers consuming honey (Hossain et al., 2021). The average percentage of breast milk increasing in the control group or nursing mothers consuming pure honey from the second day to the seventh day was 28.98% and 80.6%, in the intervention group or who consumed black cumin.

Food consumed by nursing mothers affects the production of breast milk dramatically. When the food consumed by mothers contains adequate nutrients and a regular diet, the production of breast milk will run smoothly (Jefferson & Bibb, 2019). The quality and presentation of breast milk are significantly influenced by the food consumed by mother on a daily basis. During breastfeeding, the mother must certainly consume a balanced and diverse diet (Kabir et al., 2020). There are various developments in society regarding certain types of food which makes mother lose the natural nutrients required by mother's body during breastfeeding (Khazdair et al., 2021). Smooth milk production will be guaranteed if the routine food consumption is sufficient nutrition accompanied by a regular diet (Khodabakhsh et al., 2017).

The production and release of breast milk occur after the baby is born, followed by a decrease in levels of the estrogen hormone, which increases prolactin levels for breast milk production (Leisegang et al., 2021). Even on the first day, although there is only a tiny amount of breast milk coming out; the mother must continue breastfeeding. This action is intended to provide nutrition to the baby, so that the baby learns to breastfeed or get used to sucking the mother's nipples and enhancing the production of breast milk (Lojander et al., 2022). Honey has been examined to increase the volume of breast milk within ten days of postpartum (Mandey et al., 2015).

Black cumin increases the amount of breast milk due to the combination of lipid elements and the structure of hormones (Mehlsen et al., 2022). Furthermore, the content of polyphenols in black cumin, which is also discovered in katuk leaves, plays a significant role in increasing prolactin levels (Mir et al., 2022). Black cumin administration was examined in mice, with increases in milk production by 31.1% and 37.6% compared to the control group that was not provided with black cumin (Walsh et al., 2019). This study also corroborated previous studies that proved black cumin contains estrogenic constituents as anethole, increases milk secretion, promotes menstruation, and facilitates birth (Nielsen et al., 2022). Structurally, anetholes are similar to dopamine and spread competitive antagonism at dopamine receptor sites. Therefore, it is able to stimulate the release of prolactin and increase milk production (Nomura et al., 2019). Black cumin also contains saponins and alkaloids which produces the prolactin hormone through dopamine inhibition mechanisms (Amelina, 2019). Other benefits of applying black cumin are an immune system, anti-allergy, anti-tumor, anti-inflammatory, anti-bacterial, and breast milk promoter because it contains polyphenols that increase the prolactin hormone, that causes the mother's milk production smoothly. The mechanism of black cumin extract action containing polyphenols which stimulates the hypothalamus produces the hormone prolactin, enables the alveoli and some reflexes are let down which makes milk production smooth (Ohlendorf et al., 2019). After conducting the study for one week, the researchers concluded that there was an effect of black cumin extract on refined milk production. Another phytochemical content in black cumin galactagogue is

a nutrient which is able to accelerate breast milk production, particularly in mothers who experience problems with breast milk production (Ritonga et al., 2017).

Galactagogues affect the prolactin reflex to stimulate the alveoli active in the breast milk formation. The hormone oxytocin also stimulates the milk production. The increased oxytocin hormone is affected by galactagogue (Pattison et al., 2019). Black cumin makes breast milk flow faster. Oxytocin is the hormone contained in black cumin which is responsible for stimulating milk secretion (milk is let down) (Safi et al., 2021). The role of oxytocin in the mammary glands is to promote the contraction of myoepithelial cells surrounding the alveoli of the mammary glands so that by contracting the contents of the myoepithelium cells, the alveolus is triggered into the milk ducts as the alveoli become empty and can stimulate the subsequent synthesis of milk (Schindler-Ruwisch et al., 2019).

Maintaining the volume of breast milk requires significant effort until the achievement of lactogenesis (Shlafer et al., 2018). The successful procedure of lactogenesis begins from postpartum to 72 hours after delivery. To achieve lactogenesis function, it is necessary to conduct early breastfeeding incineration as soon as the baby is born for one hour (Susiloretni et al., 2019). This initiation of early breastfeeding is also closely associated with the success of breastfeeding (Thorley, 2019). The study results explained that if the process of lactogenesis is not achieved, the mother will experience difficulties in breastfeeding even though the breast feels full. If mothers are not able to initiate early breastfeeding, lactogenesis cannot be achieved. Obstacles frequently occur during lactogenesis because there is no stimulation of milk, thus, oxytocin and prolactin decrease (Tiwari et al., 2022).

Breastfeeding mothers in the intervention group and control group received information that drinks provided to mothers every morning increase the volume of breast milk without knowing whether the mother is getting a drink containing black cumin or honey. Moreover, nursing mothers involved in the study were also taught how to employ breast milk pumps and how to record in the milk volume book. Every day, the enumerators involved in the study ensure that nursing mothers consume the given drink every morning by making a home visit. The process of pumping breast milk is conducted between 1 to 6 a.m. Mothers are required to pump each breast for 30 minutes every day. The selection of pumping time in the morning is the right time to perform power pumping (Triansyah et al., 2021). It is also an effective time because the baby is in a sleep state, so the breastfeeding process is not ongoing. The results of the breast milk pump performed after breastfeeding cannot interpret the volume of breast milk produced by the nursing mother.

The study revealed a significant increase in breast milk volume between the control and intervention groups. Another survey involving nursing mothers also presented an increase in the importance of breast milk in mothers who pumped breast milk in the morning. However, the limitation of the researchers in this study is the researchers did not investigate the quality of breast milk in each group. The volume of breast milk in postpartum mothers consuming black cumin is more compared to postpartum mothers who consume pure honey.

The study unveiled that the average volume of breast milk will increase every day if postpartum mothers regularly consume black cumin. This finding reveals new results from previous research which discovered the benefits of black cumin to lower blood sugar levels in people with diabetes (Wagner et al., 2019). In this study, researchers also revealed the benefit of black cumin to increase the volume of breast milk. Therefore, further validation of the findings of this study may be required to look at the quality of

breast milk in mothers who consume black cumin frequently and regularly after giving birth.

The best time to have abundant milk production in the future starts from the first day to the seventh day because it is expected that the mother immediately breastfeeds her baby after giving birth and resumes regular breastfeeding activities on the second day. However, many mothers are unable to maintain it due to physical fatigue.

4. CONCLUSION

The use of black cumin (*Nigella sativa*) has been revealed to increase the volume of breast milk in nursing mothers. Based on our research, we advise nursing mothers to consume black cumin as an effort to increase the volume of breast milk, and for midwives, to be able to introduce black cumin to nursing mothers so that the inhibitory factor in providing exclusive breast milk due to the amount of milk volume which is too little can be overcome. The application of black cumin to increase the volume of breast milk is more efficient and effective because the price of black cumin is affordable and easy to obtain.

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RESEARCH

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Relationship between Procalcitonin Levels (PCT) and Disease Severity in Hospitalized Patients Confirmed Positive for COVID-19

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Abstract

Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). This disease attacks the respiratory tract and spreads rapidly almost throughout the world, hence, WHO has declared COVID-19 as a global pandemic. The presence of inflammation and bacterial co-infection in COVID-19 hospitalized patients can increase procalcitonin (PCT) levels as a biomarker of inflammation. Elevated PCT levels are also associated with disease severity. The objective of this study is to determine the relationship between PCT levels and disease severity in hospitalized patients who are confirmed positive for COVID-19. This research method is analytic observational with cross sectional design. The sample is in the form of medical record data for 180 COVID-19 patients who are hospitalized at Bhayangkara Tk. I Raden Said Sukanto Hospital, Jakarta for the period July-December 2020. The relationship between PCT levels and disease severity was statistically analyzed using the Chi Square test. The results of this study were 109 (60.6%) men and 71 (39.4%) women with the highest age group being 46-59 years. The average PCT level was 10.38 ng/mL with the lowest level of 0.01 ng/mL and the highest level of 282.00 ng/mL. PCT levels <0.5 ng/mL were discovered in 111 patients (61.7%) and PCT levels 0.5 ng/mL in 69 patients (38.3%). The severity of disease in mild-moderate illness was 87 patients (48.4%), severe was 35 patients (19.4%), and critical was 58 patients (32.2%). The Chi Square test showed that there was a relationship between PCT levels and disease severity in COVID-19 patients ($p = 0.000$). The higher the PCT level, the higher the severity of the disease, thus, PCT can be used as an indicator to see the severity of the disease.

Keywords: COVID-19, Procalcitonin (PCT), Disease Severity.

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1. INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by the recently discovered Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (WHO, 2020). Common signs and symptoms of COVID-19 infection include symptoms of acute respiratory distress such as fever, cough and shortness of breath. The average incubation period for COVID-19 ranges from 5-6 days with the longest incubation period being 14 days. In severe cases of COVID-19, it can cause pneumonia, acute respiratory syndrome, kidney failure, and even death (Kementerian Kesehatan Republik Indonesia, 2020). This disease was first discovered in Wuhan City, China at the end of December 2019 and was declared a pandemic by WHO on March 11, 2020 (WHO, 2020).

The increase in cases took place quite quickly and spread to various countries in a short time. WHO reported 149,216,984 positive confirmed cases of COVID-19 with 870,419 new cases and 3,144,028 deaths to April 28, 2021. COVID-19 has infected 223 countries in the world, of which Asia ranks third in the number of confirmed COVID-19 patients after America and Europe (WHO, 2021). In Indonesia, the first two cases of patients who were confirmed positive for COVID-19 were reported on March 2, 2020 (Kementerian Kesehatan Republik Indonesia, 2020). Data from the Task Force for Handling COVID-19 on April 28, 2021, shows that the number of confirmed positive cases of COVID-19 in Indonesia is 1,657,035 with 5,241 new cases. Of the confirmed cases, there were 100,502 active cases or 6.1%, recovered 1,511,417 or 91.2% and 45,116 or 2.7% died (Satuan Tugas COVID-19, 2021).

Laboratory tests for the diagnosis of COVID-19 could be conducted by examining viral cultures, nucleic acid amplification tests (NAAT)/molecular detection and serology (Li et al., 2020; WHO, 2020). The gold standard of testing for positive confirmation of COVID-19 is molecular. Molecular examination of SARS-CoV-2 nucleic acid employed real time reverse transcriptase polymerase chain reaction (rRT-PCR) (WHO, 2020).

Other supporting laboratory tests play a crucial role in the detection of COVID-19. Identification of appropriate laboratory biomarkers can classify patients based on the risk of severity so that they can guarantee appropriate treatment (Ponti et al., 2020). Laboratory biomarkers have the potential for diagnosis and prognosis, prediction of complications and monitoring of treatment response (Tomo et al., 2020). The biomarkers examined consisted of hematological, coagulation, biochemical and inflammatory biomarkers (Ponti et al., 2020). These various laboratory biomarkers may increase in COVID-19 patients during this outbreak (Elshazli et al., 2020).

Inflammatory biomarkers function in determining inflammatory reactions that occur in the body. Inflammatory biomarkers that are frequently used in COVID-19 patients are C-reactive protein (CRP), interleukin 6 (IL-6) and procalcitonin (PCT) (Ponti et al., 2020). The inflammatory response triggered by SARS-CoV-2 can make the body overreact by producing many cytokines, resulting in the phenomenon of a cytokine storm. The effect of this hyperinflammatory reaction is an increase in levels of PCT, CRP and IL-6 examinations (Cecconi et al., 2020; Ji et al., 2020).

PCT levels are also increased in COVID-19 patients who are co-infected with bacteria (Schuetz, 2020). Many patients die with suspected bacterial coinfection (Dolci et al., 2020; Xu et al., 2020). Bacterial coinfection can occur in COVID-19 patients because SARS-CoV-2 that enters the body will cause lung tissue damage, thereby weakening the immune response. As a result, bacteria are easier to infect the lungs which can cause bacterial lung pneumonia (Schuetz, 2020). Research by Dolci et al., (2020) in cases of COVID-19 presented bacterial coinfection of 39.8% during hospitalization.

In addition to PCT, inflammatory biomarkers such as CRP were also increased (Gregoriano et al., 2020; Huang et al., 2020). However, the specificity of PCT is higher than that of CRP in bacterial infections (Cleland & Eranki, 2020). Lippi & Plebani, (2020) stated that PCT is produced as part of the systemic inflammatory response to bacterial infection but remains low in viral infection. It provides another advantage of PCT examination to differentiate pneumonia due to virus or bacteria. PCT is also considered to be more accurate in assessing response to antibiotic therapy and determining prognosis in severe bacterial infections than CRP (Das, 2020; Gregoriano et al., 2020).

Procalcitonin (PCT) is produced as a result of the stimulus response to bacterial products. PCT levels are lower than 0.1 ng/mL in healthy individuals. Elevated levels of 0.5 ng/mL indicate severe inflammation and a bacterial infection is occurring in the body (Meisner, 2014). Measurement of PCT at the time a COVID-19 patient is admitted to the hospital can be used to assess the risk of bacterial infection and progression to severe bacterial sepsis and septic shock (Das, 2020). Increased PCT in COVID-19 patients is associated with prognosis of disease severity (Hu et al., 2020; Liu et al., 2020).

The severity of COVID-19 is determined according to the criteria and clinical manifestations based on the pneumonia present in the patient (Kementerian Kesehatan Republik Indonesia, 2020). The severity of illness in COVID-19 patients includes asymptomatic, mild, moderate, severe and critical illness. Around 80% of cases of COVID-19 are mild or moderate, 13.8% are seriously ill, and 6.1% of patients are critical (Susilo et al., 2020). Patients who are asymptomatic and who show mild symptoms generally only undergo self-isolation at home. Patients with symptoms of moderate to critical illness should be referred for hospitalization (Levani et al., 2020).

Increased PCT is associated with disease severity in hospitalized patients (Chen et al., 2020; Li et al., 2020; Liu et al., 2020). The average PCT level in patients with severe illness is 4 times higher than moderately ill, while critically ill increases 8 times that of moderate illness (Lippi, & Plebani, 2020). Increased PCT tends to be found in patients admitted to the intensive care unit (ICU) with severe/critical symptoms (Luo et al., 2020; Wang et al., 2020). The trend of increasing PCT associated with the severity of COVID-19 disease needs to be investigated in Indonesia because there is not much data available during the current pandemic. On this basis, researchers are interested in examining the relationship between PCT levels and disease severity at Bhayangkara Tk. I Raden Said Sukanto Hospital, which is one of the referral hospitals for COVID-19 patients in East Jakarta.

2. RESEARCH METHOD

The trend of increasing PCT associated with the severity of COVID-19 disease needs to be investigated in Indonesia because there is not much data available during the current pandemic. On this basis, researchers are interested in examining the relationship between PCT levels and disease severity at Bhayangkara Raden Said Sukanto Tk. I Hospital, which is one of the referral hospitals for COVID-19 patients in East Jakarta.

3. RESULTS AND DISCUSSION

Table 1. Characteristics of Inpatients Confirmed Positive for COVID-19 Based on Gender and Age at Bhayangkara Tk. I Raden Said Sukanto Hospital Period July–December 2020.

Characteristics	Frequency	%
Gender		
Male	109	60,6
Female	71	39,4
Total	180	100
Age (year)		
19-30	21	11,7
31-45	28	15,5
46-59	79	43,9
≥60	52	28,9
Total	180	100

Table 1 shows that hospitalized COVID-19 patients tend to be more male (60.6%) than female (39.4%). Similar results were discovered in previous studies which displayed a predominance of male patients (Cecconi et al., 2020; Chen et al., 2020; Minuljo et al., 2020). This difference in distribution is thought to be related to the higher prevalence of active smokers in men. In smokers, hypertension, and diabetes mellitus, it is suspected that there is an increase in ACE2 receptor expression which makes it easier for SARS-CoV-2 to infect the human body (Cai, 2020; Fang et al., 2020). Another reason could be that men have lower CD4 cells than women, resulting in less production of antibody-forming B cells. The X chromosome also contributes to the production of antivirals such as type 1 interferon. Males only have 1 X Chromosome, so that the antiviral produced is not as much as women to fight SARS-CoV-2 infection (Peckham et al., 2020).

The age characteristics in table 1 show that the majority of COVID-19 disease suffered by patients aged >46 - 59 years as much as 43.9% and age >60 years 28.9%. Meanwhile, the analysis of data from the Indonesian COVID-19 Task Force as of April 25, 2021, for patients being treated/isolated, it is known that the age group of 31-45 years (28.29%) is the highest followed by those aged 19-30 (25.6%) and age 46 - 59 years (14.8%). These data show differences in the age group of the majority with this study. The number of patients aged >45 years in this study is suspected because COVID-19 is more at risk of infecting older people with chronic comorbidities due to decreased immune function (Chen et al., 2020). However, the limitation of this study was that there were no data on patient co-morbidities.

Table 2. Descriptive Data on PCT Levels in Inpatients Confirmed Positive for COVID-19 at Bhayangkara Tk. I Raden Said Sukanto Hospital Period July - December 2020

Variable	Mean	Min	Max
PCT (ng/mL)	10,38	0,01	282,00

Table 2 shows the mean (mean) level of PCT is 10.38 ng/mL with a minimum level of 0.01 ng/mL and a maximum level of 282.00 ng/mL. This mean result is in the condition of severe sepsis/septic shock. Normal PCT levels in healthy people <0.5 ng/mL. Procalcitonin is one of the inflammatory biomarkers besides CRP and interleukin that is often examined in COVID-19 patients (Ponti et al., 2020). PCT is produced from various parenchymal cells in the lung, liver and fat as well as leukocytes in response to endotoxins and proinflammatory cytokines (Meisner, 2014; Ponti et al., 2020). The role of PCT can be used as a prognostic or diagnostic disease. According to Schuetz, (2020), PCT biomarkers in COVID-19 patients can be used to assess the risk of bacterial infection,

differentiate bacterial and viral pneumonia and progression of disease severity. The presence of bacterial coinfection can lead to systemic infection and sepsis in COVID-19 patients. The diagnosis of sepsis in patients with elevated PCT can be confirmed by blood and sputum cultures to determine the type of infecting bacteria (Schuetz, 2020).

The production and release of PCT from extrathyroidal sources into the circulation is enormous during bacterial infection, which is actively maintained by increased concentrations of interleukin (IL)-1 β , tumor necrosis factor (TNF)- α and IL-6. However, the synthesis of this biomarker is inhibited by interferon (INF)- γ , which concentration increases during viral infection. Therefore, it causes PCT levels to remain normal (<0.5 ng/mL) in some patients with SARS-CoV-2 infection without bacterial co-infection. Based on the PCT levels, viral and bacterial pneumonia infections in COVID-19 patients can be distinguished (Lippi & Plebani, 2020). Meanwhile, Shah (2020) stated that the use of PCT in COVID-19 can also be used as a marker of disease severity due to dysregulation of cytokine production. As an inflammatory marker, PCT will increase with the severity of COVID-19 disease so that PCT can be used as a severity prognostic (Ji et al., 2020).

Table 3. Frequency Distribution of PCT Levels and Disease Severity Levels in Hospitalized Patients with Confirmed COVID-19 at Bhayangkara Tk. I Raden Said Sukanto Hospital Period July–December 2020.

Variable	Frequency	%
PCT level (ng/mL)		
- <0,5	111	61,7
- \geq 0,5	69	38,3
Total	180	100
Disease Severity		
- Low-Medium	87	48,4
- Severe	35	19,4
- Critical	58	32,2
Total	180	100

Table 3 shows PCT levels and disease severity in COVID-19 patients. PCT levels <0.5 ng/mL were highest in mild and moderate pain. PCT levels 0.5 ng/mL were not found in mild illness, but tended to be severe and critically ill. Study by Luo et al. (2020) and Chen et al. (2020) is in accordance with this study, the highest PCT levels <0.5 ng/mL were discovered in mild/moderate illness and the highest PCT levels 0.5 ng/mL in severe/critical illness. Higher PCT levels in severe and critical cases indicate systemic inflammation that exacerbates the clinical manifestations of COVID-19 patients (Chen et al., 2020).

The severity of the disease in this study included mild, moderate, severe and critical illness. The severity of COVID-19 disease is based on clinical manifestations ranging from asymptomatic, mild symptoms, pneumonia, severe pneumonia, ARDS, sepsis to septic shock (Susilo et al., 2020). Table 3 displays that mild to moderate pain was dominant in this study with 87 patients (48.4%). This study is similar to previous studies which found more moderately ill hospitalized patients than critically ill patients (Liu et al., 2020). Understanding the disease course of COVID-19 is very helpful in distinguishing whether the disease phase is still the result of a viral pathogen or an uncontrolled inflammatory phase that causes the condition to worsen. Furthermore, the severity of the disease is useful for administering therapy, knowing the response to therapy and the clinical outcome of the patient (Soeroto et al., 2020).

