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Original Research

# HEALTH EFFECTS OF SECONDHANDSMOKE DURING PREGNANCY ON MATERNAL AND PERINATAL OUTCOMES IN TOMOHON CITY, NORTH SULAWESI, INDONESIA

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**ABSTRACT**

**Introduction**: A study conducted in 31 countries described that over 60% of women and children are exposed to SHS outside. **Aims:** was to explore the association of secondhand smoke (SHS) exposure on maternal and perinatal outcomes in highland settings in Indonesia. **Methods:** The retrospective cross-sectional survey was used a random sampling method with 52-items of the questionnaire included information of women and infants. This study conducted with the community health center and all seven public health centers in Tomohon city, North Sulawesi, Indonesia, from May to October 2017. The participants were women who had given birth and were exposed to SHS during pregnancy. Their health condition was measured before and after pregnancy, the gestational week at birth, birth weight and height, and perinatal health conditions of the infants. **Result:** Among 234 women who completed the questionnaire and were included in the analysis. The 97% of household active smokers had a chance to smoke outside the house. Also, approximately 70% of women (162/234) reported exposure to SHS from active household smokers during pregnancy. Maternal secondhand smoke (SHS) exposure during pregnancy was significantly associated with the risk of reduction of birth weight ($p = 0.02$). Moreover, infants' birth weight of mothers exposed to SHS outside the house was significantly less than those exposed to SHS only inside ($p = 0.03$). **Conclusion:** Further research is required to focus on public smoke-free strategies to protect women and children's health from SHS in Indonesia.

**Keywords:** Birth Weight, Breastfeeding, Secondhand Smoke, Postpartum Depression, Indonesia

## INTRODUCTION

Over one billion people smoke worldwide, and around six million people die annually from the effects of tobacco use and exposure to tobacco smoke (World Health Organization, 2016). Tobacco smoking is the most preventable main risk factor or cause of death, and it relates to six of the eight leading causes of death globally. Tobacco smoking is a problem which has attracted worldwide attention in recent years and has become a global health target within the sustainable development goals. In Indonesia, the prevalence of current tobacco usage among males over 15 years or more is over 70%, and it's considered as active tobacco smokers by any means (World Health Organization, 2015). In addition, the global adult tobacco survey reported that all non-smokers are exposed to secondhand smoke (SHS) which is defined as smoke formed from the burning end of cigarettes and other tobacco products emitted into the environment and between puffs and from the mainstream smoke exhaled by the smoker ( Öberg et al., 2011; Stanković et al., 2012). SHS is found

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throughout Indonesia, particularly at home, restaurants, and public transportations (World Health Organization, 2012).

SHS exposure brings many health problems. Exposure to SHS increases the risk of cardiovascular diseases, cancers, and respiratory symptoms like cough, wheezing, chest tightness, breathing difficulty for adults, and respiratory diseases, middle ear disease, lower respiratory illness, sudden infant death syndrome for children (Jacobs et al., 2013), contributes to preterm birth (Jaddoe et al., 2008; Khader et al., 2011; Jacobs et al., 2013), and stillbirths (OR = 1.23, 95% [CI = 1.09 to 1.38] in four studies in Sweden, the US, India, and Turkey) (Leonardi-Bee et al., 2011). Maternal SHS exposure is also associated with adverse birth outcomes (i.e., low birth weight (LBW), small gestational age, maternal mental health problems) ( Jaddoe et al., 2008; Khader et al., 2011;Wahabi et al., 2013; Zhou et al., 2014; Hawsawi et al., 2015; Niu et al., 2015; Vila Candel et al., 2015; Alibekova et al., 2016; Weng et al., 2016; Suzuki et al., 2019b). Also, exposure to SHS during pregnancy was associated with a reduction in exclusive breastfeeding duration (Baheiraei et al., 2014) and discontinuing any breastfeeding types before six months (Suzuki et al., 2019a).

However, almost all the effects reported in developed countries were from the United States and Europe. Studies from the Asian countries are few. Most studies done in Asian countries were conducted in Taiwan, China, and Korea. It is already known that women and children exposed to SHS are associated with health problems. Moreover, Indonesia's prevalence of current tobacco usage is 36.2% male youth and 4.3% female youth: 56.7% adult male and 1.9% adult female. Only a few male youths and adult male smokers use smokeless tobacco, and over 70% of males age 15 years or more in Indonesia are considered active tobacco smokers by any means (World Health Organization, 2015). In addition, the global adult tobacco survey reported that all non-smokers are exposed to SHS throughout Indonesia, particularly at home, restaurants, and public transportations (World Health Organization 2012). A study conducted in 31 countries described that over 60% of women and children are exposed to SHS outside (Wipfli et al., 2008).