Table 4. Cross Table of Disease Severity Levels and PCT Levels in Inpatients Confirmed Positive for COVID-19 at Bhayangkara Tk. I Raden Said Sukanto Hospital Jakarta Period July - December 2020

Checkup result		Disease Severity						p-value
		Mild-Moderate		Severe		Critical		
		n	%	n	%	n	%	
PCT Level (ng/mL)	<0,5	83	46,2	15	8,3	13	7,2	0,000
	≥0,5	4	2,2	20	11,1	45	25	
Total		87	48,4	35	19,4	58	32,2	

Table 4 shows that the results of the cross-table analysis between PCT levels and disease severity obtained PCT levels <0.5 ng/mL with mild to moderate pain group as many as 83 patients (46.2%), severe illness 15 patients (8.3%) and critically ill 13 patients (7.2%). PCT levels 0.5 ng/mL were found in the mild-to-moderate group of 4 patients (2.2%), seriously ill in 20 patients (11.1%) and critically ill in 45 patients (25%). The results of the Chi Square test of PCT levels with disease severity in hospitalized patients with confirmed COVID-19 obtained p value = 0.000 ($p < 0.05$) which indicates that there is a statistically significant relationship between PCT levels and disease severity. It informs that the higher the PCT level, the higher the severity of the disease. The results obtained in this study are the same as the research conducted (Chen et al., 2020; Li et al., 2020; Luo et al., 2020; Wang et al., 2020). Meta-analysis research results by Ahmed et al. (2021) also stated that 85% of cases found showed an association between PCT levels and disease severity.

The limitation of this study is that data on culture examination as a support for bacterial coinfection could not be included in this study due to the limitations of culture examination at the hospital at that time. Thus, the recommendation of this study is to include completeness of bacterial culture data in COVID-19 patients.

4. CONCLUSION

The results of the data analysis of this study found a relationship between PCT levels and the severity of disease in inpatients who were confirmed positive for COVID-19. The higher the PCT level, the higher the severity of the disease. PCT can be used as an indicator to observe the severity of the disease during this pandemic. Bacterial coinfection in COVID-19 patients has not been proven to be the cause of the severity in this study, the increase in PCT with increasing disease severity may be due to a cytokine storm.

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RESEARCH

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Spiritual Activity as an Effort to Cope with Depression during the COVID-19 Pandemic in Indonesia

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Abstract

Spiritual activity is used to be associated with better mental health, particularly in the face of stress. At the beginning of the COVID-19 pandemic, numerous new regulations, including quarantine, restrictions on mobility, and physical distancing, triggered stress throughout society. The objective of the study is to explore the relationship of spiritual activities at each level of depression in Indonesia in the early stages of the COVID-19 pandemic (2-4 May 2020). The cross-sectional research was administered online in 34 provinces in Indonesia, involving 2189 respondents aged 15 years old and over and social media users. The researchers employed a structured questionnaire to examine demographic characteristics and coping activities and measured depressive symptoms using the Patient Health Questionnaire (PHQ-9). Multivariate results presented that the spiritual activities are able to decrease the risk of depression at every depression level (mild, moderate, and severe) after being controlled by gender and marital status. The values for each level, which are mild, moderate, and severe, were OR=0.332 (95% CI 0.19-0.60; p-value=0.000), OR=0.198 (95% CI 0.09-0.43; p-value=0.000), and OR=0.234 (95% CI 0.08-0.64; p-value=0.005), respectively. Good spiritual activities during an infectious disease outbreak are efficient to support some individuals in reducing the risk of depression, particularly in Indonesia.

Keywords: Spiritual Activity, Depression, Pandemic, COVID-19, Indonesia.

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1. INTRODUCTION

For some people, stress may lead to severe depression. At the beginning of the COVID-19 pandemic, the community have been experiencing many changes in habits and feelings, such as quarantine, restrictions on mobility and activities, wearing masks, fear of death, economic difficulties, and uncertainty about the future (Zarrouq et al., 2021). These made it tremendously possible for the incidence of depression to appear higher than usual (Chirico, 2021). A cross-sectional study conducted in Spain on 3480 respondents in early March 2020 revealed that 18.7% of respondents expressed symptoms of depression, while 21.6% reported anxiety (González-Sanguino et al., 2020). Another study in Morocco presented that 43% of respondents experienced anxiety, and 53% experienced depression at the beginning of the COVID-19 pandemic (Zarrouq et al., 2021).

Each individual attempts to overcome unpleasant events in their lives or stressful situations in various ways, one of which is by performing spiritual activities (Shamblaw et al., 2021). People consider that spirituality is able to encounter the negative consequences of the COVID-19 pandemic in the short and long terms (Chirico, 2021). Spirituality is religious behavior towards religious beliefs such as praying, fasting or reading scriptures, both individually or together. Several studies have unveiled that spiritual activity is inversely associated with depression. Research in the United Arab Emirates (UAE) confirmed this relationship by comparing spirituality between Christians and Muslims (Thomas, & Barbato, 2020). Many other studies have also evident the relationship between spirituality and depression (Davis et al., 2021), (Zarrouq et al., 2021), (Askari et al., 2018).

Furthermore, numerous studies have discussed the relationship between spiritual activity and depression, including the biological mechanism. Spiritual practice is associated with positive emotions such as gratitude, inner peace, and acceptance for everything that happens (Rentala et al., 2017). Performed together, spiritual activities may produce a sense of belonging and social support (Mahwati, 2017). As a result, it is expected to prevent the doers from consuming alcohol and drugs, particularly among Muslims, in which excessive use of these substances is significantly related to higher depression scores (Shamblaw et al., 2021).

Previous studies examined the relationship between spiritual activity and the incidence of depression but almost none concerning the role of spiritual activity at each level of depression, whether mild, moderate, or severe. By paying attention to the culture which develops in Indonesia, in which Indonesian people are tremendously thick with spiritual activities, the researchers were eager to investigate the relationship of spiritual activity at each level of depression in the general public in Indonesia. The researchers proposed two hypotheses which are (1) there is a relationship between spiritual activity at each level of depression and (2) spiritual activity protects people from depression.

2. RESEARCH METHOD

This research was a cross-sectional study conducted online randomly in 34 provinces of Indonesia from 2 to 4 of May 2020, when the peak of the COVID-19 cases occurred in Indonesia. The researchers employed the lime survey application to generate a URL link containing the questionnaire and distributed it to key respondents via social media. The key respondents were individuals living in the provinces where the study was conducted, owned social media, and, mostly, worked in government agencies. They were asked to share the link with the next eligible respondents. The reason for selecting government agencies as key respondents is because government agencies possess an extensive network in their area.

The research population was the entire Indonesian population aged 15 years or older. The research sample was the Indonesian population aged 15 years or older who lived in Indonesia during the pandemic period, had social media, and had the willingness to fill out the survey questionnaire. Before the study was conducted, the minimum sample size was 1200 assessed using the proportion estimation formula with a p-value for psychological conditions $p = 35.1\%$; $d = 0.04$; 95% confidence interval; $deff=2$, considering a 10% drop-out. As many as 2800 respondents agreed to participate in this study and fill out a complete questionnaire. However, the researchers excluded 611 respondents who were working as health workers, assuming that the psychological pressure experienced by health workers was different from that experienced by the general public. Thus, only 2189 respondents were ready to be examined.

Symptoms of depression were calculated using the Patient Health Questionnaire (PHQ 9) (Kroenke & Spitzer, 2002). PHQ-9 is a mental health instrument which is part of the primary care evaluation of mental disorders (PRIME-MD) and has been employed in general by various studies. The PHQ-9 comprised 9 (nine) questions about how frequent the respondent experienced emotional disturbances in the last two weeks, with a Cronbach's alpha of 0.777. The researchers translated 9 question items in the PHQ-9 into Bahasa in this study. The questions encompassed "I am not interested in or passionate about doing anything," "I feel gloomy, sad, or hopeless," "I have trouble getting to sleep, or wake up easily, or sleep too much," "I feel tired or lacking energy," "I lack appetite or eat too much," "I lack self-confidence or feel like a failure or have let myself or my family down," "I have trouble concentrating on something, such as reading the newspaper or watching television," "I move or speak so slowly that I other people notice it or, conversely, I feel restless so that I move more often than usual," and "I would rather die or want to hurt myself in any way." Each answer to each question possessed 4 Likert scales which ranges from 0 to 3, in which 0 was for never, 1 was for several days, 2 was for more than one week, and 3 was for almost every day (Kroenke & Spitzer, 2002).

Depression scores were divided into four categories, which are "none" coded "0" for respondents with a total score of 0-4, "mild" coded "1" for those with a total score of 5-9, "moderate" coded "2" for those with a total score of 10-14, and "severe" coded "3" for those with a total score of ≥ 15 (Kroenke & Spitzer, 2002).

Questions about spiritual coping were developed by the authors with eight questions about the coping strategies which were implemented by respondents to maintain mental health during the COVID-19 pandemic. Questions incorporated "What do you do to maintain mental health?" "1. Do you do sports/physical activities?" "2. Do you practice spiritual activities (worship, prayer, *dhikr*, meditation, etc.)?" "3. Do you do recreational activities (doing hobbies, watching movies, gardening, etc.)?" "4. Do you consume cigarettes?" "5. Do you consume alcohol?" "6. Do you consult with health workers/professionals (doctors, psychiatrists, psychologists)?" "7. Do you consult with non-medical personnel (spiritual teachers, pastors, priests, etc.)," and "8. Do you talk about problems with partner/family/friends? The answer to each question has two scales, which consist of "0" for "no" and "1" for "yes." The variable spiritual coping was obtained to the second question, that is "What do you do to maintain mental health? Do you practice spiritual activities (worship, prayer, *dhikr*, meditation, etc.)?" with the code "0" for "no" and "1" for "yes."

The researchers applied six covariates as potential confounders. This covariate is frequently applied by previous studies (Mahwati, 2017). The covariates encompass the variables age, gender (female vs. male), marital status (not/unmarried vs. married), educational status (middle vs. low), employment status, and homeownership status. The

variable age was classified into three categories, which are 15-24 years, 25-45 years, and >45 years. The variable employment status was segregated into five categories, consisting of Layoff, Unemployed, Informal Worker, Student, and Civil servant/Private/Retiree. Respondents in the layoff category were those who before the COVID-19 pandemic possessed a job but were experiencing layoffs during the COVID-19 pandemic. Respondents in the unemployed category were those who had not been working from before the pandemic period until the time of data collection (excluding retirees). These categories were differentiated from each other because the researchers speculated that individuals who are laid off encounter higher psychological pressure than their non-working status from the beginning. The student category did not encompass civil servants assigned to schools. The variable homeownership status was indicated by the researchers to represent the socio-economic status of the respondents with four categories incorporating own house, family-owned house, office-owned house, and rented house.

Statistical analysis was conducted by employing SPSS (Statistical Package for the Social Sciences) version 22.0. The relationship between respondent characteristics (covariates) on symptoms of depression and spiritual activity was examined using chi-square. A p -value < 0.05 was considered statistically significant. Covariate variables that possess a statistically significant relationship with depressive symptoms and spiritual activity were determined to be potential confounders. Simple multinomial logistic analysis was administered to calculate the crude Odds Ratio (OR) of the relationship between spiritual activity and symptoms of depression at each level. Multiple multinomial logistic analysis was applied to measure the adjusted OR of the relationship between spiritual activity and depression level in the control covariate variables. This analysis also analyzed a confounding variable. It would be implied to be a confounding variable if the OR of spiritual activity changes by over 10% when the potential confounding variable is omitted in the model.

This study followed the research protocol which is submitted to the Research Ethics Commission. The ethical approval was admitted by the Health Research Ethics Commission-Health Research and Development Agency, that is Ethical Approval No. LB.02.01/2/KE.326/2020. All respondents who were distributed the link had previously been explained about the objective of the study and were asked for their consent to participate in the research voluntarily.

3. RESULTS AND DISCUSSION

This study involved 2189 respondents who have filled out the questionnaire completely and were included in the analysis. Table 1 presents the distribution of respondents based on demographic characteristics and levels of depression. Characteristic variables associated with the level of depression (p -value < 0.05) were age, gender, marital status, educational status, employment status, and homeownership status. Respondents experiencing severe depression were, mostly, aged 15-24 years (4.8%), women (3.6%), unmarried (4.8%), had high-middle education (3.4%), were laid off (6.2%), and lived in a rented house (5.2%). Likewise, most of them experiencing moderate or mild depression were teenagers (15-24 years), women, unmarried, had high-middle education, were laid off, and lived in a rented house. Full details of the characteristics are displayed in Table 1.

Table 1. Distribution of respondents based on demographic characteristics and level of depression.

Variable	Total N (2189)	Depression Level				p-value
		None (N=1495)	Mild (N=488)	Moderate (N=134)	Severe (N=72)	
Age (year)						0.000*
15-24	606(27.7)	348(57.4)	164(27.1)	65(10.7)	29(4.8)	
25-44	1161(53.0)	798(68.7)	271(23.3)	58(5.0)	34(2.9)	
>=45	422(19.3)	349(82.7)	53(12.6)	11(2.6)	9(2.1)	
Gender						0.000*
Female	1486(67.9)	960(64.6)	363(24.4)	110(7.4)	53(3.6)	
Male	703(32.1)	535(76.1)	125(17.8)	24(3.4)	19(2.7)	
Marital Status						0.000*
Unmarried	983(44.9)	578(58.8)	266(27.1)	92(9.4)	47(4.8)	
Married	1206(55.1)	917(76.0)	222(18.4)	42(3.5)	25(2.1)	
Educational Status						0.472
Mid-high	2103(96.1)	1434(68.2)	467(22.2)	131(6.2)	71(3.4)	
Low	86(3.9)	61(70.9)	21(24.4)	3(3.5)	1(1.2)	
Employment Status						0.000*
Layoff	161(7.4)	82(50.9)	50(31.1)	19(11.8)	10(6.2)	
Unemployed	379(17.3)	243(64.1)	89(23.5)	30(7.9)	17(4.5)	
Informal Worker	92(4.2)	66(71.7)	21(22.8)	3(3.3)	2(2.2)	
Student	432(19.7)	257(59.5)	118(27.3)	34(7.9)	23(5.3)	
Civil servant/private/retiree	1125(51.4)	847(75.3)	210(18.7)	48(4.3)	20(1.8)	
Homeownership Status						0.000*
Rented house	368(16.8)	223(60.6)	94(25.5)	32(8.7)	19(5.2)	
Family-owned house	915(41.8)	565(61.7)	237(25.9)	78(8.5)	35(3.8)	
Office-owned house	53(2.4)	40(75.5)	11(20.8)	1(1.9)	1(1.9)	
Own house	853(39.0)	667(78.2)	146(17.1)	23(2.7)	17(2.0)	

*Statistically significant, p -value<0.05

Table 2 presents the distribution of respondents based on demographic characteristics and spiritual activities. Characteristic variables associated with spiritual activities (p -value <0.05) were gender and marital status. The respondents who performed spiritual activities in maintaining their mental health were slightly more in the female group (97.8%) and the married group (98.0%).

The COVID-19 pandemic owns consequences on global public health, such as the physical and mental health of the population. The result of this study revealed that most respondents experiencing depression were teens. In accordance with Gonzales-Sanguino's study, groups of adolescents are more likely to experience symptoms of depression because the younger group possesses less maturity and resources to deal with

stress (González-Sanguino et al., 2020). Adolescents are still progressing a perspective of the world and do not yet possess a satisfactory answer on the meaning of life (Giannone & Kaplin, 2020). They also own the frequency of accessing news of the COVID-19 pandemic through social media, which makes them more vulnerable to anxiety and depression (Zarrouq et al., 2021).

Other groups prone to symptoms of depression in this study were women, unmarried or divorced, and unemployed. As in Mahwati's research, depression is more common among women, unemployed, and unmarried or divorced groups (Mahwati, 2017). Another study in Spain also unveiled that women were associated with the greater symptoms of depression (González-Sanguino et al., 2020). It was correlated with the absence of work for women and possible domestic violence which develops symptoms of depression in women in Morocco (Zarrouq et al., 2021).

Table 2. Distribution of respondents based on demographic characteristics and spiritual activities.

Variable	Total N (2189)	Spiritual activities		p-value
		Yes (N=2126)	No (N=63)	
Age (year)				0.215
15-24	606(27.7)	585(96.5)	21(3.5)	
25-44	1161(53.0)	1126(97.0)	35(3.0)	
>=45	422(19.3)	415(98.3)	7(1.7)	
Gender				0.005*
Female	1486(67.9)	1454(97.8)	32(2.2)	
Male	703(32.1)	672(95.6)	31(4.4)	
Marital Status				0.009*
Unmarried	983(44.9)	944(96.0)	39(4.0)	
Married	1206(55.1)	1182(98.0)	24(2.0)	
Educational Status				0.500
Mid-high	2103(96.1)	2044(97.2)	59(2.8)	
Low	86(3.9)	82(95.3)	4(4.7)	
Employment Status				0.840
Layoff	161(7.4)	156(96.9)	5(3.1)	
Unemployed	379(17.3)	371(97.9)	8(2.1)	
Informal Worker	92(4.2)	89(96.7)	3(3.3)	
Student	432(19.7)	417(96.5)	15(3.5)	
Civil servant/private/retiree	1125(51.4)	1093(97.2)	32(2.8)	
Homeownership Status				0.068
Rented house	368(16.8)	356(96.7)	12(3.3)	
Family-owned house	915(41.8)	880(96.2)	35(3.8)	
Office-owned house	53(2.4)	52(98.1)	1(1.9)	
Own house	853(39.0)	838(98.2)	15(1.8)	

*Statistically significant, p-value<0.05

The multivariate analysis discovered two confounding variables, comprising of gender and marital status. Both of them possess a significant relationship with spiritual activity and depression. Substantially, the two variables are not intermediate variables in the relationship between spiritual activity and depression. When the variables gender and

marital status were excluded in the analysis, when, there was a change in OR over 10 percent. The final results of the multivariate analysis can be observed in Table 3.

Table 3 illustrates the relationship of spiritual activity at each level of depression employing a crude model (model 1) and a model adjusted by the variables gender and marital status (model 2). Spiritual activity decreases the risk of depression at every level of depression (mild, moderate, and severe), either crudely or after adjustment. The values of the relationship after adjustment for mild, moderate, and severe depression are OR = 0.332 (95% CI 0.19-0.60; p -value = 0.000), OR = 0.198 (95% CI 0.09-0.43; p -value = 0.000), and OR=0.234 (95% CI 0.08-0.64; p -value=0.005), respectively. Table 3 also presents that the model without adjustment by demographic characteristics (model 1) underestimates the spiritual relationship with depression at the mild and moderate levels but overestimates it at the severe level.

Table 3. Relationship between spiritual activity and level of depression based on crude and adjusted odds ratios.

Variable	OR (95% CI)	p-value
Mild		
Model 1 (crude model) ^a		
Spiritual		
Yes	0.344(0.19-0.61)	0.000*
No	1 (reference)	
Model 2 (adjusted model) ^b		
Spiritual		
Yes	0.332(0.19-0.60)	0.000*
No	1 (reference)	
Moderate		
Model 1 (crude model) ^a		
Spiritual		
Yes	0.211(0.10-0.45)	0.000*
No	1 (reference)	
Model 2 (adjusted model) ^b		
Spiritual		
Yes	0.198(0.09-0.43)	0.000*
No	1 (reference)	
Severe		
Model 1 (crude model) ^a		
Spiritual		
Yes	0.228(0.10-0.61)	0.003*
No	1 (reference)	
Model 2 (adjusted model) ^b		
Spiritual		
Yes	0.234(0.08-0.64)	0.005*
No	1 (reference)	

*Statistically significant with 95% confidence interval

^a model 1: crude model of the relationship between spiritual activity and severe depression

^b model 2: model of the relationship between spiritual activity and severe depression, after adjustment by the variables gender and marital status

The main results of this study corroborated the proposed hypothesis, that spiritual activity is able to decrease the risk of depression at every level of depression (mild,

moderate, and severe), or it is implied that spiritual activity owns an inverse relationship with the occurrence of depression at all levels. It is in accordance with a study conducted in India on 120 patients with depressive disorders. Those with mild depression possessed higher spirituality scores than those with moderate or severe depression. Spiritual activities are significantly correlated with positive emotions, such as gratitude, inner peace, and acceptance, and making the doers overcome problems of meaning and purpose in life and provide self-restraint from relapse (Rentala et al., 2017). In Columbia, spirituality is lower in severely depressed individuals (Mcclintock et al., 2019). Spiritual activity reframes unpleasant events in life into less stressful ones (Zarrouq et al., 2021).

A longitudinal study of family life in the United States examined the relationship of hope in the relationship of spirituality with depression. Higher spiritual levels are incorporated with lower levels of depression indirectly through higher hope (Rose et al., 2018). Similarly, research in the UAE on Muslims and Christians unveiled that in the Muslim community, it was discovered an inverse relationship between spiritual activity and depression ($r=-0.110$; $p=0.02$). Muslims reveal a greater dependence on spiritual activities compared to Christians during the COVID-19 pandemic ($F=97.64$; $P<0.001$). Muslims hope God strengthen them in this situation and prove that spiritual activity is able to uphold some people in handling their mental health during the COVID-19 pandemic (Thomas & Barbato, 2020).