Women, especially pregnant women and their fetus are also exposed to SHS in many places in Indonesia. Thus, the purpose of this study was to explore the association of SHS exposure from a partner or other family members on the maternal and perinatal outcomes of pregnant women and their infants in Tomohon, North Sulawesi Indonesia.

## METHODS

### Design and setting

In this retrospective cross-sectional survey, participants were drawn from a population sample frame, and who brought their baby for a health check or immunization at community health centers (*posyandu*) of the seven public health centers (*puskesmas*) in Tomohon which is one of the cities of North Sulawesi Province in central Indonesia.

### Participants and procedure

Participants' selection included random sampling at two hospitals, seven puskesmas, and posyandu in each selected village in Tomohon. Postpartum women who were 20 years old or older and had a singleton birth within January to August 2017 and live in Tomohon were included. However, women who already moved out of Tomohon and women who did not consent to participate in this study were excluded. The questionnaires were distributed to participants by community health volunteers (kader) in each posyandu or each participant's house directly visited. Before collecting data, kaders were given an explanation of the study. Also, they were educated to collect the data from the research team. The participants first read

the consent form, and they agreed to participate. They then answered the questionnaire. The data were collected from May to October 2017.

### Sample size

The sample size was calculated with a simplified formula for proportions (Yamane, 1967). The number of 1513 deliveries in Tomohon during 2015 was used to calculate the sample size. A confidence level of 95% and a p-value of 0.05 were assumed. The minimum sample size is 316, and an increase of 10% adjusted the target sample size to compensate for participants who might be excluded from the research. Therefore, the total number of participants needed is 348.

### Measurements

The questionnaire was written in Indonesian, and it was created based on the Global Adult Tobacco Survey (GATS) questionnaire (Global Adult Tobacco Survey Collaborative, 2010),which was first designed in English and then translated into Indonesian. Also, independently back translated to English to check the quality of translation before being used for field implementation. The 52-item questionnaire included characteristics of mothers (mothers' age, parity, marital status, educational status, smoking status, occupation and working place, pre-existing condition), infants (gender, birth weight, and birth height), secondhand smoke exposure status (frequency of smoking status at home and office, smokers' information around women and infants), and health condition information for women and infants. The 20 postpartum women were recruited to validate the questionnaire from the same inclusion and exclusion criteria from the Minahasa regency, similar to the research setting before the primary research in Tomohon. After collecting the questionnaires, we only needed to make slight modifications for some items to increase clarity.

### Statistical analysis

The dichotomous data were analyzed as odds ratio (ORs) and used single and multiple logistic regression models. Continuous data were analyzed using single and multiple linear regression models. The statistical significance is determined as p values less than 0.05, and results will be shown with 95% confidential intervals (CI). Statistical analyses were performed using IBM SPSS Statistics version 25 for Mac OS.

### Ethical consideration

This researcher collaborated with Sam Ratulangi University, North Sulawesi, Indonesia, after ethical approval from St. Luke's International University, Tokyo, Japan (17-A007) and Sam Ratulangi University, North Sulawesi, Indonesia (2404/UN12/LL/2017). Participation in this research was completely voluntary after agreeing to the consent form. Also, we were informed of withdrawal by discontinuing the answers, and no disadvantage occurred to participants.

## RESULTS

### Demographics and characteristics of participants and SHS exposure status

Of the 991 eligible women enrolled at two hospitals and seven *puskesmas* in Tomohon, 348 eligible women were randomly picked to use the computer-based random number list. A total of 95 women were excluded because they were registered in the pregnancy information in *puskesmas*, but they had already moved out. Therefore, *kaders* could not locate some participants. Also, 19 women were excluded for analysis because their age was less than 20 years old or smoked during pregnancy. Finally, 234 (67.2%) women completed the questionnaire and were included in the analysis (Table 1). As many as 162 women (69.2%) reported exposure to SHS and 66 (28.2%) women were not exposed to SHS from someone in the household who was an active smoker. Also, 2.9% of smokers were

smoking only inside the home, 38.8% smoking only outside the home, and 58.3% smoking inside and outside the home. The relationship between smokers and pregnant women mainly was husbands (3.5% inside, 43.1% outside, and 53.5% of both). Other smokers were fathers (4.8% inside, 33.3% outside, and 61.9% of both).