A study conducted by Roming in the United States on 440 college students aged around 21 years discovered that spiritual activity is a crucial adaptive factor associated with mental health and a better quality of life for college students. Those possessing a low level of spirituality experienced higher levels of depression and, thus, a lower quality of life (Roming & Howard, 2019). The same study among adolescents in Malaysia revealed that spirituality was a protective factor against hopelessness, depression, and suicidal behavior among adolescents. According to the Islamic view, one's spirituality provides him a close relationship to Allah SWT that strengthens him to encounter difficulties. Individuals may possess hope and optimism in solving their problems in a better way (Talib & Abdollahi, 2017). Likewise, in a study of Chinese students in Hong Kong, students with lower levels of spiritual well-being owned higher rates of depression (Leung & Pong, 2021).

A study on adults in Korea recommended that higher levels of spiritual well-being are correlated with lower levels of depression. Prayer can substantially decrease stress levels as it is able to produce psychological comfort (You, et al., 2019), while spiritual practice increases social support, healthy behavior, lifestyle, and better happiness, thus, it helps people overcome difficulties in life's journey (Vitorino et al., 2018).

In a similar study collecting data online, the elderly age group possessed the lowest proportion because the questionnaires were distributed through social media, whereas most of them owned limited access to social media. A study conducted in Indonesia concerning the elderly justified a strong relationship between spirituality and depression (OR=1.869; 95% CI 1.42-2.46); Lower depression was revealed in those who performed spiritual activities (Mahwati, 2017). Clinical trial research conducted by Askari on 40 old adults unveiled that spiritual-religious psychotherapy could reduce 60% of symptoms of depression in the elderly (Askari et al., 2018). Old adults frequently participate in religious congregations, at which social support and open communication, which may reduce symptoms of depression. Furthermore, religious individuals are more likely to get married and have stable family relationships, which allow them to have a place to share feelings that is able to decrease symptoms of depression. Religious individuals generally have hope in God and think positively that everything is for their good. Such hope provides them strength in encountering difficulties (Mahwati, 2017).

Another study conducted on 84 pregnant women in Iran with an RCT also presented a 41% reduction in depression and blood pressure stability in pregnant women who were provided intervention in the form of religious education. Religious education is able to reduce the emotional symptoms of pregnant women and, in turn, stabilize the blood pressure (Sanaeinasab et al., 2021).

However, there are certain conditions in which spiritual activity can be a factor increasing the risk of an increase in depression longitudinally, even to severe depression (OR=1.34). The spiritual activity in question is any activity which objective is to identify contemplation with loneliness; contemplation like “why am I so sad?” or “why is this happening in my life?” and loneliness, which is an act of a sense of social isolation. Both of these activities may raise the symptoms of depression (Vittengl, 2018).

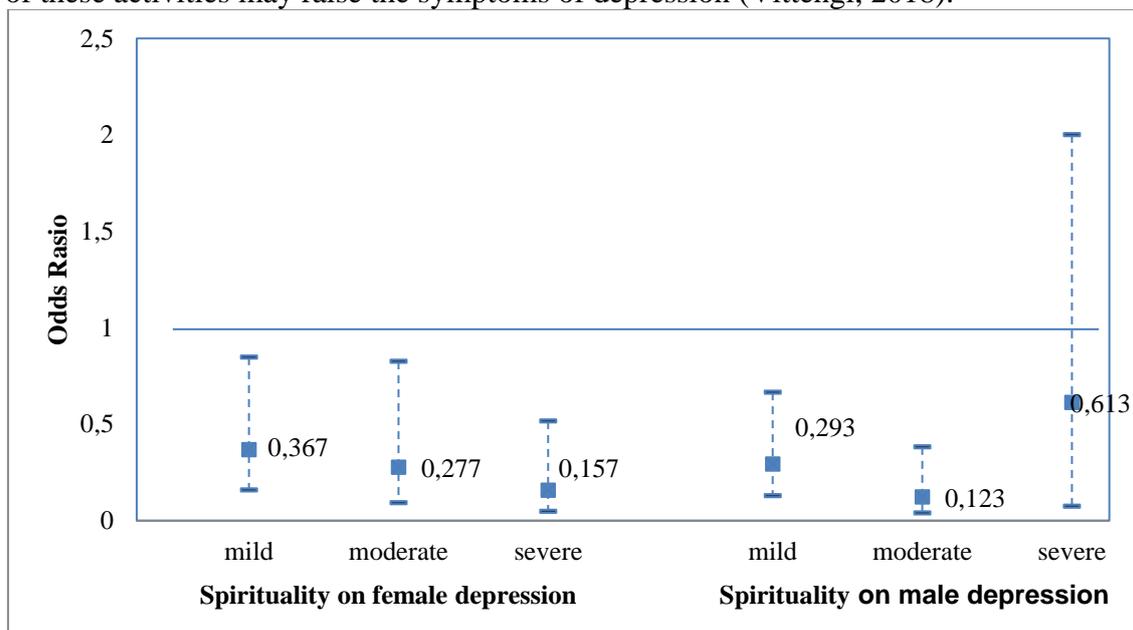


Figure 1. The relationship between spiritual activity and depression based on gender.

Figure 1 displays the stratification by gender. In the female group, the relationship pattern of spiritual activity with the level of depression is the same as that of the overall respondent. Spiritual activity reduces the risk of depression either at mild, moderate, or severe levels. The values for mild, moderate, and severe depression were OR=0.367 (95% CI 0.16-0.85; p-value=0.019), OR=0.277 (95% CI 0.09-0.83; p-value =0.021), and OR=0.157 (95% CI 0.05–0.52; p-value=0.002), respectively. Meanwhile, in the male group, the relationship between spiritual activity and depression was only significant at mild and moderate levels of depression, but not significant at the severe level with OR = 0.613 (95% CI 0.08-5.00; p-value = 0.647).

The limitation of this study was that the research was conducted online through the distribution of links through social media. Therefore, the sampling was not random; the respondents were selected unevenly in various characteristics. Most of the respondents were civil servants, and their close relatives possessed relatively good spiritual knowledge and a relatively stable economic level. Another limitation was that the variables were calculated not clinically but through self-reporting questionnaires.

4. CONCLUSION

Spiritual activity is able to decrease the risk of depression at every level (mild, moderate, and severe). The higher one's spiritual level, the lower his/her level of depression. Good spiritual practice during an infectious disease outbreak is able to reduce the risk of developing depression for some individuals, particularly in Indonesia.

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DOI: [10.31965/infokes.Vol20Iss1.684](https://doi.org/10.31965/infokes.Vol20Iss1.684)Journal homepage: <http://jurnal.poltekkeskupang.ac.id/index.php/infokes>**RESEARCH****Open Access****Determinants of Contraceptive Use at The First Sexual Intercourse among Unmarried Adolescents in Indonesia: 2017 IDHS Analysis****Restya Sri Sugiarti^{1a}, Helda^{1b*}, Kholisotul Hikmah^{1c}**¹ Department of Epidemiology, Faculty of Public Health, Universitas Indonesia, Depok, West Java, Indonesia^a Email address: restya.sri@gmail.com^b Email address: heldanazar1@gmail.com^c Email address: kholisotul.hikmah@ui.ac.id

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Abstract

Adolescents confront boundaries in obtaining contraception counting prohibitive policies and adolescents possess failure to obtain contraceptives since of information, transportation, and monetary limitations. The objective of this study is to assign the variables which impact on the use of contraception for the first sexual intercourse among unmarried adolescents. Quantitative research employing cross sectional analysis was implemented in this study, by processing 2017 Indonesian Health Demographic Survey (IDHS) data. Cox regression was utilized to examine the association between sociodemographic, peer and social influences, contraceptive knowledge and contraceptive use. The study populace encompassed 705 single young people; 15 to 24 years old. The study resulted that contraceptive use at the primary sexual intercourse by single young people in Indonesia was approximately 50.35%. After bivariate analysis was applied, it was revealed that there is a significant relationship between education with the contraceptive use at the first sexual intercourse among unmarried adolescents in Indonesia (p-value = 0.049). In the final model, we discovered that the level of education and contraceptive use was statistically significant, and the contraceptive use was higher in adolescents with high education than adolescents with middle and primary education (PR 1.51, 95% CI 1.09 – 2.07, p = 0.012). Therefore, this finding provides information that education is a prominent variable for understanding contraceptive use in adolescents.

Keywords: Adolescent, Contraceptive, Unmarried.***Corresponding Author:**

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1. INTRODUCTION

Adolescents require and possess a human right to comprehensive sexuality learning and health reproduction. Greater admission to contraceptive information and services could decrease the number of young adolescents for being pregnant and give birth very young age (World Health Organization, 2021). However in developing countries, around 12 million adolescent girl aged 15-19 years and 777,000 young female under 15 give birth each year (World Health Organization, 2020). In Indonesia, according to the 2017 IDHDS, 7 percent of the young woman aged 15-19 years old have given birth or presently pregnant for their first child (Kementerian Kesehatan Republik Indonesia, 2018).

The occurrence of pregnancy and childbirth in young women could be affected by several factors, particularly as girls experience pressure from their social environment to marry and give birth at a young age, it is exacerbated by the limited knowledge of girls (World Health Organization, 2020). The limited knowledge and lack of understanding of the contraception application, resulted in those who are willing to prevent pregnancy were unable to do so (Prendergast et al, 2017). There are difficulties in obtaining contraceptives, which encompasses limited knowledge about birth control methods, laws and policies governing the provision of contraceptives and the weak ability of adolescents to observe contraceptives due to lack of knowledge and economic capacity (World Health Organization, 2020).

On the other hand, the Government of Indonesia has not implemented regulations which is able to guarantee the occurrence of comprehensive contraceptive information and services for premarital sexually active adolescent. The government is frequently influenced by the traditional norm, that family planning services are merely for married couples (Budiharsana, 2017). Family planning services that are available for adolescents in Indonesia are currently limited to information, education, and counseling services. The provision of family planning tools for adolescents is not part of the Population, Family Planning and Family Development Program policies (Badan Kependudukan dan Keluarga Berencana Nasional, 2017). Hence, the application of contraception among sexually active youth creates an ethical quandary in Indonesia, particularly in scrutinizing reproductive health rights as primary rights (Budiharsana, 2017). As a result, the sexual and reproductive health requires unmarried young people and adolescents to continue to be left out and unmet (Durojaye, 2011).

Based on the 2017 IDHS, 81% of adolescents assumed that they demand family planning services and 37% of them stated that they desire family planning tools. The percentage of male adolescents who reported experiencing premarital sexual intercourse was 8% higher than female adolescents (1%). However, overall, merely 43% of adolescents used contraception at the first time they had sexual initiation. The most common contraceptive methods employed by adolescents in Indonesia are withdrawal (51%) and condoms (45%), while the rest applied other contraceptive methods (Badan Kependudukan dan Keluarga Berencana Nasional, 2017).

Adolescent contraceptive needs which have been fulfilled is a requirement to comply Sustainable Development Goals (SDGs) 3.7 on reproductive health, which targets that by 2030, a widespread approach or use of contraceptive for all ages should be implemented to family planning (Oppong et al., 2021). Evaluating determinants in young adult contraceptive use is crucial for determining the fulfillment of preceding intervention efforts, monitoring progress on the target 3.7 of the SDGs, as well as for prioritizing destiny moves (Adedini et al., 2021). Although contraceptives might not postpone the onset of their sexual action, it is still able to anticipate the undesired pregnancy and different undesirable results (Budiharsana, 2017). Therefore, this study examined

determinants of contraceptive use at the first sexual intercourse among unmarried adolescents in Indonesia: 2017 IDHS analysis.

2. RESEARCH METHOD

This study employed cross-sectional survey datasets from the IDHS 2017. The sample framework applied is the Master Sample Census Block from the results of the 2010 Population Census with a stratified two-stage sampling design. The analysis of this study concerned on the unmarried but sexually active adolescent male and female aged 15–24. The sexually active was unmarried boys and girls who revealed to have ever engaged in sexual activity. Prior to the interview, all respondents had given their consent to be involved in the survey.

The survey sampled 49,261 households, of which 47,963 (99.5%) were interviewed. Among the eligible respondents, 10,691 unmarried women and 13,079 unmarried men aged between 15-24 years were successfully interviewed. From 23,770 male and female adolescents who had been interviewed, 1,559 (6.6%) adolescents had performed sexual intercourse before marriage and 705 of them filled out the questions completely according to the variables required for this study.

Univariate and bivariate analyzes were conducted by applying SPSS 23 software to determine the factors influencing the use of contraceptives for adolescents 15-24 years old who had sexual intercourse before marriage. The assessed outcomes were adolescents using contraception during their first sexual intercourse, encompassing condoms, pills, emergency contraception, withdrawal, and periodic abstinence or calendar. Determined 3 groups in the independent variables, incorporating: (1) sociodemographic (sex, age at the date of interview, educational level, working status, type of residence, and age at first sexual intercourse); (2) peer and social influence (having a talk about sexual matters with a friends, teacher, and health service provider, the frequency use of the internet, watching TV about family planning (FP), dating status, having friends had sex before marriage, and agree with premarital sex); and (3) contraceptive knowledge (knowledge of the fertile period and ever learning about FP at school). Analysis with Cox logistic regression was implemented obtain the prevalence ratio (PR) and 95% confidence interval (CI) to calculate the determinants of contraceptive use in first sexual intercourse in unmarried adolescents.

3. RESULTS AND DISCUSSION

Table 1. Frequency distribution of respondent.

Variable	Frequency (N= 705)	Percentage (%)
Sociodemographic		
Gender		
Male	605	85.82
Female	100	14.18
Age at the date of interview		
<18	83	11.77
≥18	622	88.23
Educational level		
Primary (Primary, Junior High School)	147	20.85
Middle (Senior High School)	348	49.36
High (Academic, University)	210	29.79
Working status		
Yes	429	60.85

Variable	Frequency (N= 705)	Percentage (%)
No	276	39.15
Type of residence		
Urban	417	59.15
Rural	288	40.85
Age at first sexual intercourse		
<18	361	51.21
≥18	344	48.79
Peer and social influence		
Having a talk about sexual matters with friends		
Yes	508	72.06
No	197	27.94
Having a talk about sexual matters with teacher		
Yes	291	41.28
No	414	58.72
Having a talk about sexual matters with health service provider		
Yes	242	34.33
No	463	65.67
Frequency used internet		
Daily	486	68.94
≥ 1/ week	169	23.97
< 1/ week	31	4.40
Never	19	2.70
Watching TV about FP		
Yes	262	37.16
No	443	62.84
Dating status		
Have partner	551	78.16
No partner	154	21.84
Having friends had sex before marriage		
Yes	681	96.60
No	24	3.40
Agree with premarital sex		
Yes	371	52.62
No	334	47.38
Contraceptive knowledge		
Knowledge of fertile period		
Yes	574	81.42
No	131	18.58
Ever learned about FP at school		
Yes	237	33.62
No	468	66.38
Using contraception during first sexual intercourse		
Yes	355	50.35
No	350	49.65

Table 1 illustrates univariate analysis which reveals that 705 male and female adolescents aged 15–24 years have ever done premarital intercourse. The sociodemographic of the respondents was distributed between male and female (86% and 14%). Most of the respondents were more than 18 years old when interviewed (88%). About 49% were at middle educational level (Senior High School), 60% were working and living in rural areas. Based on peer and social influence variables, 72% were having a talk about reproductive health with friends, 70% almost used internet every day, only 37% were watching TV about FP, 78% had partner, 53% agreed with premarital sex, and most have friends had sex before marriage (97%). Based on contraceptive knowledge, 81% respondents had knowledge of fertile period and only 34% had ever learned about FP at school. Univariate analysis discovered that only 355 (50.35%) of 705 unmarried male and female adolescents aged 15-24 years in Indonesia, reported using contraception during first sexual intercourse.

Table 2. Bivariate Analysis Factors Correlated with Contraceptive Use at the First Sexual Intercourse among Unmarried Adolescents in Indonesia.

Variable	Used contraceptive during first sexual intercourse (N=705)		p-value	Unadjusted PR (95% CI)
	Yes	No		
Sociodemographic				
Gender			0.334	0.86
Male	311 (87.61%)	294 (84.0%)		(0.62 – 1.17)
Female	44 (12.39%)	56 (16.0%)		
Age at the date of interview			0.307	1.17
<18	48 (13.52%)	35 (10.0%)		(0.86 – 1.59)
≥18	307 (86.48%)	315 (90.0%)		
Educational level			0.034*	1.18
Primary (Primary, Junior High School)	61 (17.18%)	86 (24.57%)		(1.01 – 1.36)
Middle (Senior High School)	173 (48.73%)	175 (50.0%)		
High (Academic, University)	121 (34.08%)	89 (25.43%)		
Working status			0.513	1.07
Yes	210 (59.15%)	219 (62.57%)		(0.87 – 1.33)
No	145 (40.85%)	131 (37.43%)		
Type of residence			0.916	1.01
Urban	209 (58.87%)	208 (59.43%)		(0.82 – 1.25)
Rural	146 (41.13%)	142 (40.57%)		
Age at first sexual intercourse			0.981	0.99
<18	182 (51.27)	179 (51.14)		(0.81 – 1.23)
≥18	173 (48.73)	171 (48.86)		
Peer and social influence				
Having a talk about sexual matters with friends			0.277	0.88
Yes	265 (74.65)	243 (69.43)		(0.69 – 1.11)

Variable	Used contraceptive during first sexual intercourse (N=705)		p-value	Unadjusted PR (95% CI)
	Yes	No		
No	90 (25.35)	107 (30.57)		
Having a talk about sexual matters with teacher			0.486	0.93 (0.75 – 1.14)
Yes	153 (43.10)	138 (39.43)		
No	202 (56.90)	212 (60.57)		
Having a talk about sexual matters with health service provider			0.114	0.84 (0.68 – 1.04)
Yes	136 (38.31)	106 (30.29)		
No	219 (61.69)	244 (69.71)		
Frequency used internet			0.406	1.06 (0.92 – 1.23)
Daily	240 (67.61)	246 (70.29)		
≥ 1/ week	88 (24.79)	81 (23.14)		
< 1/ week	13 (3.66)	18 (5.14)		
Never	14 (3.94)	5 (1.43)		
Watching TV about FP			0.319	0.90 (0.73 – 1.11)
Yes	141 (39.72)	121 (34.57)		
No	214 (60.28)	229 (65.43)		
Dating status			0.176	0.83 (0.64 – 1.09)
Have partner	288 (81.13)	263 (75.14)		
No partner	67 (18.87)	87 (24.86)		
Having friends had sex before marriage			0.235	0.65 (0.32 – 1.32)
Yes	347 (97.75)	334 (95.43)		
No	8 (2.25)	16 (4.57)		
Agree with premarital sex			0.068	0.82 (0.67 – 1.01)
Yes	204 (57.46)	167 (47.71)		
No	151 (42.54)	183 (52.29)		
Contraceptive knowledge				
Knowledge of fertile period			0.278	0.86 (0.65 – 1.13)
Yes	297 (83.66)	277 (79.14)		
No	58 (16.34)	73 (20.86)		
Ever learned about FP at school			0.525	0.93 (0.75 – 1.16)
Yes	125 (35.21)	112 (32.00)		
No	230 (64.79)	238 (68.00)		

The bivariate analysis presented in table 2 displays the relationship between sociodemographic, peer and social influences with contraceptive knowledge and contraceptive use. Education level ($p=0.034$) was independently associated with contraceptive use, at a 5% significant level. However, other sociodemographic (sex, age at the date of interview, working status, type of residence, and age at first sexual intercourse), peer and social influence and contraceptive knowledge were not statistically independent associations with contraceptive use.

Table 3. Multivariate Analysis and Final Model of Factors Related to Contraceptive Use at the First Sexual Intercourse among Unmarried Adolescents Aged 15–24 Years in Indonesia.

Variable	B	Wald	p-value	PR	95% CI
Educational level		6.523	0.038		
Primary (Primary, Junior High School)					
Middle (Senior High School)	0.217	2.080	0.149	1.24	0.93 – 1.67
High (Academic, University)	0.410	6.327	0.012	1.51	1.09 – 2.07
Agree with premarital sex					
Yes	-0.165	2.202	0.138	0.848	0.68 – 1.05
No					
Age at the date of interview					
<18	0.238	2.185	0.139	1.27	0.92 – 1.74
≥18					
Dating status					
Have partner	-0.171	1.569	0.210	0.84	0.65 – 1.10
No partner					
Gender					
Male	-0.136	0.674	0.412	0.87	0.63 – 1.21
Female					
Frequency used internet		2.892	0.409		
Daily	-0.434	2.457	0.117	0.65	0.38 – 1.11
≥ 1/ week	-0.368	1.624	0.203	0.69	0.39 – 1.22
< 1/ week	-0.561	2.107	0.147	0.57	0.27 – 1.22
Never					
Having friends had sex before marriage					
Yes	-0.310	0.735	0.391	0.733	0.36 – 1.49
No					

By using Cox logistic regression, the final model of the multivariate analysis (table 3) revealed that the factors associated with contraceptive use among unmarried adolescents in Indonesia were at education level. PR value is employed to calculate the strength of the relationship between factors influencing contraceptive use; the greater the PR value, the greater the effect on contraceptive use. Education level after adjusting with other variables (agree with premarital sex, age, dating status, sex, the frequency used the internet, and having friends had sex before marriage), compared to that primary and middle education, adolescents with high education were more likely to use contraception (PR = 1.51, 95% CI = 1.09 – 2.07, p-value = 0.012). In other words, the influence of other variables may increase the contraception uses in adolescents who are pursuing higher education.

According to this study, the correlation between sociodemographic factors, which are gender and contraceptive use in adolescents, is not statistically significant (p-value 0.412). The finding is not in accordance with research conducted by Linberg et. al. which

revealed that the use of contraceptives is higher in male adolescent (Lindberg et al., 2021). Misconceptions about gender roles frequently place adolescents at risk of unsafe health. Adolescent boys generally discover it imperative sexually active. Meanwhile, girls are mostly calm, guiltless and do not understand sexual issues. It definitely can reduce their capacity to deny undesirable sexual acts, to offer contraceptive utilize, and more secure sexual practices (World Health Organization, 2004). The different results in this study is affected by data distribution which presents that the majority of the respondents were male (86%) and 14% were female. This unequal number of male and female respondents was because fewer female adolescents reported a history of sexual relations before marriage, in which 8% of male adolescents informed having had premarital sex, while only 2% of female adolescents reported having had premarital sex (Badan Kependudukan dan Keluarga Berencana Nasional, 2017). Therefore, there is a possibility of potential underreporting which influences the strength of the association.

Although this study displays no relationship between age and contraceptive use (p-value 0.139), based on Young research, condom utilize was associated with older age (Young et al., 2018). Adolescents 20-24 years tend to report more consistent condom use than those aged 15-19 (Adedini et al., 2021). Other study discovered more specific results that older girls (18-19 years) were three times more potentially to practice contraception than younger girls. It is probably because older girls possess more mature way of thinking and understand better about the various contraceptives and the urgency of applying contraception (Nyarko, 2015).

The bivariate analysis indicates that there was a statistically significant relationship between education and the use of contraceptive use at the first sexual intercourse by unmarried adolescents in Indonesia (p-value=0.049). In the final model after adjusting with other variables, contraceptive use was higher among respondents with high education compared to respondents with middle and primary education (PR 1.51, 95% CI 1.09 – 2.07, p=0.012). This finding is in accordance with another study which revealed that respondents with secondary education (Senior High School) possessed higher contraceptive use compared to those with basic education (Oppong et al., 2021). Another finding also discovered that women were less likely to use inconsistent condoms compared to primary, secondary and tertiary education. Furthermore, education can also be a protective factor for early sexual initiation among young male and female (Adedini et al., 2021).

Similarly, Nyarko revealed that adolescent contraceptive utilizes expanded significantly with the increasing education level. It is probably because the educated ladies more motivate to apply contraception and value the positive impact of contraception on their lives (Nyarko, 2015). The significant use of contraceptives among adolescents with higher education is due to the fact that they obtain correct information about the benefits of the usage of contraceptives. Education also encourages young women to determine greater consideration about their sexual and reproductive health (Oppong et al., 2021).

This study indicates that there is no statistically significant relationship other sociodemographic variable (work status, area of residence, age and at first having sex) with contraceptive use (p-value>0.05). Meanwhile, Nyarko's research unveiled that young girls who are working are three times tend to use contraceptives than girls who are not (Nyarko, 2015). It is in accordance with Mandiwa's research in Malawi which revealed that working woman are more likely to use contraception than those who do not (Mandiwa et al., 2018). It is because working young women tend to be educated and exposed to contraceptive information, is willing to preserve their jobs, spend more time

on work and can afford contraception than those who are not working (Mandiwa et al., 2018; Nyarko, 2015).

The area of residence describes the availability of health care facilities and personnel in which facilities in urban county are more adequate than in rural county (Adilah et al., 2017). Other study presented that adolescents in rural areas were more likely to report inconsistent condom use but lower using modern contraception than those in urban areas (Adedini et al., 2021; Ahinkorah, 2020). It indicates that family planning and reproductive health services for rural communities are still inadequate due to the lack of access for adolescents to the advice and sexual health services they (Adedini et al., 2021; Young et al., 2018).

A study in Sub-Saharan Africa identified higher use of modern contraceptives among young girls who experienced their first intercourse between the ages of 15-19 and those who had never been married compared to those who had the first intercourse between the ages of 20-24 (Ahinkorah, 2020). However, research in South Korea revealed that there is a tendency to decrease contraceptive uses in young women who have early sexual activity and are affected by alcohol consumption (Lee, 2017). In general, these findings are in accordance with the theoretical basis of the Health Belief Model which asserts that adolescent girls who are aware that they consider themselves at risk for pregnancy may be more likely to utilize contraception (Ahinkorah, 2020).

In summary, the result of this study unveiled that there is no relationship between peers and social influence and contraceptive use in adolescents ($p\text{-value} > 0.05$). However, Young uncovered that the presence of support, communication, and peer pressure influences the timing of sexual activity and sexual acts (Young et al., 2018).

Mothers and fathers, health care workers, and teachers are believed by adolescents to be reliable sources of information, but adolescents frequently receive information from friends and relatives (Munakampe et al., 2018). A study in Nicaragua states that feeling comfortable when discussing sexuality matters with friends is correlated with escalate condom use (Decat et al., 2015). Peers are significantly influential for young adult, and they empathize with each other because they possess the same experiences and challenges. Hence, they are expected to have a great influence one another in terms of the use of modern contraception. Schools also share information about contraceptives, as well as places in which peers interact and share information about contraception (Mulubwa et al., 2021). Obtaining information about contraception from teachers is less favorable because the explanation from them is considered incomplete and not exhaustive (Munakampe et al., 2018). Health workers are admitted as a source of information expert, but sometimes, health workers own a negative perspective of contraceptive use among adolescents, which makes them feel uncomfortable in applying contraceptives (Mulubwa et al., 2021). The existence of regulations refusing adolescent contraceptive services because they are not married can also be an obstacle to contraceptive use (Oppong et al., 2021).

Adolescents also receive other information which is easier to obtain from peers, television, mass media, and the internet. However, there are firm indications that they receive inaccurate information due to the ease of obtaining the information. However, low knowledge due to incorrect or incomplete information may possess a direct effect on behavior (Munakampe et al., 2018). Another study revealed that adolescent exposed to access the information had a greater chance of utilizing condoms than respondents who were not exposed to information at the time they had sexual intercourse at the first time. Mass media, both print and electronic, which display good messages may influence teenagers to follow them (Adilah et al., 2017).

Another study unveiled that it is easier for the adolescents to share information about sexual matters with their partners in terms of the contraceptive use between boys and girls because (Decat et al., 2015). Women without a partner are less likely to use contraceptive since they feel that the relationship is not serious (Upadhyay et al., 2016). Recognizing the existence of friends involved in harmful sexual behavior including premarital sex can be an influential factor for contraceptive use. Having friends who have positive experiences on using contraception also motivates other adolescents to use contraception (Chernick et al., 2015).

The relationship of agree with premarital sex in this study is correlated to the common norms in society. Having sex before marriage is considered taboo, even though this traditional norm is rapidly shifting nowadays (Adedini et al., 2021). The Agha study revealed that social norms which prohibit contraception can decrease the rate of contraceptive use. The existence of social norms can make young women ashamed and not confident to discuss about the use of contraception with their partners (Agha et al., 2021).

This study discovered that the relationship between contraceptive knowledge and contraceptive use was not statistically significant ($p\text{-value} > 0.05$). However, other studies have uncovered that adolescent girls who understand their ovulation cycle are more feasible to use contraception compared to girls who are unaware of their ovulation cycle (Mandiwa et al., 2018; Nyarko, 2015). It is probably young women who well understand their ovulation cycle are likely to use some of the available contraceptive methods encompassing calendar or rhythm contraceptive methods (Nyarko, 2015). This way is utilized in order to protect them from unwanted pregnancies during ovulation compared to women who are unaware of their ovulation cycle (Mandiwa et al., 2018).

Randomized controlled trials (RCT) in senior secondary school provide a brief educational intervention to increase contraceptive use. After the two-year program, the intervention group presented more contraceptive use and condoms during the last intercourse than the standard class group (Lopez et al., 2016). The presence of contraceptive learning organized in schools is a critical enabler to pursue reproductive health education. Adolescents who receive sexual education in schools own better awareness of contraceptive options (Chernick et al., 2015).

Despite this study employs a survey that reflects a national sample, it possesses the advantage of providing an opportunity to investigate further analysis of cross-sectional data on contraceptives and sexual behavior (Adedini et al., 2021). We acknowledge the limitations of the study, which encompasses insufficient data on adolescent girls, difficulties in defining variables, and information bias during interviews (Habito et al., 2019). This study implements several specific variables, particularly regarding social influence on adolescents, but not all related variables are discovered in the adolescent IDHS questionnaire (Budiharsana, 2017). Furthermore, some of the variables employed are self-reported data by respondents. Hence, there is a possibility of memory bias and underreporting. Thus, these variables need to be verified in future surveys (Adedini et al., 2021; Budiharsana, 2017). Incomplete respondent data were not examined in this study. As a result, the sample became smaller, thus, it may affect the power study. Therefore, the estimated association obtained can be underestimated as well as overestimated (Young et al., 2018).

In general, this study possesses strength because it applies a fairly large sample of respondents obtained from a national survey with an even sample selection based on the Census Block. Thus, it can be indicated that this study represents Indonesian youth in general, particularly in the association of education with contraceptive use. However,

factors correlated with more specific variables, which are peer and social influences, were self-reported by respondents with less specific questions in the questionnaire. Hence, there was a possibility of memory bias and underreporting.

4. CONCLUSION

Based on this research, it can be implied that there is a relationship between the level of education and the use of contraception in the first sexual intercourse among unmarried adolescents in Indonesia, that is likely to escalate due to the increasing education level. However, these findings present that peer and social influences and contraceptive knowledge are not related to contraceptive use in adolescents. This study can be utilized as a reference for further studies to administer standardized questionnaires in order to explore more information about peers and social influences and contraceptive knowledge. This evidence also provides suggestions for enhancing health promotion strategies and actions to increase contraceptive use among adolescents based on education level.

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RESEARCH

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Analysis of the Readiness of Primary Health Center Nurses in Encountering Community Stigma during the COVID-19 Pandemic

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Abstract

The COVID-19 outbreak has resulted in public fear of transmitting infection. Nurses in dealing with the COVID-19 outbreak also obtained stigmatized due to discrimination received by COVID-19 sufferers. The objective of the study is to identify the dominant factor to determine the occurrence of stigma experienced by nurses when caring for COVID-19 patients. The research design was qualitative and quantitative, with a sample of 121 Primary Health Center nurses who were performed by convenience sampling. Data analysis with Multiple Linear Regression presented that overall, there was a significant correlation between knowledge in preventing COVID-19, Personal Ability and Organizational Ability to stigma from society experienced by nurses with ANOVA or F test results (229.427) with $p = 0.000$. Moreover, there is a strong and significant relationship between knowledge, self-efficacy and organizational ability to community stigma (R Square = 0.964). The dominant factor that affects stigma as seen from the t-test is self-ability = 14,828 ($p=0.001$) followed by organizational ability= -8,790 (0.001) and knowledge = 5.050 ($p=0.001$). It was concluded that the limitations of human resources and special infrastructure for people with COVID-19 were the trigger for the occurrence of stigma. It is hoped that the maintenance of well-being among health workers is at the forefront by beginning at the policy-making level to offer enhanced support for health workers who play a critical role during large-scale disease outbreaks. The psychological implications are mostly negative and urgently need greater attention to be mitigated, potentially through the involvement of psychologists, given better awareness and education. It is expected that further researchers can explore the phenomenon of the experience of nurses who suffer from COVID-19 in dealing with the stigma that occurs to them.

Keywords: COVID-19, Nurses of Primary Health Center, Stigma.

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1. INTRODUCTION

The COVID-19 outbreak is a public health emergency because there is a fear of infection transmission. Individuals who are declared positive for being infected by the COVID-19 virus, living their lives will be difficult because from a physical point of view, the individual will experience changes associated with the development of the disease. A person infected with COVID-19 is generally difficult to accept in society, considered dangerous, isolated, labeled bad. This view makes the patient even more depressed. Patients with COVID-19 tend to be ostracized by family, friends and the environment. Even at the beginning of the COVID-19 pandemic, some sufferers experience discrimination in health services. Thus, the stigma of COVID-19 sufferers at the beginning of the incident is obvious in the community. Stigma is an attribute, behavior, or social reputation which is discredited in a certain way (Kohrt et al., 2018)

Stigma and discrimination against COVID-19 sufferers has an impact on the spread of the COVID-19 disease. Stigma and discrimination can discourage a person from taking the test and cause people to feel reluctant to seek information and ways to protect against COVID-19 (Manik et al., 2021). Stigma and discrimination will also create isolated or marginalized communities; discrimination has caused the human rights of COVID-19 sufferers to have been violated, particularly in the right to freedom from discriminatory treatment, and the stigma of COVID-19 sufferers has an impact on a person's unwillingness to show their status as a COVID-19 sufferer (Abudi et al., 2020). Social stigma has become the prior cause of COVID-19 survivors experiencing stress, anxiety, worry, heartache, high emotions, and trauma (Prastika et al., 2022).

Lack of knowledge from health professionals themselves causes many challenges in health services such as primary health center and creates a stigma about disease and sufferers who suffer from the disease (Zarei et al., 2015; Kohrt et al., 2018). The capacity of health services to respond to emergencies plays a key role in disease management. Awareness, readiness, and alertness of health professionals as the front line are tremendously important in dealing with complications of related diseases. Nurses play an essential role as one of the health workers who are at the forefront of patient care (Kieft et al., 2014)

Some literature reports on nurses' perceptions and experiences of their role in epidemic responses such as anxiety, discriminatory treatment (Lam & Hung, 2013) and the awareness of nurses about the patient's condition and needs are still lacking (Lam et al., 2019). Such treatment can produce a negative impact on people with COVID-19, as well as their care givers, families, friends and communities. A person who does not have the disease but shares the same characteristics as this group may also experience stigma (World Health Organization, 2020).

At the beginning of COVID-19, nurses' readiness to deal with infectious disease outbreaks was still lacking, many things were not understood in handling COVID-19, not only from the medical aspect (virus structure, spread mechanism, treatment method, prevention and spread methods) but there are non-medical factors that need to be studied (eg. related to lock down policy or not) (Mas'udi & Winanti, 2020).

COVID-19 is a disease that has recently been recognized by the public. Thus, Primary Health Center nurses need to possess a perception of knowledge about COVID-19 disease and study clinical appearance and not be influenced by myths circulating in the community rather than evidence-based information. Based on these reasons, the researchers collected views from nurses who practice at the Primary Health Center of Jakarta, Bogor, Depok, Tangerang, and Bekasi (Jabodetabek) regarding the perception, awareness, and familiarity of COVID-19 through the interview method.

The results of the preliminary study showed that the Primary Health Center nurses discovered that the forms of discrimination received by COVID-19 sufferers from the environment were family rejection (shunned by the family), separation of eating utensils, being ostracized, and rejection from the surrounding environment such as village residents and the work environment. Discrimination occurs due to environmental fears of contracting the COVID-19 disease which causes sufferers to be isolated. Stigma and discrimination are not only committed by ordinary people who do not have sufficient knowledge about the disease of people with COVID-19, but can also be done by health workers. Education regarding the prevention and spread of COVID-19 as well as the importance of mental health during the COVID-19 pandemic needs to be improved so that the public does not misinform in perceiving COVID-19 (Novita & Elon, 2021).

Health workers must have the ability to understand the promotive and preventive patterns of COVID-19 in the community, and in hospitals or clinics, they must be able to design programs and policies to accelerate the handling of Covid-19 (Hastuti, & Djanah, 2020). Knowledge is significantly essential to deal with stigma because social stigma occurs due to lack of public knowledge about the ongoing pandemic phenomenon, prejudice and discrimination against individuals or groups who have received certain labels associated with COVID-19 (Abudi et al., 2020). Health workers who work as employees in a health service in dealing with COVID-19 must have their own abilities, as quoted from research Sujianto (2010), self-ability has a positive effect on an employee's performance, self-ability is needed by an employee in working, particularly during the COVID-19 pandemic. Yenti et al (2014) asserted that self-ability can be realized by being honest, responsible, visionary, disciplined, cooperative, fair, and caring so that the duty becomes productive, as one of the determinants of the success of one's performance. The organizational ability of health workers is required to deal with the COVID-19 situation, especially in promotive and preventive efforts, and strengthening the role of community empowerment in the health sector, and integrating health workers starting from the lowest level in the community, which is the primary health center (Putri et al., 2018). The factors of knowledge, self-efficacy and organizational skills that have been described above are believed to have contributed to the ability of nurses to deal with stigma when caring for COVID-19 sufferers. Research has proven that lack of knowledge is a risk factor for stigma against COVID-19 patients and health workers (p-value 0.005). Knowledge is closely related to stigma labels for people with COVID-19 (Muliawati et al., 2021). It is also proven that there is a close relationship between knowledge and the stigma of COVID-19 in the community in Medan City (Siregar et al., 2022). Knowledge that is less risky is 2.13 times more likely to stigmatize COVID-19 sufferers and health workers (Oktaviannoor et al., 2020). Ignorance about the mechanism of transmission, overestimation of the risk of transmission, and inappropriate negative attitudes towards COVID-19 sufferers are closely related to the growing stigma of COVID-19 sufferers (Mas'udi, & Winanti, 2020)

The management of community stigma against COVID-19 can be performed by increasing public knowledge about COVID-19, increasing the participation of peers, family and community support. The role of nurses can influence people's behavior. The role is associated with increasing knowledge for the prevention of COVID-19. Community nurses at the Primary Health Center are responsible for providing nursing care in an effort to deal with negative stigma in the community, providing health education related to COVID-19 disease information.

Conducting health education in the prevention of COVID-19 can be through social support from peers and family. Primary Health Center nurses are crucial to increase

competence regarding knowledge, awareness, and severity of COVID-19, perceived personal ability to handle and manage COVID-19, organizational ability to handle and manage COVID-19 to overcome obstacles in handling and managing COVID-19 so that it does not arise societal stigma.

Based on the existing descriptions and thoughts, it is important to identify the readiness of Primary Health Center nurses in the Jakarta-Bogor-Depok-Tangerang-Bekasi (Jabodetabek) area in handling community stigma against COVID-19 sufferers. The objective of the study is to identify the dominant factor to determine the occurrence of stigma experienced by nurses when caring for COVID-19 patients.

2. RESEARCH METHOD

This research is conducted by employing a mix of quantitative and qualitative methods. The research design is cross sectional, the combination research strategy used in this research is the Concurrent Triangulation Strategy. The independent variables encompass Knowledge (X1) (knowledge of COVID-19 prevention; knowledge of preventing self-awareness related to COVID-19, and knowledge of preventing COVID-19 management), Personal Ability (X2), Organizational Ability (X3) and the dependent variable, which is Perceived Stigma (Y).

Instrument variable Knowledge (X1): knowledge of COVID-19 prevention (X.1.1) consists of 10 statements using the Gutman scale with true and false formats; while knowledge of self-awareness prevention related to COVID-19 (X1.2) 8 statements; knowledge of prevention of COVID-19 management (X1.3) 23 statements; personal ability (X2) 14 statement items; organizational ability (X3) 15 statements and perceptions of perceived stigma (Y) 15 statements and all employ a Likert Scale

The instrument validity and reliability test was conducted on 30 respondents from Nurses of Depok primary health center is Cinere and Limo with the following results: knowledge of COVID-19 prevention (X.1.1) using Pearson Correlation, obtained a significant value = 0.000 - 0.046; prevention of self-awareness related to COVID-19 (X1.2) = 0.399 – 0.679 and $r = 0.778$; knowledge of self-awareness prevention related to COVID-19 (X1.2) = 0.610 – 0.955 and $r = 0.788$; knowledge of prevention of COVID-19 management (X1.3) = 0.368 – 0.677 $r=0.897$; Personal ability (X2) = 0.548 – 0.864 and $r = 0.940$; organizational ability (X3) = 0.327 – 0.704 and $r = 0.864$; perception of Stigma (Y) = 0.323 – 0.751 and $r = 0.875$. Based on the analysis of the validity and reliability tests, all research instruments can be employed to collect research data and distribute them to respondents.