## Association between SHS and birth weight

The prevalence of LBW where the mother was exposed to SHS was higher than non-SHS exposure mothers (12.3% of SHS exposed vs. 6.6% of non-SHS exposure). There was no statistically significant difference in the risk ratio of LBW when exposed to SHS during pregnancy compared to the non-SHS group. However, the direction of 95% CI was a higher risk of LBW for SHS exposure. (Risk ratio = 2.0, 95% CI: 0.7 to 6.2).

The existence of SHS exposure was associated with birth weight using multiple linear regression analysis. Babies born from non-exposure mothers had heavier birth weight (g) than SHS exposures (Adjusted Estimate (β) = 488.23, 95% confidence interval [CI]: 86.78 to 892.67, p = 0.02).

**Table 1.** Characteristics of Participants by Secondhand Smoke Exposure Status

| | | | Exposure status (n=228) | | |
|---|---|---|---|---|---|
| | | **Total** | **Non-SHS exposure** | **SHS exposure** | ***p* value** |
| **(%)** | | **n=234 (%)** | **n=66 (%)** | **n=162 (%)** | |
| Maternal age (n=212) | Median [IQR] Range | 27 [24, 31] 20 - 46 | 27 [24, 31] 20 - 45 | 27 [24, 31] 20 - 46 | 0.38 |
| | 20 to 34 | 190 (89.6) | 58 (92.1) | 132 (88.6) | 0.62 |
| | Over 35 | 22 (10.4) | 5 (7.9) | 17 (11.4) | |
| Maternal education level | Primary school | 3 (1.3) | 0 | 3 (1.9) | <0.001 |
| | Secondary school | 34 (15.1) | 6 (9.4) | 28 (17.9) | |
| | High school | 130 (57.8) | 29 (45.3) | 98 (62.8) | |
| | University/ College | 58 (25.8) | 29 (45.3) | 27 (17.3) | |
| Marital status | Married | 197 (88.3) | 61 (96.8) | 133 (85.8) | 0.02 |
| | Single (Divorced/Bereaved) | 26 (30.8) | 2 (3.2) | 22(14.2) | |
| Maternal occupation | Housewife | 155 (69.2) | 38 (59.4) | 116 (74.8) | 0.03 |
| | Working mother | 69 (30.8) | 26 (40.6) | 39 (25.2) | |
| Maternal smoking status before pregnancy | Yes | 10 (4.6) | 3 (4.6) | 7 (4.7) | 1 |
| | No | 209 (95.4) | 62 (95.4) | 143 (95.3) | |
| Parity | 1 | 81 (36.2) | 25 (39.1) | 52 (33.5) | 0.44 |
| | Over 2 | 143 (63.8) | 39 (60.9) | 103 (66.5) | |
| Pre-pregnancy | Median [IQR] | 22 [19.7, 25.6] 12.7 - 37.8 | 22.1 [19.7, 25.5] 14.6 - 37.0 | 22.0 [19.9, 25.8] | 0.94 |

| | | | | | |
|---|---|---|---|---|---|
| BMI (n=186) | Range | | | 12.7 - 37.8 | |
| | Under weight | 20 (10.8) | 6 (10.9) | 13 (10.3) | 0.97 |
| | Normal | 89 (47.8) | 27 (49.1) | 60 (47.6) | |
| | Overweigh t | 77 (41.4) | 22 (40.0) | 53 (42.1) | |
| Breastfeedi ng status | Exclusive breastfeedi ng | 119 (52.9) | 32 (49.2) | 85 (54.8) | 0.46 |
| | Any breastfeedi ng | 106 (47.1) | 33 (50.8) | 70 (45.2) | |
| EPDS [a] (n=218) | Median [IQR] Range | 9 [7.0, 12.0] 1 - 23 | 9 [7.0, 12.3] 1 - 19 | 10 [7.0, 12.0] 1 - 23 | 0.71 |
| | Less than score 9 | 87 (39.9) | 28 (43.8) | 57 (38.0) | 0.45 |
| | Over score 10 | 131 (60.1) | 36 (56.2) | 93 (62.0) | |