During the COVID-19 pandemic, data collection was conducted online using the G-form. The sampling technique was convenience sampling and a large sample of 121 nurses who were only open for 1 month (21 August – 20 September 2021). Quantitative data analysis used Multiple Linear Regression, and Anova test, while qualitative data analysis used Colaizi. Data were collected from respondents after obtaining approval from the Health Research Ethics Commission (KEPK from Universitas Pembangunan Nasional Veteran Jakarta No. 421/VIII/2021/KEPK).

3. RESULTS AND DISCUSSION

Table 1. Demographic Data of Primary Health Center Nurses in Jabodetabek Area (and=121).

Variable	n	%
Age		
23 – 32	91	75,2
33 - 42	20	16,5
43 -52	6	5,00
> 52	4	3,33
Total	121	100.0
Gender		
Male	19	15.7
Female	102	84,3
Total	121	100.0
Education		
D3 Nursing	73	60.3
S-1 Nursing	5	4,1
Nurses	42	34,7
S-2 Nursing	1	0,8
Total	121	100.0
Length of work		
< 5	47	38,8
> 5	74	61,2
Total	121	100.0

Table 1 shows that most of the nurses aged 23–32 years were 91 people (75.2%); female 102 people (84.3%); educated D3 Nursing people (60.3%); and length of work more than 5 years 74 people (61.2%).

Table 2. Distribution of Knowledge, Personal Ability, Organizational Ability Perception of Stigma felt by Primary Health Center Nurses in Jabodetabek Area (n=121).

Variable	Mean	Median	SD	IQR	Min-Max	SE
Knowledge (X1):						
Knowledge of COVID-19 prevention (X.1.1)	6,60	7,0	0,493	1	6 – 7	0,45
Knowledge of self-awareness prevention related to COVID-19 (X1.2)	24,48	25,0	3,421	4	14 – 31	0,311
Knowledge of prevention of COVID-19 management (X1.3)	68,45	70,0	9,275	13	38 – 84	0,843
Total Knowledge (X1)	95,53	101,0	12,313	17	58 -121	1.119
Personal Ability (X2)	41,25	42,0	5,386	7	23 – 51	0,490
Organizational Ability (X3)	34,77	34,0	6,378	6	25 – 57	0,580
Perceived Stigma (Y)	44,62	46,0	6,772	8	21 -53	0,570

Table 2 shows knowledge of COVID-19 prevention (X.1.1) an average of 6.6 and a standard deviation of 0.493. The data variance is less varied. For the other variables, the standard deviation shows that the data varies. Data on self-awareness prevention knowledge related to COVID-19 (X1.2), knowledge of preventing COVID-19 management (X1.3), personal ability (X2), organizational ability (X3) and perceived stigma perception (Y) appear to have extreme values (data distribution is not normal), then the data limit can be used the median value and the inter quartile range (IQR).

Table 3. Relationship between knowledge of COVID-19 prevention, awareness of COVID-19 prevention, and management of COVID-19 prevention (n=121).

Variable	C-19 Prevention Knowledge	C-19 Prevention Awareness	Preventive Management C-19
Pearson Correlation C-19 Prevention Knowledge:	-	0,077	0,145
Sig (2 – tailed)		0,687	0,114
C-19 Prevention Awareness		-	
Pearson Correlation:	0,037		0,808
Sig (2 – tailed)	0,687		0,000
Preventive Management C-19			-
Pearson Correlation:	0,145	0,808	
Sig (2 – tailed)	0,114	0,000	

Table 3, explains that knowledge of COVID-19 prevention and awareness of COVID-19 prevention results in a weak correlation because the value is $0.077 > 0.5$ (range of correlation values), with no negative sign indicating that increasing knowledge allows increasing awareness of COVID-19 prevention. Knowledge of COVID-19 prevention with COVID-19 prevention management has a weak correlation also $0.145 < 0.5$, the more knowledge of COVID-19 prevention, the more COVID-19 prevention management increases. There is a correlation between awareness and management of Sig.2 tailed $0.000 < 0.05$.

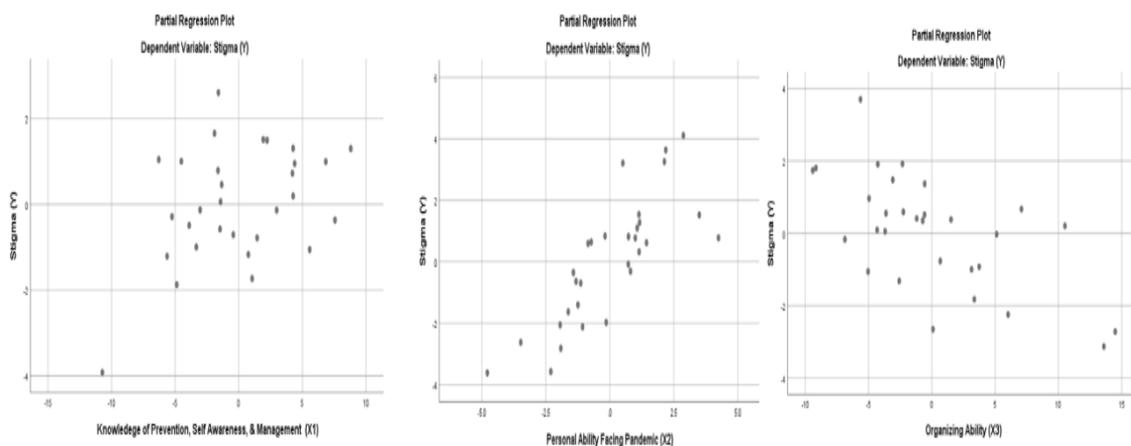


Figure 1. Scatterplot of classical assumption test for variables of knowledge, self-efficacy, and organizational ability on perceived stigma perceptions.

Figure 1 shows that based on the results of the Classical Assumption Test, it was revealed that: a) There is no multicollinearity between independent variables because all values are below 0.6 ($X1-X2 = 0.007$; $X1 - X3 = 0.134$; $X2 - X3 = - 0.921$); b) Classical

assumption test of Heteroscedasticity: i.e. All scatterplots of the three independent variables do not form a pattern, thus, there is no heteroscedasticity, or also called homoscedasticity, where the points spread below or above the origin point (number 0) on the Y axis and have no regular pattern; c) Test of the classical assumption of normality test is to perceive if the data distribution is normally distributed or not. The regression equation is considered good if it has data on the independent and dependent variables with normal distribution, it can be identified using histogram graphs (normal if the curve line is normal) and Normal Probability Plots (occurs if the line/point follows the diagonal line).

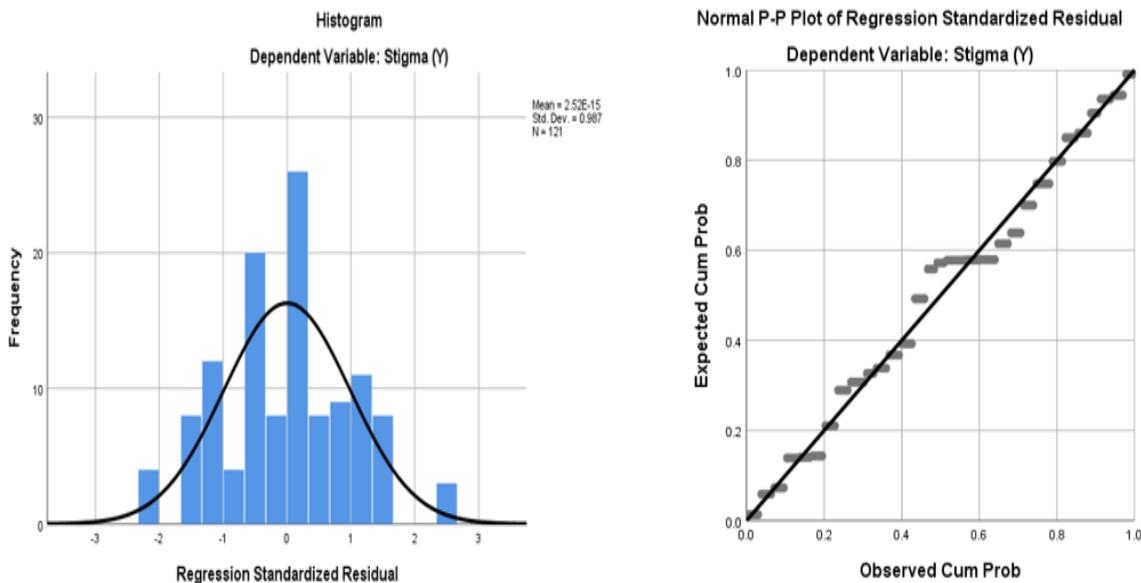


Figure 2. Normality Test.

d). Classical assumption test of a good regression Equation Autocorrelation is that it has no autocorrelation problem. One measure of autocorrelation is the Durbin Watson (DW) test. The results of the data obtained $DW = 2,309$ means $2,309 > +2$, meaning that there is a negative autocorrelation.

e). The multicollinearity diagnostic test obtained that all VIF values were not more than 10, and the tolerance number was below 1. Thus, there was no multicollinearity between independent variables (see table 4). Looking at the results of the classical assumption test, the data can be processed using multiple Linear Regression, with the results:

Table 4. Results of ANOVA data for Jabodetabek Primary Health Center Nurses (n=121).

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Regression	4556,275	3	1518,75	1081,19	.000 ^b
Residual	164,237	117	1,404		
Total	4720,512	120			

Table 4 explains, from the ANOVA or F test, the calculated F is 1081.19 with a significant level = 0.000. Then, this regression model can be employed to predict Stigma, or it means that knowledge of COVID-19 prevention, personal ability and organizational ability together the same effect on the perception of stigma felt by nurses.

Table 5. Multiple Linear Regression Test Results for Jabodetabek Primary Health Center Nurses (n=121).

	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>		<i>t</i>	<i>Sig</i>	Statistical Collinearity
	Beta	Std. Error	Beta	Std. Error			Tolerance VIF
(Constant)	5,016	1,307		3,839	0,000		
Knowledge: Prevention, Self Awareness and Management (X1)	0,120	0,024	0,237	5,050	0,000	0,136	7,379
Personal Ability to deal with the Pandemic (X2)	0,804	0,054	0,690	14,828	0,000	0,137	7,287
Organizational Ability (X3)	-0,160	0,018	-0,162	-8,790	0,000	0,873	1,145

Table 5 shows that the regression equation/formulation is as follows: $Y = 5.016 + 0.120 X1 + 0.804 X2 + (-0.160) X3$ with a constant meaning of 5.016, it is stated that if there is no COVID-19 knowledge variable, personal ability, and organizational ability, the stigma value is still 5.016. The X1 regression coefficient of 0.120 means that each additional 1 point of knowledge of Covid-19 will increase the understanding of stigma by 0.120. The X2 regression coefficient of 0.804 means that each additional 1 point of personal ability will increase the understanding of stigma by 0.804. While the X3 regression coefficient of -0.160 means that every 1-point reduction in organizational ability will reduce the perception of stigma by -0.160. Perceiving the results of the regression coefficient test all significant figures <0.05 . It shows that the existing regression model can be used to predict stigma scores in the future.

Table 6. Summary of Models of Jabodetabek Primary Health Center Nurses (n=121).

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
0.982a	0.965	0.964	1.185	2.309

Table 6 explains the R Square value of 0.965, meaning that 96.5% of the variation in stigma can be explained by the variables of COVID-19 knowledge, self-efficacy and organizational ability while the remaining 3.5% can be caused by other factors.

The results of qualitative data obtained information on the difficulties of nurses in caring for and dealing with community stigma for people with COVID-19, limited human resources, limited infrastructure, particularly special rooms for treating COVID-19 sufferers, limited time in providing health education, differences in level of knowledge and perceptions with community about COVID-19, difficulties in tracing, and non-compliance with COVID-19 sufferers during self-isolation to stay at home. However, the strength of nurses is the ability to perform health protocols such as wearing PPE (Personal Protective Equipment) according to standards, communicating therapeutically, educating, providing counseling, having empathy, and conducting cross-sectoral collaboration.

DISCUSSION

The results of the study (table 1) present that the age of nurses is dominated by young adults. This age category is a productive age, in which a person still has the ability to be agile in activities, and is trying to develop an identity to achieve stability, and is a determinant of someone to choose a suitable job for the individual's career and at this productive age as well as strengthening career choices to achieve the goals to be achieved (Supriatin, 2015). Most of the sexes are dominated by women, because the nursing profession is more in demand by women, because women instinctively have a soft soul and have a mother instinct (Kozier, 2012). The opposite statement from the research results stated that the male sex who worked as a nurse did not have much opportunity to improve their social status (Limiñana-Gras et al., 2013).

Other research confirms that male nurses are slower to develop their careers in nursing (Barrett-Landau & Henle, 2014). Qualitative research from OConnor (2015) discovered that Men have difficulty identifying themselves in the nursing profession and have little intrinsic motivation away from the motivation to become nurses.

It is also stated from research that female nurses have more social competence than male nurses who have more roles in leadership, so that masculine stereotypes change due to changes in male social roles (Aranda et al., 2015).

Most nurse education at the Primary Health Center is Diploma 3 Nursing. It is in accordance with the mandate of the Nursing Act, that implementing nurses in the field must have a minimum Diploma 3 Nursing education (Presiden Republik Indonesia, 2014). Even though they only have a Diploma 3 Nursing education, there is no need to doubt the competence of these vocational nurses, because they have more than 5 years of working experience. If it is perceived by the level of the nurse's career level, they are already at PK 2 level (Peraturan Menteri Kesehatan RI No. 40/2017, 2017). It is also emphasized in Peraturan Menteri Pendayagunaan Aparatur Negara Dan Reformasi Birokrasi RI Nomor 35 Tahun 2019, 2019 that nurses who are certified D-III (Diploma III) in Nursing have the Functional Position of Nurse in the skill category, while nurses with the certificate of Nurse have the Functional Position of Nurse in the category of expertise. Nurses who work at the Primary Health Center are permanent employees and civil servants. It is rare for freshly graduated students to work at the Primary Health Center as temporary workers unless they enter the Civil Servant Candidate (PNS) route (results of interviews with two different Primary Health Center Administrative Staff).

The results of the study (Table 3) discovered that there was a correlation between knowledge of COVID-19 prevention, awareness of COVID-19 prevention, and management of Covid-19 prevention. Moreover, there was also a correlation between knowledge and the desire to prevent the occurrence of COVID-19, as emphasized by Notoadmojo, (2012) that knowledge is an important factor to change someone to do something, although in the data there is a weak relationship but still has a role for someone to do something. Braveman & Gottlieb (2014) conveyed that knowledge is a predisposing factor to change a person, in addition to genetics, environment, health, and policies that apply in social life, and as a basic cause of one's health success. Research of Sinurat et al (2021) presents that there is a relationship between the self-awareness of the people of Sibolga and behavior in suppressing the spread of COVID-19 by implementing the 5 M behaviors that have been announced by the government (maintaining distance, using masks, washing hands, avoiding crowds, reducing mobility). Research results prove that nursing students can understand how to prevent COVID-19 after being given health education and campaigns in preventing COVID-19 (Albaqawi et al., 2020). It is also corroborated by Koren et al., (2021) that it is crucial to apply the latest knowledge in

protecting healthcare professionals and nursing staff caring for patients with COVID-19; Health care providers should educate nurses/other health workers about the dangers of communicable diseases, including proper use of personal protective equipment, proper personal hygiene practices, and related environmental measures.

The results of the correlation between variables from the multiple linear regression analysis process of all variables, both knowledge of prevention-awareness of prevention and management of COVID-19 prevention as well as variables of self-ability and organizational ability, revealed that there is a correlation and a close relationship to Stigma. Duan et al., (2020) conveyed that there are 3 profiles of a person in dealing with the COVID-19 stigma, which are 35.98% refused, 48, 13% confused, 15.89% accepted, and generally people with a high level of education, threatening feelings, symptoms of anxiety arise, and are familiar with quarantine cases (COVID-19) have a high probability of being stigmatized. Stigma experienced by a person will have a negative impact on life both economically and psychologically, thus, it is necessary to take the right approach, especially from religion (Hashmi et al., 2020)

The results of the study (Table 5) found that the dominant factors influencing stigma seen from the t-test were self-efficacy (X_2) = 6.841 ($p = 0.000$) followed by organizational ability (X_3) = 2,214 ($p = 0.000$) and knowledge of COVID-19 prevention (X_1) = 2.214 ($p = 0.036$). Personal or self-ability is defined as a person's ability to complete various tasks in a job he does and make a person safe at work accompanied by a sense of satisfaction and success (Pool et al., 2007). Nurses who provide services to patients understand how they work and interact socially in the patient's environment, who takes into account patient safety (Fryer, 2012).

It is essential for the employee to possess self-ability which are the knowledge, attitudes and skills (Rasul et al., 2009). There are 10 skills that must be possessed in order to increase self-efficacy, encompassing the ability to communicate and interpersonal relationships, problem solving, self-motivation, work under pressure, organizational skills, team spirit, learn skills, skills using data, assess diversity, and negotiate (Syahrudin, 2018). The second order that affects the stigma which occurs in society is organizational skills are skills related to creating structure and order, increasing productivity, and prioritizing tasks that must be completed immediately, versus tasks that can be postponed, delegated to others, or eliminated at all, and it is proven from research results that the ability to commit to an organization improves the quality of nurses' work (Diana et al., 2022). In pandemic conditions, it is necessary to have good organizational arrangements so that the health service system that will assist in managing the disease is prohibited. The movement of people across borders is prohibited, the impact of which can reduce the burden on health care institutions (Donev et al., 2013). The third order that affects stigma is knowledge. According to Noar & Zimmerman (2005); Yanti et al., (2020) and (Li et al., 2021), knowledge is a factor to change a person's healthy behavior and show a positive attitude to healthy behavior. Knowledge must be possessed so that a person can act on the situation he is in, as conveyed by (Kelly & Barker, 2016), to change someone's behavior from something bad to better must be based on knowledge, because knowledge is an important factor for changing behavior (over behavior).

As elaborated by The United Nations International Children's Emergency Fund, (2020), the level of stigma associated with COVID-19 is based on three main factors: a) COVID-19 is a new disease and much remains unknown; b) Feelings of fear of the unknown; and c) Associating that fear with others; thus, it creates confusion, anxiety and fear among the people. Research from Manik et al., (2021) revealed that from a total of 11 nurse participants who were interviewed, four main themes of perceived stigma in caring for COVID-19 patients emerged, which are rejection, feelings of sadness and fear,

sources of support, and professional vigilance; and the social stigma experienced by nurses comes from co-workers and the community and the impact of psychological pressure. Hence, support from family and co-workers strengthens nurses in dealing with social stigma. Nurses in Iran as researched by Ahmadidarrehsima et al., (2022) experience stigma while caring for COVID-19 patients. They encounter many personal and professional challenges. What they feel is four main themes and ten sub-themes: a) physical, psychological, and social burden of care (excessive workload; fear, anxiety, worry; unpleasant social experiences; affection fatigue) b) unmet needs (personal needs and professional needs), c) positive experiences (pleasant social experiences and) inner satisfaction), and d) strategies (problem solving strategies and mitigation strategies stress symptoms). Research in Turkey conducted by Kackin et al., (2021) discovered that nurses who treat COVID-19 patients also experience psychosocial problems which are categorized as stigma in the form of an adverse impact on nurses, with three main themes found: a) the theme of the epidemic effect (working conditions, psychological effects and social effects; b) the theme of short-term coping strategies (normalization, thinking about rejection, avoidance, expression of emotions and distractions); and c) needs themes (psychosocial support and resource management).

The strength of this research is that the COVID-19 pandemic condition has many supporting journals to be studied, which makes it easier for researchers to analyze and discuss problems that occur in Primary Health Center nurses. The weakness is that filling out the questionnaire cannot be completed directly, because the situation is still in the Large-Scale Restriction period, in which filling out the questionnaire is performed through the g-form, so for open-ended questions, the researcher has not been able to dig deeper into open-ended questions.

4. CONCLUSION

The perception of stigma felt by nurses while providing services to patients with COVID-19 during the pandemic was experienced by Primary Health Center nurses. The readiness of nurses to treat patients with COVID-19 in terms of prevention knowledge, self-awareness and management related to knowledge and mentality, including the category of new disease outbreaks. Nurses should continue to cooperate with the COVID-19 Task Force in their area in preventing community stigma through communication, information, and education on how to prevent an increase in cases and treat COVID-19 patients. The effective nurses' actions to always promote to the community and cultivate a cohesive health culture need to be performed. It is also important to create a media that can transmit scientific knowledge, and promote positive interaction and social cohesion between stigmatized groups and dominant groups, and create space for stories that maintain group identification among people involved.

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RESEARCH

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Prediction Model of Related Factors with Youth Fertility in Kalimantan

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Abstract

Adolescent fertility is an essential issue because it is associated with the level of morbidity and mortality of mothers and children. Kalimantan provinces own fertility problems. Teenagers are still complex, including Age Specific Fertility Rate 15-19 years is still significant. It is recorded that 4.6% of children aged 10-17 years in Kalimantan have got married. The objective of this study is to identify the predictive model of factors correlated with provincial youth fertility in Kalimantan. The analysis was conducted by employing descriptive and inferential methods and binary logistic regression. The results of the study were among 433 adolescents in Kalimantan, 11% were married, 9.9% had given birth or were pregnant with their first child, 14.1% experienced sexual relations and 3.1% encountered sex at <15 years of age. The data employed was the 2017 Indonesian Health Demographic Survey with a unit of analysis for adolescents aged 15-19 years in 5 provinces in Kalimantan totaling 433 respondents. The sampling technique employed total sampling. Statistically, it is discovered a significant relationship between age, marital status, adolescent sexual behavior, contraceptive use status, education level, economic status, and access to the internet with youth fertility in Kalimantan. The results of logistic regression analysis displayed that the variable of family planning use possess the most effect on adolescent fertility simultaneously with the strength of the relationship OR (Exp β) = 0.2. Suggestions for further research to further scrutinize relevant programs such as maturing age at marriage and parenting skill to suppress adolescent fertility.

Keywords: Adolescence, Fertility, Kalimantan, 2017 IDHS.

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1. INTRODUCTION

Adolescence is a transitional period between childhood and adulthood. The results of population projections in Indonesia were performed by the National Statistics Agency and National Planning and Development Agency in 2010-2015. The number of people in the category of adolescents in 2020 is 44.3 million people and 21.7 million are female adolescents or 1 in 4 of the population in Indonesia is a teenager (Badan Perencanaan Pembangunan Nasional, 2013).

In the hands of young people, it exists a big responsibility and a bright future for themselves, their families and the country. However, it is distressing if the current situation is investigated, in which numerous risky behaviors are prone to happen in adolescence. In general, the prevalence of smoking, alcoholic beverages and premarital sex among adolescents tends to increase, particularly among junior high school students or students in early adolescent (National Population and Family Planning Board of Indonesia, 2018).

The dating behavior of teenagers in Indonesia is no less worrying. The survey results discovered that 2% of male adolescents and 1% of women revealed that they had committed to premarital sexual intercourse and it was revealed in all age groups. The median age for the first time having premarital sexual intercourse was 18 years old (United Nations International Children's Emergency Fund, 2018)

Adolescent fertility is an essential issue from a health and social perspective because it is associated with the morbidity and mortality rates for mothers and children. Regarding adolescent fertility, marriage at this age is a phenomenon which still occurs globally. It is recorded that around the world, 21% of women aged 20-24 years are married in adolescence. Precisely, as many as 650 million women got married at the age of 18 years. The highest incidence occurred in South Asian countries (44%) and followed by sub-Saharan Africa (18%) (Triyanto, 2013).

Marriage in adolescence is a severe violation of his rights and potential. Marriage in adolescence causes adolescents to possess a lack of understanding of their rights and obligations as husband and wife, which may lead to the serious cases of Domestic Violence, unstable income, and divorce (Triyanto, 2013). Early marriage is also the biggest cause of children dropping out of school and losing hope to pursue goals and permanent job (Sekine & Hodgkin, 2017).

Being pregnant as a teenager also increases the risk of miscarriage, preeclampsia, infection, anemia and stress. Furthermore, there is a risk of giving birth to premature babies, low birth weight (LBW), congenital abnormalities and intrauterine fetal death (IUFD). During the postpartum period, babies are at risk of not exclusively breastfed, hence, they are prone to nutritional problems such as stunting. The most fatal impact is maternal death due to complications during pregnancy and childbirth (Sekine & Hodgkin, 2017). Based on the data, around 2 million women die each year and 50% are due to unsafe abortion (National Population and Family Planning Board of Indonesia, 2018).

The practice of early marriage in Indonesia is quite immense. The results of the 2012 IDHS revealed one in ten young women who had given birth and or were pregnant at the time of the survey. Approximately, 95.2% of adolescents who have given birth possess one child, the remaining 4.8% own two or three children. Moreover, 11.1% of female adolescents first got married at the age of 10-14 years. The results of the 2017 IDHS are also not much better, the survey results revealed that 7% of women aged 15-19 years have been mothers; 5% had given birth and 2% are pregnant with their first child (National Population and Family Planning Board of Indonesia, 2018). Other results display that 20% of women aged 15-19 years understand that their friends have committed to abortion (National Population and Family Planning Board of Indonesia, 2017).

One of the targets of the National Medium-Term Development Plan for national development listed for 2020-2024 is the development of the youth population. However, the results of Indonesia Demographic Health Survey (IDHS) in 2012 portrays that the Age Specific Fertility Rate (ASFR) of age 15-19 years in Indonesia are still high, which is 36 and the target of Health in 2024 is 18. It implies that Indonesia owns a numerous things to plan in acquiring these expectations (Kementerian Kesehatan Republik Indonesia, 2020).

Kalimantan Island is in the middle of the Indonesian archipelago and comprises of 5 provinces, which are West Kalimantan with the capital city of Pontianak, Central Kalimantan with the capital city of Palangkaraya, South Kalimantan with the capital city of Banjarmasin, East Kalimantan with the capital city of Samarinda and most recently North Kalimantan with the capital city of Tanjung Selor. All of the provinces possess fertility problems, particularly adolescents, which are still complex, encompassing Age Specific Fertility Rate (ASFR) 15-19 years, Total Fertility Rate (TFR) and child marriage that is significant. It is recorded that 4.6% of children aged 10-17 years in Kalimantan have got married (Kementerian Pemberdayaan Perempuan dan Perlindungan Anak, 2018).

West Kalimantan is one of the provinces with the highest ASFR nationally, which is 46 (National Population and Family Planning Board of Indonesia, 2018). The results of the 2017 IDHS in West Kalimantan display that 8% of women aged 15-19 have already become mothers and 6% had given birth and 2% are pregnant with their first child (National Population and Family Planning Board of Indonesia, 2018).

It is not much different from the condition of youth fertility in other provinces in Kalimantan. East Kalimantan owns a total of 289,204 teenagers with the TFR figure that is still above the national figure of 2.7 and the median age at first marriage is 21.7. It is also discovered that 8% of women aged 15-19 years in East Kalimantan possess either given birth or are pregnant with their first child (National Population and Family Planning Board of Indonesia, 2018). Central Kalimantan occupies the lowest national median age at first marriage, which is 20.8 with a TFR of 2.5. It was also uncovered that 13.8% of women aged 15-19 years in Central Kalimantan had either given birth or are pregnant with their first child. This figure is the second highest nationally after North Maluku (National Population and Family Planning Board of Indonesia, 2018)

Another province in Kalimantan is South Kalimantan. South Kalimantan possesses an expansive population category description with most of the population in the young age group with high birth rates. TFR is South Kalimantan's 2.40 with an ASFR of 15-19 years of age of 56. It is still far from the 2017 target with a TFR of 2.3 and ASFR of 15-19 years of age of 42. South Kalimantan is also identified as one of the provinces with the lowest median age of marriage nationally, that is 20.8. It was also revealed that 9.2% of women aged 15-19 years in South Kalimantan own either given birth or are pregnant with their first child.12 North Kalimantan is a new province established on October 12, 2012 and is a division of Central Kalimantan province. North Kalimantan gains the lowest national median age at first marriage, which is 21.9 with a TFR of 2.8. It was also unveiled that 5.4% of women aged 15-19 years in East Kalimantan had either given birth or are pregnant with their first child (National Population and Family Planning Board of Indonesia, 2018).

The causes of early marriage can be affected by various factors, encompassing low education, economic needs, the culture of young marriage, arranged marriages and free sex in adolescents which causes unintended pregnancy (before marriage) (National Population and Family Planning Board of Indonesia, 2018). The results of research on

adolescent fertility factors illustrate that there is a significant relationship between the incidence of adolescent fertility with the area of residence, education, work status, and family welfare. Women at high risk of fertility at adolescence are those who are living in rural areas, possess low education, do not work and own low economic status (Raharja, 2014). Other research emphasizes that education and knowledge are not factors influencing early marriage, but the role of parents and culture is the dominant factor regarding the case (Nurzia, 2019).

The determinants of fertility in adolescents are required to investigate more deeply because they contribute to various impacts both on the health of mothers and babies. Moreover, these impacts may affect various sectors of a country. Therefore, the researcher is eager further scrutinize the Prediction Model of the Associated Factors Adolescent Fertility in Kalimantan.

2. RESEARCH METHOD

The type of research employed was analytic research with a cross-sectional research design. Research conducted was a secondary data study by applying the 2017 IDHS data in Kalimantan which aims to examine the determinants of adolescent fertility in Kalimantan. The primary data collection of the IDHS was also implemented through an ethical review with a certificate of Institutional Review Board Findings Form ICF IRB FWA00000845.

Sampling technique used purposive sampling. The unit of analysis in this study was WUS aged 15-19 years in 5 provinces in Kalimantan and possessed a complete dataset on 2017 IDHS, as many as 433 adolescents. The analysis was administered using descriptive and inferential methods and binary logistic regression utilizing SPSS program.

The dependent variable investigated was the incidence of adolescent fertility, which was women aged 15-19 who had given birth or were pregnant at the time of the survey. The independent dependent variables in this study encompass adolescence, marital status, adolescent sexual behavior, contraceptive use status, knowledge of contraception, desire for the number of children to live in, education level, economic status, job status, reading ability and access to the internet.

The flow of data processing can be presented in the chart below.

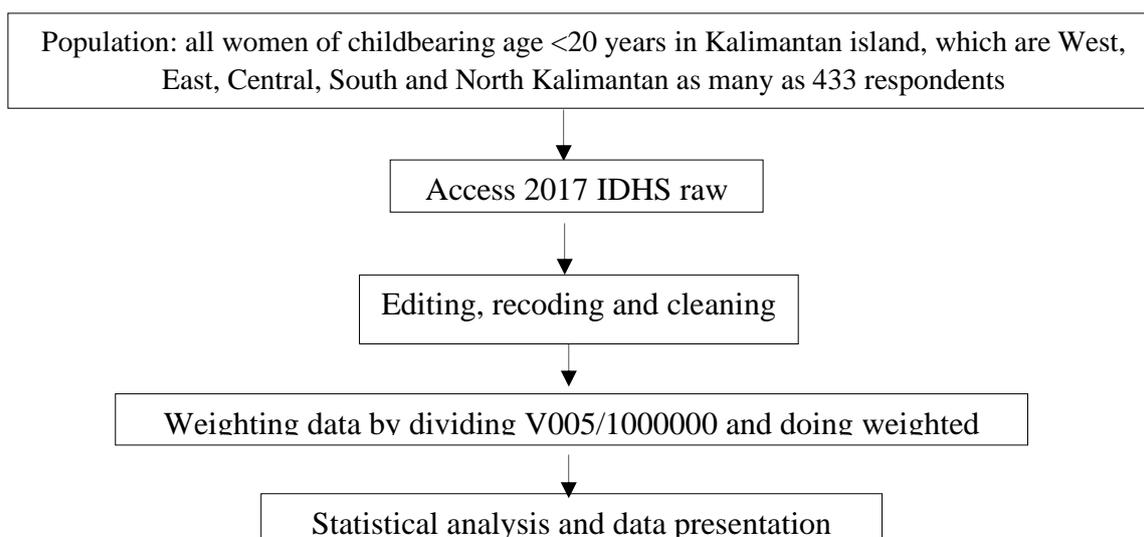


Figure 1. Research Flow

3. RESULTS AND DISCUSSION

The study was conducted on 433 adolescent respondents in Kalimantan with the number of each province as follows:

Table 1. Frequency Distribution of Respondents by Province.

Variable	n	%
West Kalimantan	163	37.7
Central Kalimantan	53	12.1
South Kalimantan	112	25.9
East Kalimantan	83	19.2
North Kalimantan	22	5.1
Total	433	100

Table 1 illustrates that the largest number of respondents came from West Kalimantan, which are 37.7% and very few respondents came from North Kalimantan, which are 5.1%.

Table 2. Frequency Distribution of Respondents based on Individual Characteristics and Behavior.

Variable	Category	n	%
Fertility adolescents	Had never been pregnant and never given birth	390	90.1
	Had ever been pregnant and given birth	43	9.9
Age	15-17 years	301	69.5
	18-19 years	132	30.5
Marital status	Unmarried	379	87.5
	Married	50	11.5
	Divorced	4	1
Adolescent sexual behavior	Never having sex	372	85.9
	Having sex	61	14.1
Age at first having sex	Never having sex	372	85.9
	<15 years	13	3.1
	15-17 years	34	7.7
	18-19 years	12	2.8
Age at first childbirth	<15 years	10	29.4
	15-17 years	12	35.29
	18-19 years	11	32.35
	Mean \pm SD	16.5 \pm 1.574	
Number of children born	1 child	31	92.2
	2 children	3	8.8
Contraceptive use status	Not applying family planning	407	94.1
	Applying family planning	26	5.9
Desire for the number of children	0-2 children	335	77.4
	>2 children	98	22.6
Knowledge of benefits and types of family planning	Know the benefits and types of family planning	27	6.2
	Do not know the benefits	406	93.8

	and types of family planning		
Education level	≤9 years	51	11.8
	>9 years	382	88.2
Economic status	Middle to lowest	297	68.6
	Middle upper to top	136	31.4
Employment status	Not working	332	76.7
	Working	101	23.3
Residence	Urban area	187	43.1
	Rural area	246	56.9
Reading ability	Not literate	3	0.8
	Literate	428	94
	Blind	1	0.3
Internet access	Using the Internet	322	74.5
	Not using the Internet	110	25.5
Total		433	100

Based on table 2 on above, it is presented that most of the respondents (69.5%) were aged between 15-17 years, 88.2% of teenagers had pursued study up to SMA/equivalent and 94% of youth were literate. For economic variables, 68.6% of adolescents were in the wealth quintile index middle to lowest, 23.3% of adolescents have worked and 56.9% live in rural areas. Although many of whom live in rural areas, almost all respondents (74.5%) possess owned and actively utilized the internet in the past month.

Among 433 adolescents, almost all respondents were unmarried (87.5%) but there were also 4 (1%) adolescents who had got married but ended up divorcing. Although most were unmarried, 9.9% had ever given birth or were pregnant with their first child with an average age at first delivery of 16.5 years. Further analysis, 14.1% had had sex and 3.1% had sex at the age <15 years.

Table 3. The relationship between the characteristics of the respondents and the incidence of adolescent fertility.

Variable	Category	Fertility Adolescents				Total	%	p-value	OR	95% CI
		Had never been pregnant and never given birth	%	Had ever been pregnant and given birth	%					
Age	15-17 years	285	73.1	16	37.2	301	69.5	0.000	4.58	2.373-8.841
	18-19 years	105	26.9	27	62.8	132	30.5			
Marital status	Unmarried	377	96.7	1	2.4	378	87.5	0.000	1189	151.6-9322.6
	Married	13	3.3	41	97.6	54	12.5			
Adolescent sexual behavior	Divorced	372	95.4	0	0	372	85.9	0.000	3.389	2.299-4.995
	Never having sex	18	4.6	43	100	61	14.1			
Contraceptive use status	Not using family planning	387	99.2	29	47.6	407	94.2	0.000	141.9	39.167-514.094
	Using	3	0.8	22	52.4	25	5.8			

	family planning									
Knowledge of benefits and types of family planning	Not knowing the benefits and types of family planning	25	6.4	2	4.7	27	6.2	0,6	1.4	0.321-6.144
	Knowing the benefits and types of family planning	365	93.6	41	95.3	406	93.8			
Number of children born	1 child	300	76.9	34	81	334	77.3	0.5	0.7	0.351-1.75
	2 children	90	23.1	8	19	98	22.7			
Residence	Urban area	170	43.6	17	39.5	187	43.2	0.6	1.182	0.621-2.249
	Rural area	220	56.4	26	60.5	246	56.9			
Education level	≤9 years	38	9.7	13	31	51	111.8	0.000	0.24	0.115-0.502
	>9 years	352	90.3	29	69	381	88.2			
Economic status	Middle to lowest	259	66.4	37	88.1	296	68.5	0.04	0.2	0.103-0.696
	Middle upper to top	131	33.6	5	11.9	136	31.5			
Employment status	Not working	301	77.2	31	72.1	332	76.7	0.454	1.3	0.646-2.65
	Working	89	22.8	12	27.9	101	23.3			
Reading ability	Not literate /blind	3	0.8	2	4.7	5	1.2	0.079	0.159	0.026-0.979
	Literate	387	99.2	41	95.3	428	98.8			
Internet access	Utilizing the Internet	90	23.1	20	46.5	110	25.4	0.001	0.345	0.81-0.657
	Not utilizing the Internet	300	76.9	23	53.5	323	74.6			

The results of the analysis revealed that there was a significant relationship between age, marital status, adolescent sexual behavior, contraceptive use status, education level, economic status, and access to the internet with youth fertility in Kalimantan, with all p value <0.05. Another analysis discovered that there is no significant relationship between the variables of knowledge about contraception, the desire for the number of children, place of residence, employment status and reading ability with adolescent fertility in Kalimantan with all p value > 0.05.

Table 4. Multivariate analysis of respondent characteristics with the incidence of fertility adolescent.

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C. I. for EXP(B)	
								Lower	Upper
Step 1 ^a	Age (1)	-.624	.696	.804	1	.370	.536	.137	2.097
	Marital Status (1)	-2.118	1.148	3.405	1	.065	.120	.013	1.141
	Adolescent behavior (1)	-19.380	2059.756	.000	1	.992	.000	.000	.
	Contraceptive use status (1)	-1.610	.759	4.496	1	.034	.200	.045	.885
	education category (1)	.290	.921	.099	1	.752	1.337	.220	8.125
	economic status categories (1)	.588	.932	.398	1	.528	1.800	.290	11.178
	178 reading ability categories (1)	1.944	2.955	.433	1	.511	6.987	.021	2288.754
	Internet categories1 (1)	-.074	.820	.008	1	.928	.929	.186	4.629
	Constant	1.864	.979	3.627	1	.057	6.448		

Logistic regression analysis Table 4 above displays that the application of family planning contraceptives simultaneously influences adolescent fertility with the strength of the relationship OR (Exp^β) = 0.2.

The regression equation model administered from the above analysis is: $y = \text{constant} + a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 + a_6x_6 + a_7x_7 + a_8x_8 + \text{and so on.}$

$y = 1864 + (-6.24)(\text{age}) + (-2118)(\text{marital status}) + (-1640)(\text{status of applying family planning}) + (-0.74)(\text{internet use}) + (0.167)(\text{education}) + (0.58)(\text{economic status}) + (-19,389)(\text{adolescent sexual behavior}) + (1,944)(\text{reading ability}).$

The results of univariate analysis display the incidence value Youth fertility in Kalimantan that is quite significant. Of the 433 adolescents in Kalimantan, 9.9% explained that they had given birth or were pregnant at the time of the survey. It presents that the number is higher than the national figure in the same year, that is 7.1% and a figure which is not much different from the 2012 IDHS results, that is 10% (Raharja, 2014). Of the number of adolescents who had given birth, it was discovered that 29.4% of adolescents gave birth at the age of <15 years and almost all new adolescents possessed one child (92.2%).

Marriage in adolescence causes adolescents to experience problems associated with education such as dropping out of school, medically causes reproductive health problems for women, which comprise of being vulnerable to several diseases such as uterine cancer, an unstable economy, and still vulnerable to a lack of understanding of their rights and obligations as husband and wife, thus, affecting a high divorce rate (Triyanto, 2013).

Being pregnant as a teenager also increases the risk of miscarriage, preeclampsia, infection, anemia, and stress. Furthermore, there is a risk of giving birth to premature babies, low birth weight (LBW), congenital abnormalities, and fetal death in the uterus (IUFD). The most fatal impact is maternal death due to complications during pregnancy

and childbirth. Approximately, 2 million women die each year and 50% are caused by unsafe abortion (National Population And Family Planning Board of Indonesia, 2018). Moreover, pregnancy with stress also causes the mother to experience hyperemesis and childbirth with the assistance of tools. During the puerperium, babies are also at risk of not receiving breast milk exclusively (Afriani & Mufdlilah, 2016). Inadequate nutrition during pregnancy and the golden period also makes a child at 2.62 times the risk of stunting in women who are pregnant under 20 years (Irwansyah et al., 2016).

Research on the impact of early marriage has also extensive been conducted in other countries, particularly those with high rates of early marriage, such as in Bangladesh. Marriage under 18 years of age in Bangladesh produces a high risk of Domestic Violence. Bangladesh possesses the highest prevalence of domestic violence in women in the world. In a study of 3,355 married women, nearly half (44.5%) revealed experiencing domestic violence and 68% got married at less than 18 years of age. The median age of marriage ranged from 14.8 to 18 years (Yount et al., 2017).