| | | | **Exposure status (n=228)** | | |
|---|---|---|---|---|---|
| | | **Total** | **Non-SHS exposure** | **SHS exposure** | ***p* value** |
| **(%)** | | **n=234 (%)** | **n=66 (%)** | **n=162 (%)** | |
| Paternal age (n=209) | Median [IQR] Range | 30 [26, 35] 17 - 50 | 30 [27, 35] 21 - 50 | 30 [25, 34] 17 - 50 | 0.30 |
| | 20 to 35 | 155 (74.1) | 45 (29.0) | 110 (71.0) | 0.61 |
| | Over 35 | 54 (25.8) | 18 (33.3) | 36 (66.7) | |
| Paternal education level | Primary school | 12 (5.4) | 2 (3.1) | 10 (6.5) | 0.02 |
| | Secondary school | 43 (19.3) | 7 (10.8) | 36 (23.2) | |
| | High school | 121 (54.3) | 35 (53.8) | 84 (54.2) | |
| | University/C ollege | 47 (21.1) | 21 (32.3) | 25 (16.1) | |
| Paternal occupation | Private employee | 49 (21.7) | 14 (21.5) | 34 (21.4) | 0.05 |
| | Government employee | 22 (9.7) | 12 (18.5) | 10 (6.3) | |
| | Entrepreneur | 45 (19.9) | 15 (23.1) | 29 (18.2) | |
| | Farmer | 32 (14.2) | 9 (13.8) | 23 (14.5) | |
| | Laborer | 28 (12.4) | 4 (6.2) | 24 (15.1) | |
| | Others | 50 (22.1) | 11 (16.9) | 39 (24.5) | |
| Types of delivery | Vaginal birth | 160 (71.4) | 42 (64.6) | 114 (74.0) | 0.19 |
| | Cesarean section | 64 (28.6) | 23 (35.4) | 40 (26.0) | |
| Household earning [b] | Rp. 2.600.000 or less | 111 (52.6) | 27 (43.5) | 84 (57.1) | 0.10 |

| | | | | | |
|---|---|---|---|---|---|
| | Over Rp. 2.600.000 | 100 (47.4) | 35 (56.5) | 63 (42.9) | |
| Types of households | Nuclear family | 67 (29.9) | 30 (46.9) | 37 (23.9) | 0.001 |
| | Joint family | 157 (70.1) | 34 (53.1) | 118 (76.1) | |
| Socioeconomic status [c] | High | 62 (29.1) | 44 (68.8) | 18 (12.1) | <0.001 |
| | Middle | 82 (38.5) | 10 (15.6) | 72 (48.3) | |
| | Low | 69 (32.4) | 10 (15.6) | 59 (39.6) | |
| Gender of baby | Boys | 111 (47.8) | 28 (42.2) | 79 (49.7) | 0.38 |
| | Girls | 121 (52.2) | 38 (57.6) | 81 (50.3) | |
| Birth week | Median [IQR] | 36.2 [36.0, 38.0] | 36.6 [36.0, 38.0] | 36.0 [36.0, 38.0] | 0.37 |
| Birth weight (n=221) | Median [IQR]<br>Range | 3100 [2800, 3400]<br>1600 - 4500 | 3000 [2900, 3300]<br>1800 -4000 | 3100 [2800, 3400]<br>1600 - 4500 | 0.93 |
| | Less than 2500 g | 23 (10.2) | 4 (6.3) | 19 (12.1) | 0.54 |
| | Normal | 192 (85.3) | 57 (90.5) | 135 (85.4) | |
| | Over 4000 g | 6 (2.7) | 2 (3.2) | 4 (2.5) | |
| Birth height | Median [IQR] | 48 [46.0, 50.0] | 48 [45.0, 49.1] | 48 [46.0, 50.0] | 0.34 |

a Cut-off point is 9/10 based on using the Edinburgh Postnatal Depression Scale (EPDS) translated into languages other than English

b Cut-off point based on regional standard salary of North Sulawesi, Indonesia in 2017 (sourced by Badan Pusat Statistik)

c Based on score of nine items of economic indicator used for principal component analysis

Moreover, the birth weight of babies whose mothers were exposed to SHS outside the house was less than those exposed to SHS inside (Adjusted β = -272.39, 95% CI: -511.84 - -32.95, p = 0.03). However, on the one hand univariate regression analysis showed there was no significant association between the existence of SHS and SHS exposure place (β = -17.51, 95% CI: -159.16 - -124.13, p = 0.81 for existence of SHS, β = -67.99, 95% CI: -154.98 - -19.01, p = 0.12 for SHS exposed place). On the other hand, the univariate regression analysis reported pre-pregnancy BMI was associated with birth weight (β = 116.38, 95% CI: 12.99 to 219.77, p = 0.03). Also, multiple regression analysis showed no significant association, but there were weak trends between pre-pregnancy BMI and birth weight (Adjusted β = 125.02, 95% CI = -15.15 to 265.2, p = 0.08). All results are shown in Table 2 and 3.