Marriage at an early age is also correlated with the existence of multiple responsibilities and has become a prior factor for depression, particularly in adolescent girls. Early marriages which are insisted to establish make teenagers own a sense of rejection and low self-esteem when compared to their peers who still possess the opportunity to socialize and take higher education (Ahmed et al., 2013).

Research in the Gambia revealed that teenage marriages happen mostly in certain ethnicities in which there is an understanding of anxiety about premarital sex which frequently occurs. Hence, parents prefer to marry off their children. A more in-depth analysis discovered that in reducing the number of early marriages, it is necessary to increase the adolescents' empowerment such as vocational schools in accelerating the absorption of youth workers (Lowe et al., 2019).

According to the age group, young women present that the younger the women are, the higher the percentage of fertility incidence. The result of other analysis states that the value is Odd Ratio 4.58. Thus, it can be implied that adolescents aged 15-17 years own a 4.58 chance to get pregnant or give birth at that teenage age. It indicates a positive relationship between fertility incidence and female adolescence. Adolescent women aged 15-17 years possess a higher percentage of fertility incidence (69.5%) compared to those over 18-19 years, which is 30.5%.

According to adolescent sexual behavior and marital status, it reveals that 50 (11.5%) adolescents have got married and 4 teenagers (1%) have got married but then divorced. Moreover, 61 adolescents (14.1%) reported having had sex and 43 of them had given birth or were pregnant at the time of the survey. Statistically, there is a significant relationship between adolescent sexual behavior and marital status with the adolescent fertility incidence in Kalimantan with p -value = 0.000. Married adolescents own 1189 times the chance to get pregnant or give birth. furthermore, adolescents who have had sexual intercourse possess a chance of 3,389 times to get pregnant or give birth. it is in accordance with another survey which discovered that 4.6% of children aged 10-17 years in Kalimantan got married (Kementerian Pemberdayaan Perempuan dan Perlindungan Anak, 2018).

Free sex, pregnancy and early marriage are correlated. Poor peer relationships may also create adolescent attitudes and behavior to commit juvenile delinquency such as drinking alcohol and smoking, starting to perform early sexual intercourse and eventually unwanted pregnancy (Husna et al., 2016). Literature studies using analysis of Social Cognitive Theory in identifying the outcome of premarital sex is a behavioral factor which increases the early marriage incidence. Early marriage is a form of paternal responsibility

and reduces family shame (Agustini, 2017).

Moreover, free sex during adolescence also causes a severe impact on female reproductive organs, encompassing increasing the risk of cervical cancer. The earlier woman performs sexual intercourse, the higher the risk of precancerous lesions on the cervix, thus, the greater the chance of suffering the cervical cancer. It is because at that age, there is a location change of the squamous-column joint. The juvenile cervix is more susceptible to carcinogenic stimuli because it contains an active metaplasia process, happens in the transformation zone during the developmental period (Hanum & Tukiman, 2015).

For the variable of desire, the number of children presents that 77.3% of teenagers are merely willing to have 0-2 children. There is no relationship between the desire for the number of children and adolescent fertility in Kalimantan with a p-value = 0.5. Adolescents who plan to own only 2 children will have a 0.7 times chance of not getting pregnant or giving birth at that teenage age.

Pregnancy planning is closely correlated with the knowledge and use of contraception for adolescents. The results of the analysis unveiled that almost all adolescents (93.8%) have already understood the benefits and types of family planning. A total of 25 teenagers or 5.8% have applied contraceptives. However, this number is not proportional to the number of married adolescents, which are 54 teenagers or only 46.29% of the total married teenagers. Statistical results discovered that there is a relationship between contraceptive use status and adolescent fertility in Kalimantan with a p-value = 0.000. Adolescents who do not utilize contraception possess 141.9 times the chance to get pregnant or give birth.

Adolescents who have had sexually active relationships possess a greater risk of getting pregnant and giving birth at that age. Pregnancy and childbirth in adolescence causes a severe health risk, psychology and social issues. Thus, one method that can be implemented to prevent this problem is the contraception application in adolescents.

Research results by Rizkianti et al (2017) on further analysis of basic health research 2013 discovered that as many as 54.2% of married women and their partners applied contraception. Multivariate analysis, age, education level, socioeconomic status and application of health insurance possess a significant relationship with contraceptive use. Fulfilling adolescent access to contraception is expected not only to concern on increasing adolescent knowledge but also increasing purchasing power, one of which is through the use of health insurance (Rizkianti et al., 2017).

Contraceptive application among adolescents and young women is also low in other countries, encompassing South Africa. However, the use of contraception in this age group also prevents to suffer from sexually transmitted diseases. The causes of the low number of unmet needs in this age group encompass false myths, lack of knowledge of the benefits and access to contraceptive use, less support from parents and partners, and fear of having a treatment at health facilities (Jonas et al., 2022).

The results of the univariate analysis uncovered that the percentage of adolescents who gave birth or got pregnant and living in rural areas was higher than those living in urban areas, which are 43.2% and 56.9%, respectively. However, statistically, it was discovered that there was no relationship between residence and adolescent fertility in Kalimantan with a p-value = 0.6. In almost all developing countries, the teenage pregnancy rate is higher in rural areas than in urban areas. The characteristics of cities which provide the availability of good educational facilities, the employment sectors and health facilities, and information and family planning tools encourage on delaying to have children. There are more differences in opportunities for education and employment in urban areas than in rural areas, hence, women tend to postpone the marriage, choose to

continue their education and apply for the job opportunity (Raharja, 2014).

For the variable level of education and reading ability of adolescents, it was revealed that 381 (88.2%) had completed basic education >9 years of elementary and junior high school, hence, 98.8% of adolescents were literate. Despite completing basic education, there were 29 adolescents who had given birth or were pregnant at the time of the survey. Thus, it can be implied that there is a relationship between education and youth fertility in Kalimantan with a p-value = 0.000. Adolescents who have completed education are 0.24 times more likely to not get pregnant or give birth at that teenage age. Education is a dominant factor which influences a person in making crucial decisions in his life, including marriage. Education also affects one's maturity in solving problems. Children with low education are at risk of getting married at an early age. Statistically, the low level of education of children elevates the risk of early marriage 4.5 times. Parents' education factor has also been discovered to influence their child's early marriage. Low parental education level escalates 3.7 times for the risk of children being married (Desiyanti, 2015).

The level of education also affects adolescents' awareness on the importance of reproductive health knowledge. The results of research conducted in Nigeria state that teenage marriage is more common in population groups possessing basic education levels and lacking of knowledge of reproductive health (Anayochukwu, 2022).

Early marriage also impacted on the number of teenagers who drop out of school. However, with the support of the social environment, married teenagers can actually continue their education. Education is understood to provide great benefits for adolescents' life. Higher education is able to increase self-efficacy, ability and enhance the welfare of life (Raj et al., 2019).

In terms of the variable of economic status and adolescent employment, the percentage of adolescents with middle to lowest economic status is as much as 68.6%, and of this percentage, 37 of whom had given birth or are pregnant. Hence, the result of further analysis illustrates that there is a relationship between economic status and adolescent fertility in Kalimantan with a p-value = 0.04. Adolescents with middle to lower economic status possess a 0.2 times chance of getting pregnant or giving birth at that teenage age. Furthermore, there were 101 (23.3%) who were already working and of those who had worked 12 of them had given birth or were pregnant at the time of the survey. There is a robust pattern and relationship between the incidence of fertility among adolescents and the welfare level. The higher the family welfare status is, the lower the percentage of teen fertility incidence will be. Adolescents with a high wealth index possess a lower risk of becoming adolescent mothers than adolescents with a low wealth index. Moreover, socio-economic conditions also impact negatively on the probability of becoming a mother in adolescent age (Raharja, 2014).

It is similar with the research in western Ethiopia. A cross-sectional study involving 373 women produced a conclusion that 167 women (44.8%) were married in the age range of 9 to 23 years, and the causative factors were due to the low family income, low parental education level, thus facilitating the practice of early marriage in the family (Bezie & Addisu, 2019).

A person's occupation reflects income, social status, education and health problems. Parents' job definitely influences their social status in society. A good job synergizes with the economic capacity of the family. Families who are in the poverty line will marry off their children to release a burden on the family. Marriage is considered capable of solving problems for the family (Desiyanti, 2015).

It is in accordance with the results of research conducted by Fitriyani et al., (2017). Apart from free sex, another shocking thing affecting adolescent fertility is the prostitution

factor, adolescents who prefer to commercialize their bodies due to life necessities and helping the family financial income. Free sex, changing girlfriends or boyfriends on the basis of consensual consensus to prostitution, most of which lead to the unwanted pregnancy and marriage because they want to cover up the shame (Fitriyani et al., 2017).

The results of the univariate analysis revealed that most adolescents owned access to the internet, with a percentage of 74.6% and 23 of them or 53.5% had given birth or were pregnant at the time of the survey. Thus, there is a relationship between having access to the internet and youth fertility in Kalimantan with $p\text{-value} = 0.001$. Adolescents who possess access to the internet that is active in the year past own a 0.345 chance of getting pregnant or giving birth at that teenage age.

Qualitative research on the factors affecting the marriage of female adolescents in the Indramayu region uncovered similar things. The development of mass media, cyber space, internet, and electronic information also influences the shift of cultural values in society and the association of teenagers. Due to this promiscuity, not a few were married because they were willing to cover up the disgrace due to the unwanted pregnancy (Fitriyani et al., 2017).

4. CONCLUSION

Among 433 adolescents in Kalimantan, 11% got married, 9.9% had ever given birth or were pregnant with their first child, 14.1% had had sexual intercourse, and 3.1% had had sex at <15 years of age. Statistically, there is a significant relationship between age, marital status, adolescent sexual behavior, contraceptive application status, education level, economic status, and access to the internet with youth fertility in Kalimantan. The results of logistic regression analysis revealed that the variable of family planning use impacted the most on adolescent fertility simultaneously with the strength of the relationship $OR (Exp\beta) = 0.2$. A suggestion for further research is to examine related programs such as maturing age at marriage and parenting skill to suppress adolescent fertility.

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RESEARCH

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Plugging the Gap and Nicheing the NICHE: Nursing Informatics Competencies for Higher Education

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Abstract

Despite the rapid advancement and evolution of nursing informatics applications in healthcare, the incorporation and refurbishing of undergraduate informatics competencies in the curriculum has been organized. The integration of informatics in the Philippine curriculum began decade ago. However, it is still not identified whether these initiatives are successful in enhancing NI skills among graduates considering the low rate of technology utilization by most hospitals in the country. As a result, it requires a global need for nursing informatics competencies to be updated and revisited into the nursing curriculum. The objective of this study is to gather accord from the literature and to determine the definition of fundamental nursing informatics competencies for baccalaureate nursing programs in the Philippines. A review of related studies and corroboration of related literature such as different nursing curricula, perspectives of nursing informatics competencies in every country and to the resource organizations standards providing trainings, conducts research and guide HEIs was performed. International and local organizations were preparing the advancement of informatics through research, trainings, continuous quality improvement, and innovations in HIT. The identified common ground plugging the gap in nursing informatics competencies were nursing care and management proficiencies, information literacy and management, computer skills, health facilities' technology resources, and ethics and legal understanding in HIT (NICHE). The prior competencies (basic computer skills, information literacy, and information) should be adaptable to local differences and consulted to industry partners and stakeholders. These attempts at competency standardization have to be balanced with suppleness to account for local variations and conditions.

Keywords: Nursing Informatics, Competencies, Nursing Education, Caring.

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1. INTRODUCTION

The health information technology (HIT) in healthcare has swiftly advanced and evolved whereas the assimilation of undergraduate informatics concepts into nursing education has been delayed (Nygårdh, et al., 2017). It produces a gap between nursing education, nursing practice and the possibility of a catastrophe. Thus, it widens the discussion on designing nursing informatics education to enhance the safety and quality care employing effective curriculum and applying the relevant health information systems (Hübner, et al., 2019).

Nursing informatics (NI) is defined as a field of nursing which merges nursing science along with a plethora of perspectives and the science of analytics to identify, illustrate, operate, and express data, knowledge, information, and wisdom in nursing practice in accordance with the definition of the American Nurses Association, (2015). The advent of information technology, and the technological innovations in nursing care and medicine, serve as a pedestal for the healthcare industry. In association with information technology and innovations in healthcare, health informatics, based on the published article of the American Medical Informatics Association, (2011), it leads to demonstrating and concerning on public health, enhancing life science research, educating health professionals, and improving patient care.

The American Medical Informatics Association (AMIA) contends that this integrative and multidisciplinary discipline efforts on Health Information Technologies (HIT) which encompassing cognitive, social sciences, and computer for health. On the other hand, nursing informatics based on ANIA (American Nursing Informatics Association), is defined as a field which is fundamental to delivering cost-effective and high-quality nursing care and enhance the health of people, societies, individuals, and to the families by employing HIT. Thus, advancing information communications technology and management in health and healthcare is the result of informatics. Furthermore, education, research, and practice pave the way for the health care future and prepare individuals for all roles and different settings.

Today, informatics is rapidly elevating particularly in nursing, and allied health on our healthcare system (Prodelli, 2017). It has evolved into a critical component of the infrastructure for enhancing access to health information, providing safer patient care, lowering costs in healthcare, and advancing patient outcomes and recovery (Prodelli, 2017; Tellez, 2012). In all roles and contexts, healthcare stakeholders, such as physicians, nurses, patients, other healthcare workers, and stakeholders, benefited from health informatics decision-making support.

Around the world, although there have been several resources for informatics, it has existed the variations to the curriculum and competencies in nursing informatics. There is no comprehensive list addressing the specific knowledge and skills required at the undergraduate level in a developing country's local context. Hence, this study owns an objective that is to collect accord from the literature and define the fundamental nursing informatics competencies for baccalaureate nursing programs in the Philippines.

2. RESEARCH METHOD

Through scoping review, the concepts on competencies, curriculum of nursing informatics were examined. The review concerned on the objective of identifying the gaps and opportunities in implementing the program which employs key words such as nursing informatics, education, technology, competencies and caring science. Search engines utilized encompassed *google scholar*, *research gate* and published journals in reputable repositories to extract information for analysis.

3. RESULTS AND DISCUSSION

a. Nursing Informatics: Its Position in Society, Nursing Education, and Industry

Significant advancements in nursing informatics necessitated a local context's definition of competencies, performance, and the curriculum without compromising the learning quality. The aim of this section is to review and corroborate set of articles, policies, guidelines, and standards for undergraduate nursing informatics, in investigating local resources, industry demands and nursing informatics' strengths and weaknesses.

b. Nursing Informatics Curriculum Development

In the Philippines, informatics course was instilled into the nursing curriculum of the baccalaureate degree (BSN) taking part in 2008 through the Commission on Higher Education (CHED) Memorandum Order (CMO) number 5 series of 2008. The CMO contains PSG (Policies, Standards and Guidelines) for a particular degree program of Philippine Higher Education issued through the Commission on Higher Education (CHED). The CMOs for nursing program which indicates with Nursing Informatics began from CHED Memorandum Order number 5 series of 2008, Memorandum Order number 14 series of 2009, and the most recent is the CHED Memo Order number 15 series of 2017. The first 2 CMOs were competency-based, while the present curriculum is an Outcomes-Based Education (OBE). This section also seeks to present the ongoing evolution of nursing informatics course as corroborated by the PSG of the BSN program. The basic competencies 1, 2, and 3 (presented in the table) under the key areas of responsibility in CMO No. 5, which is item I. Records Management was discussed on the utilization of a record system such as the Hospital Information System in maintaining an accurate and updated documentation and observing legal imperatives in record managing. It facilitated the adoption of basic computer and information technology concepts in the nursing curriculum.

In section 8 or the curriculum outline discovered in the CMO No. 5 s. 2008, Nursing Informatics is categorized as General Education (GE) course and classified under Mathematics, Natural Sciences, and Information Technology with three broken down units to two units for the lecture and one unit for the laboratory. Primarily, the description emphasizes the information technology system application, an introduction of nursing informatics principles and theories, and data standards. The course manner prepares the nursing students to ethically employ technology in making the nursing care rendition better. Technological advancement as expressions of unending care (Acob, 2018) plays pivotal role in the modern era particularly on the post pandemic environment. Meanwhile, telehealth nursing introduced a little earlier than COVID-19 is evidence of technology utilization to nursing care. Furthermore, it emphasizes on the application of healthcare information processes in the clinical area and corroborate in decision-making of nursing care and management. The application or laboratory component of the course should be performed for practice application. The addition identified in the CMO no. 14 series of 2009 is that it illustrates an additional performance indicator in the competency standards under the key areas of responsibility I: Records Management.

Table 1. Nursing Informatics Course in Different CMOs.

CMO	CHED Memorandum Order No. 5 (2008)		CHED Memorandum Order No. 14 (2009)		CHED Memorandum Order No. 15 (2017)	
Category and Total Number of Units	Part of the GE courses with three (3) units: two (2) lecture units and one (1) laboratory unit.		Part of the GE courses with three (3) units: two (2) lecture units and one (1) laboratory unit.		Part of the Professional courses and with three (3) units: two (2) lecture units and one (1) laboratory unit.	
Key Areas of Responsibility	I. Records Management		I. Records Management		CMO 15 s. 2017 is an OBE Curriculum	
Core Competencies and indicator/s	The Core Competency no. 1: Maintain an accurate and updated documentation of patient care (based on CMO).	Complete updated documentation of patient care.	The Core Competency 1: Maintain an accurate and updated documentation of patient care (based on CMO).	Complete updated documentation of patient care. Apply principles of record management.	PO 6. Report or document client care accurately and comprehensively.	Document the client's responses, nursing care services rendered and processes, and outcomes of the nurse client working relationship.
Program Outcomes (CMO 15 s. 2017)				Monitor and improve accuracy, completeness and reliability of relevant data. Makes record readily accessible to facilitate client care.		Ensure completeness, integrity, safety, accessibility and security of information. Adhere to the protocols and principles of confidentiality in safekeeping and releasing of records and other information.
	The Core Competency no. 2: Records outcome of patient care (based on CMO).	Utilizes a records system ex. Kardex or Hospital Information System (HIS) (based on CMO).	The Core Competency no. 2: Records outcome of patient care (based on CMO).	Utilizes records system ex. Kardex or Hospital Information System (HIS) Utilize data in decision and policy	PO 12. Implement techno-intelligent care systems and processes in health care delivery	Employ appropriate technology to perform safe and efficient nursing activities. Implement system of informatics to

CMO	CHED Memorandum Order No. 5 (2008)	CHED Memorandum Order No. 14 (2009)	CHED Memorandum Order No. 15 (2017)
			making activities (based on CMO). support the delivery of health care.
	<p>The Core Competency no. 3: Observes legal imperatives in record keeping (based on CMO).</p> <p>Observe confidentially and privacy of the patient's records.</p> <p>Maintain an organized system of filing and keeping patients' records in a designated area.</p> <p>Refrain from releasing records and other information without proper authority.</p>	<p>The Core Competency no. 3: Observe legal imperatives in record keeping (based on CMO).</p> <p>Maintain integrity, safety, access, and security of records.</p> <p>Document/monitor proper record storage, retention and disposal.</p> <p>Observe confidentiality and privacy of the clients' records.</p> <p>Maintain an organized system of filing and keeping clients' records in a designated area.</p> <p>Follow protocol in releasing records and other information.</p>	

Table 1 presents the summarized implementation and course description of nursing informatics course based on the approved curriculum of the Commission on Higher Education (CHED). Currently, with the CMO no. 15 series of 2017 as implemented by the HEIs, Nursing Informatics is categorized as part of the professional courses with a code of NCM 110 – Nursing Informatics in accordance with the mentioned curriculum. The course encompasses the introductory concepts, relevant theories and principles, and procedures of informatics in the practice of nursing, nursing education, and research in nursing. Life-long learning opportunities for this course are the

implementation and the utilization of available technology in healthcare industries and understanding the applicable nursing responsibilities in the nursing informatics utilization.

The objective of BSN program is to develop professional nurses who are capable of holding entry-level employment in hospitals, community settings, and other health care settings. The CMOs provide adequate time for HEIs who offer BSN to amend their core curriculum while adhering to basic requirements.

c. Model of Nursing Informatics Education

The model is depicted as a jigsaw puzzle, with the components completing the system. It imposes the interlocking and connections of irregularly shaped interlocking and parts, which results in a finished picture once completed. If one component is lacking or removed, the system suffers, and turmoil and disarray ensue.

The BSN program is designed to formulate a professional nurse for entry-level work in hospitals or community settings (Commission on Higher Education Republic of the Philippines Officer of the President, 2017). The program's goal is to create professional nurses for health promotion, disease prevention, curative, and rehabilitative aspect of care, and afford end-of-life care to patients of varying ages, genders, and status of health and illness; healthy or at-risk families and communities; populace and communities; singly or in collaboration with other health care providers (Commission on Higher Education Republic of the Philippines Officer of the President, 2017).

The nursing curriculum is the product of collaboration and consultation with higher education institutions, nursing organizations, and health care facilities (in hospital, community, etc.). This model was developed and constructed after a thorough assessment of literature as well as the industry needs in the country and global interest.

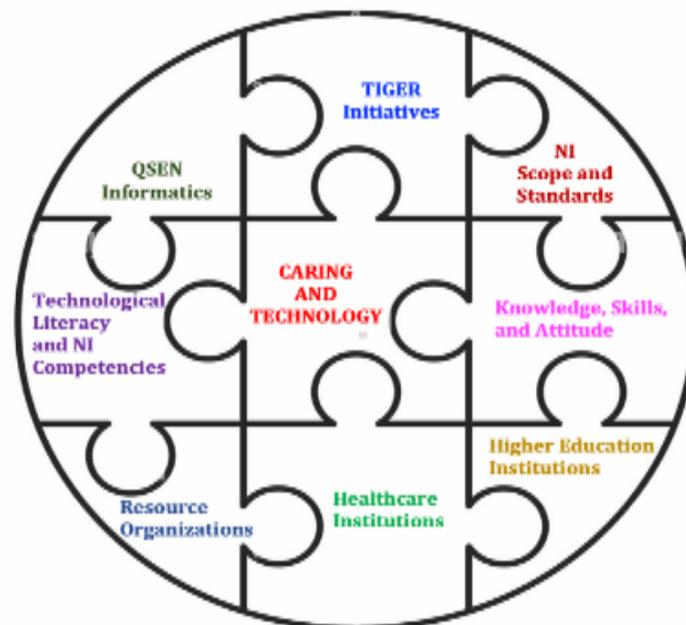


Figure 1. The model outline in filling the gap of nursing informatics in the Local Context.

d. TIGER (Technology Informatics Guiding Education Reform) Initiative

TIGER program was launched in 2006 which goal is to nurture cooperation and community growth and international collaboration and development by integrating technology and informatics into seamless practice, education, and research resource

creation (Saba & McCormick, 2021, Healthcare Information and Management Systems Society, 2022). It is presently hosted by the HIMSS (Hospital Information and Management Systems Society, 2022) (Saba & McCormick, 2021).

The TIGER recognized nursing care management, IT management, quality improvement (QI) management, care collaboration, and nursing practice as prior informatics competencies of health care professionals. The objective of international efforts is to develop a framework for core informatics competencies, generating educational recommendations, and demonstrating best practice examples in implementing these recommendations (Shaw, et al., 2020).

The prior goal is to design and address skills which all nurses require in the 21st century and concern on the development of a clinical workforce which employ technology to enhance the delivery of care (Saba & McCormick, 2021). Professional healthcare workers particularly nurses will be necessary to possess a basic comprehension of informatics, ranging from basic computer abilities to advanced information technology and literacy.

The objective of this initiative is to assist nurses adopt informatics technologies, theories, concepts, and practices which makes health care better, more capable, patient-centered, and reasonable services for all parties involved (Dulong, 2008). The three elements of the NI skills model designed are computer competencies (basic), information literacy and understanding, and information and data management (Saba & McCormick, 2021).

The TIGER initiative has identified the following information literacy skills in accordance with the article by Hubner et al., (2019); Shaw et al., (2020) in understanding the nature and scope of the information required; effectively and efficiently approaching vital information; critically assessing information and its sources, and incorporating selected data into the knowledge base and value system; individually or as part of a group, efficiently using information to fulfill a specified task; and examining the effects of information use (Hübner, et al., 2019; Shaw, et al., 2020).

The HIMSS (Hospital Information Management System Society) identified the following concepts for computer abilities, which comprise of: information and communication technology (ICT) ideas; file management and computer use; spreadsheets; database use; word processing; presentation; and the TIGER defines computer abilities encompassing web browsing and communication (Hübner, et al., 2019; Shaw, et al., 2020).

The International Competency Synthesis Project of the Technology Informatics Guiding Education Reform (TIGER) developed a Global Health Informatics Competency Recommendation Frameworks in April 2020 (Healthcare Information and Management System Society, (2022). The TIGER International Task Force began a series of efforts to generate a list of proposed core international informatics competencies in accordance with input from a variety of countries, scientific societies, and research programs.

This international guideline framework for nurses' key areas of competency in health informatics attempts to provide a grid encompassing comprehension on competencies, professional functions, main concern, and sensible experience (Healthcare Information and Management Systems Society, 2022). In reflecting its roots in nursing informatics and its directness to other healthcare professionals and their interactions with nurses, the framework employs the phrase health informatics in nursing (Hübner, et al., 2019). On an individual level, the organization believes that learning and teaching are processes of active construction of educational space.

The guiding essence of TIGER is to expand the assimilation of informatics and technology into uniform training, instruction, research, and resource development (Healthcare Information and Management Systems Society, 2022). It advances the addition of health informatics through facilitating in enhancing patient care and developing a learning health system, informatics and technology which are utilized (Shaw, et al., 2020).

e. QSEN (Quality and Safety Education for Nurses) Competencies

The QSEN teaching body have produced undergraduate and graduate quality and safety proficiencies for nursing, and planned objectives for knowledge, abilities, and attitudes to be established in nursing pre-licensure programs, by employing the Institute of Medicine (IOM) standards generated for nursing. The overarching objective of the QSEN initiative is to encounter the task of training nurses with the KSAs (knowledge, skills, and attitudes) required to enhance the safety and quality of the health care systems in an institution they are in charge.

According to the QSEN's definition of informatics, it is "the use of technology to communicate, manage knowledge, mitigate error, and support decision making". In the table are the QSEN pre-licensure KSAs (knowledge, skills, and attitudes) providing as standards to curricular development for conventional academic programs, growth to practice, and sustainable learning programs for nurses.

Table 2. Quality and Safety Education for Nurses (QSEN) Knowledge, Skills, and Attitude (KSAs)

Knowledge	Skills	Attitude
Explain why information and technology skills are crucial for safe patient care.	Identify education on how information is managed in care settings before providing care. Apply technology and information management tools to enhance safe processes of care.	Appreciate the necessity for all health professionals to investigate lifelong, sustainable learning of information technology skills
Identify essential information which is available in a common database to corroborate patient care. Contrast benefits and limitations of different communication technologies and the impact on safety and quality.	Navigate the electronic health record. Document and plan patient care in an electronic health record. Employ communication technologies to perform patient care.	Value technologies which support clinical decision-making, error prevention, and care coordination. Protect confidentiality of protected health information in electronic health records.
Elaborate examples of how technology and information management are associated	Respond appropriately to clinical decision-making supports and alerts.	Value nurses' involvement in design, selection, implementation, and evaluation of information

Knowledge	Skills	Attitude
with the quality and safety of patient care.	Utilize information management tools to monitor outcomes of care processes.	technologies to enhance patient care.
Recognize the time, effort, and skill required for computers, databases and other technologies in being reliable and effective tools for patient care.	Employ high quality electronic sources of healthcare information.	

Note: List of achievable informatics competencies relevant to all pre-licensure nursing education. Adapted from "Quality and Safety Education for Nurses" (<https://qsen.org/competencies/pre-licensure-ksas/>)

Nurses must possess an access to information and communication technologies in providing safe and quality nursing care in this digital set-up. New ethical and legal issues arise due to written and electronic documentation in the health care facilities (Nygårdh, et al., 2017). Meanwhile, healthcare information technology has cultivated rapidly, the integration of nursing informatics education has been incremental based on the published study of Nygårdh et al (2017).

f. The American Association of Colleges of Nursing (AACN) Competencies

The AACN endorsed detailed aptitudes which have to be accomplished by nurses to warrant safe and superior quality patient care, that are: communication, illness and disease management, ethics, and information and healthcare technologies, and critical thinking (American Association of Colleges of Nursing, 2008).

The baccalaureate program of nursing, in accordance with the American Association of Colleges of Nursing (2008), aims to prepare graduates to learn the way utilizing patient-care technology, information systems, and communication devices in providing safe nursing care. Its objective is also to employ information technology in enhancing caring attitude of nurses and create a safe environment for patients (American Association of Colleges of Nursing, 2008). Among several enhancements to the basics in nursing education were a greater emphasis on patient safety and healthcare IT.

g. 2012 NCCS (National Core Competency Standards) 2012 for the Filipino Nurses

The Bachelor of Science in Nursing attempts to develop a nurse in demonstrating initial professional competencies and the assumption of responsibility for patient care. In exhibiting nurse competence, key areas of responsibility are being adhered and the bases for core competency standards for Filipino Nurses. These encompass (a) safe and high-quality nursing care, (b) communication, (c) collaboration and teamwork, (d) health education, (e) legal responsibility, (f) ethic-moral responsibility, (g) personal and professional development, (h) records management, (i) resource and environmental management, (j) quality improvement, and (k) research.

Stakeholders revisited, modified, consulted, and validated the Nursing Core Competency Standards (NCCS) 2012 during the revision process. The National Core Competency Standards (NCCS) for Filipino Nurses displays that there are only two nursing informatics competencies outlined:

Table 3. The National Core Competency Standards (NCCS) of the Professional Regulatory Board of Nursing with the Nursing Informatics Competencies

Key Area of Responsibility	Core Competency	Indicators
Communication	Core competency 5: Utilizes appropriate information technology to facilitate communication (CMO no. 14 s. 2009)	<ol style="list-style-type: none"> 1. Utilizes telephone, mobile phone, electronic media. 2. Utilizes informatics to support the delivery of healthcare.
Records Management	Core competency 2: The Records outcome of client care (CMO no. 14 s. 2009)	<ol style="list-style-type: none"> 1. Employs records system ex. Kardex or Hospital Information System (HIS). 2. Utilizes data in their decision and policy making activities.

Note: List of key area of responsibility, core competencies, and indicators based on the CHED Memorandum Order No. 14 series of 2009 and National Core Competency Standards (NCCS) of Professional Regulation Commission (PRC) (2012).

The NCCS was utilized to enhance the following: Basic Nursing Education Program in the Philippines through the Commission on Higher Education (CHED); Competency-based Test Framework as the basis for developing course syllabi and test questions for entry level nursing practice in the NLE; Standards of Professional Nursing Practice in a variety of settings; and the National Career Progression Program (NCP) for nursing practice in the Philippines.

h. 2014 NNCCS (National Nursing Core Competency Standards)

Global and local advances in health and professional nursing encouraged the PRBON in assessing the Core Competency Standards of Nursing Practice in the Philippines after several years of implementation (Commission on Higher Education; Professional Regulatory Board of Nursing; International Labor Organization, 2014). The PRBON (Professional Regulatory Board of Nursing) formulated a task force on Nursing Core Competencies Revisiting Project in 2009, collaborating with the Commission on Higher Education-Technical Committee on Nursing Education and a group of nursing leaders from numerous different nursing professional organizations, with the primary objective of identifying the relevance of current nursing core competencies to become the expected nurse roles, and current and future work settings (Commission on Higher Education; Professional Regulatory Board of Nursing; International Labour Organization, 2014).

The Philippine Professional Nursing Practice Standards (PPNPS) were disseminated through the PRBON Resolution no. 22 series of 2017 to promote, lead, and direct professional nursing practice in the country. The different nursing competencies and its performance indicators were emphasized to serve as a reference for developing competency standards (Commission on Higher Education; Professional Regulatory Board of Nursing; International Labour Organization, 2014).

The 2014 NNCCS illustrate three major beginning roles and corresponding responsibilities in client care, leadership and management, and research (Commission on Higher Education; Professional Regulatory Board of Nursing; International Labor

Organization, 2014). Under the client care, the third responsibility was specified into the maintaining comprehensive, precise and current recording and reporting system. It elaborates the specified competencies and performance indicators on the methods and systems employed in electronic documentation systems. Informatics was incorporated in the implementing system and the NNCCS delineated the implementing system of informatics in health care delivery presented in Table 6:

Table 4. The Nursing Informatics Competencies of the National Nursing Core Competency Standards (NNCCS)

Competencies	Performance Indicators
3.3 Implement system of informatics to corroborate the delivery of health care	1. Demonstrate competencies in the use of informatics. 2. Utilize appropriate, up-to-date and available system of informatics.

The 2014 NNCCS conceptual framework and description help understand the informatics competencies sought of nurses based on industry needs and the types of clients they serve.

i. Nursing Informatics Knowledge, Skills, and Attitude

1). NI Knowledge and Skills

The article published by Davies et al., (2021) asserted that information management, data, human aspects, research skills or knowledge, project management leadership and management, systems development and evaluation, and health and healthcare are among the eight primary domains in the prior competencies for clinical informaticists. Nursing informatics, for instance, appears to be further along in terms of acquiring comprehensive competency standardization. Attempts at competency standardization should be in accordance with suppleness to account for local variations and conditions (Davies, et al., 2020).

Davies et al., (2020) in their article about core competencies for clinical informaticist elaborated that skills should be adaptable to local differences; a consultation to former students and industry partners or stakeholders by course and curriculum designers to identify the recent industry advances which have to be incorporated in the course and curriculum content; it is essential to consider on how people working in a further specialized sector of informatics obtain wider ability no matter where they are working; and it is also important to think about how people are working in a more specialized sector.

2). The Attitudes of Health Care Staff towards IT

Ward et al., (2008) identified several major challenges in their study, encompassing the need for flexibility and usability, adequate education and training, and software which is "fit for purpose," demonstrating that organizations should plan carefully when integrating IT-based systems into the process of their work. Moreover, involving users with more prior IT experience, who possess more positive views, could be useful to such businesses.

Health care workers' education in utilizing technology at the undergraduate level is an essential aspect influencing their attitudes (Ward, et al., 2008). Furthermore, the healthcare worker's attitudes may possess a considerable effect in the reception and effectiveness of IT utilization in practice, in accordance with the reviewed studies. There

do not appear to be any consistent indications of their likely attitude other than experience and comfort with technology (Ward, et al, 2008).

Nurses resisting information technology in the workplace has elaborated and examined on nurses' resistance to the implementation and utilization of computer systems. He discovered that 'technophobia' cannot account for the majority of opposition in this situation. Instead, the nurses' comments display that system failure is a far more viable explanation. Systems ignored the nurses' practices, which were frequently deeply ingrained, long-standing, and totally justified in the nurses' eyes. Resistance cannot be reduced to a single dimension in this setting. Rather, it was a complicated and variable occurrence (Ward, et al., 2008). Clinicians' needs for flexibility should be accommodated by information technology (IT) systems. Regarding the efficient deployment, education and training in general IT and the specific software being installed is essential (Ward, et al., 2008).

3). Technological Literacy in Nursing Education

The capacity to successfully utilization technology to access, assess, integrate, produce, and transmit knowledge in enhancing the learning process through problem-solving and critical thinking," is in accordance with the definition of technological literacy. Nes et al. (2021) asserted that nursing students are necessary to be technologically literate in order to become proficient and competent while also developing their critical thinking abilities in regard to the utilization of technology in education and the profession. As a result, nurse educators, experts, and learners need to learn how to manage the vast amount of new information, concepts, and talents which come with technological innovation (Nes et al., 2021).

Nes et al., (2021) argued that simulated electronic documentation, different teaching methods, and assessment as a learning importance enhanced the development of technological knowledge and skills in nursing education. Such approaches are in accordance with constructive alignment concepts which encompass addressing learning outcomes and determining how to achieve them by implementing a variety of teaching and learning tactics.

The study of Nes et al., (2021) unveiled a statistically substantial relationship between nursing informatics and patient safety proficiencies. It indicates that incorporating informatics aptitudes into nursing education is able to encourage students in obtaining the knowledge and skills they require to render a reliable and useful nursing care (Nes, et al., 2021).

4). NI Core Competencies

Nurses are the health workers who possess the most frequent and close contact with patients, and the most knowledge of their daily needs. Nurses possess a unique set of skills which can be implemented to the technology advancement, such as the utilization of "machine" learning and prognostic analytics to better comprehend patients' situations and for the enhancement in rendering treatment and nursing care (Nes, et al., 2021). Nursing informatics is the vehicle which produces evidence of nursing interventions' impacts to be associated with care outcomes in respect to the patient by employing health information technologies (HIT). Nursing informatics is also concerned with the organization and managing of data, information, and familiarity to enhance nursing practice and the delivery of care (Honey, et al., 2017).

5). Nurse Leaders Nursing Informatics Proficiencies

Strudwick et al. (2019) argued that identifying the nurse leader's informatics competencies is a vital initial step in safeguarding that nurse utilize health information technology systems supporting nursing practice and, as a result, practice the best feasible care and outcomes for patients. Furthermore, nurse leaders play a critical role in the procurement, operation, and optimization of information technology for health (Strudwick, et al., 2019). As a result, nurse leaders should possess distinct skills than direct care nurses in order to involve in making these decisions (Strudwick, et al., 2019). Many nations are still in the early phases of developing informatics curriculum, and as an outcome, nurse leaders may not be adequately prepared to participate in health informatics projects as examined in the study of Strudwick, et al., (2019). Given the increasing prominence of health information technology in the clinical context, nurse leader education programs should ensure students to acquire these skills (Strudwick, et al., 2019).

6). The Telehealth Competencies

Nurses should enrich the necessary knowledge, skills and attitudes (KSAs) before they are trusted to undertake one of the responsibilities. The explanation of fourteen (14) NT-EPAs (Nursing Telehealth Entrustable Professional Activities) can also be utilized to help build nursing curriculum by connecting their education to practice. The communication abilities, coaching proficiencies, the ability to employ telemedicine in conjunction with clinical experience, clinical expertise, awareness of ethical issues, and a positive mindset are the most critical skills for telehealth nurses to possess (Houwelingen, et al., 2016).

Nurses utilize technology to provide health care to patients who are in distance by various ways, from videoconferencing for psychosocial support to complete an independent double-check on high-risk medication. All of these NT-EPAs appear to specify a collection of abilities, attitudes, and knowledge (Houwelingen, et al., 2016). This problem emphasizes the necessity of identifying telehealth competencies regarding the specific telehealth tasks instead of offering a broad picture. The NT-EPAs and related skills examined in the study of Houwelingen, et al., (2016) can be utilized to construct effective training and education in home care settings, rural and remote areas or in the colleges of nursing (Houwelingen, et al., 2016).

7). Resource Organizations and Stakeholders

The expanding mandate for global electronic health information systems, shared with the growing density of healthcare services and practice, has elevated the specialty for nursing professionals. All undergraduate, graduate, and doctoral nursing programs recently require some informatics competencies (American Nurses Association, 2015). International organizations encourage the nursing informatics specialty in providing trainings, research, and guiding HEIs in setting standards.

8). The Higher Education Institutions (HEIs)

The baccalaureate program in nursing is a CHED-designed outcomes-based education (OBE) program. The PSG (Policies, Standards, and Guidelines) program was outlined in CMO 15 (Commission on Higher Education Republic of the Philippines Officer of the President, 2017). CMO 15 s. 2017 reported that the BSN curriculum owns 192 units. The Nursing Informatics course is a 3-unit professional course with two units lecture and one unit for the laboratory. The CHED Memorandum Order no. 15 highlights

14 program outcomes. One of the mentioned program outcomes concerns on the implementation of knowledge in technology and care systems and methods in health care delivery. Utilizing applicable technology in performing a prudent and effective nursing care; and developing an informatics system to assist the delivery of nursing care are the indicators of performance (Commission on Higher Education Republic of the Philippines Officer of the President, 2017).

4. CONCLUSION

During a literature review, the following set of skills surfaced: nursing care and management proficiencies, information literacy and management, computer skills, technology resources of healthcare facilities, and ethics and legal understanding in health information technology. To emphasize the importance of competencies in advancing a safe and quality care, the integration of the various competencies mentioned in it should be underlined. The core competencies in NI (nursing informatics) were primarily basic knowledge of computers, literacy (information), and management of information. Second, the inherent compassion of nurses serves as the guiding attitude in the implementation of technological skills. Finally, the technology resources required in nursing informatics help provide safe and effective patient care.

The evidence discovered the way nursing informatics has progressed over time and the necessary skills and NI standards transformed in a particular country. Only a few published studies in the Philippines to corroborate how nursing informatics education and implementation are portrayed. The majority of hospitals still utilize paper-based documentation, and hospital information management systems merely possess limited capability. However, in the field of nursing informatics, many promising initiatives arises encompassing hosting seminars, conducting trainings and workshops on how to teach informatics, organizing orientation as part of the employment process and establishing a presence on social media and in the scientific community through published articles. It is hereby recommended to continue disseminating the importance of employing technology, computers in the healthcare settings. Trainings, in-house discussion to better enhance clinical or community-based care are very much encouraged. Nurse managers and policy makers should also ensure adequate support in the period of enhancements such that health workers are more motivated to engage in the mentioned development.

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