Table 4 shows the effects of SHS exposure for LBW infants. Birth weights of continuous data were categorized into two categories LBW of less than 2500 g and normal weight baby that excluded the baby weight of 4000 g or more. There was a weak trend between exposure place of SHS and LBW (AOR = 2.53, 95% CI = 0.87 to 7.43, p = 0.06). However, there was no significant association between the existence of SHS and the place of SHS and LBW.

## Association between SHS and breastfeeding

SHS exposure and breastfeeding condition had no significant association

(AOR = 1.06, 95% CI: 0.15 to 7.65, p = 0.95). Women who were married had significantly higher odds for the exclusive breastfed at two to four months than single mothers (AOR = 0.28, 95% CI: 0.09 to 0.89, p = 0.03). Moreover, the number of older mothers who exclusively breastfed at two to four months was significantly higher compared to younger mothers (AOR = 1.04, 95% CI: 1.01 to 1.29, p = 0.04) (Table 5).

**Table 2.** Effects of Secondhand Smoke Exposure for Birth Weight (Univariate regression)

| | **(β)** | **(95% CI)** | **SD** | **t value** | ***p* value** |
|---|---|---|---|---|---|
| SHS exposure | -17.51 | (-159.16 to 124.13) | 71.9 | -0.24 | 0.81 |
| SHS exposed place | -67.99 | (-154.98 to 19.01) | 44.1 | -1.54 | 0.12 |
| SHS exposed dose | -31.67 | (-188.78 to 125.44) | 79.5 | -0.4 | 0.69 |
| Smoked before pregnancy | -87.16 | (-386.03 to 211.7) | 151.6 | -0.57 | 0.57 |
| Maternal age [a] | -3.37 | (-14.74 to 8.00) | 5.77 | -0.58 | 0.56 |
| Maternal education [b] | -58.16 | (-226.15 to 108.94) | 85.0 | -0.69 | 0.49 |
| Pre-pregnancy BMI [c] | 116.38 | (12.99 to 219.77) | 52.4 | 2.22 | 0.03 |
| Parity [a] | 29.34 | (-45.63 to 104.31) | 38.0 | 0.77 | 0.44 |
| Gender of baby | -39.52 | (-165.94 to 86.91) | 64.2 | -0.62 | 0.54 |
| Paternal age [a] | -3.12 | (-13.57 to 7.33) | 5.3 | -0.59 | 0.56 |
| Paternal education [b] | -49.81 | (-198.49 to 98.87) | 75.4 | -0.66 | 0.51 |
| Household earning [d] | -22.97 | (-151.06 to 105.12) | 65.0 | -0.35 | 0.72 |

a Continuous data were used for analysis

b Category was adjusted to combine the primary with secondary and above high school as dichotomous data

c Categorized data were used for analysis

d Cut-off point based on regional standard salary of North Sulawesi, Indonesia in 2017 (sourced by Badan Pusat Statistik)

| | | | |
|---|---|---|---|
| SHS exposure | 1: Exposed | 2: Non-exposed | |
| SHS exposed place | 1: Inside of house | 2: Outside of house | |
| SHS exposed dose | 1: 1 to 6 cigarettes/day | 2: 7 to over 10 cigarettes/day | |
| Smoked before pregnancy | 1: Yes | 2: No | |
| Maternal education | 1: Completed until Secondary | 2: Completed until High School or more | |
| Pre-pregnancy BMI | 1: Under weight | 2: Normal | 3: Overweight |
| Gender of baby | 1: Boys | 2: Girls | |
| Paternal education | 1: Completed until Secondary | 2: Completed until High School or more | |
| Household earning | 1: Rupia 2.600.000/month or less | 2: Over Rupia 2.600.000/month | |

**Table 3.** Effects of Secondhand Smoke Exposure for Birth Weight (Multiple regression) _

| | **Adjusted (β)** | **(95% CI)** | **SD** | **t value** | ***p* value** |
|---|---|---|---|---|---|
| SHS exposure | 488.23 | (83.78 to 892.67) | 203.4 | 2.4 | 0.02 |
| SHS exposed place | -272.39 | (-511.84 to -32.95) | 120.4 | -2.26 | 0.03 |
| SHS exposed dose | -92.59 | (-281.39 to 96.21) | 94.9 | -0.98 | 0.33 |
| Smoked before pregnancy | -137.57 | (-659.77 to 384.62) | 262.6 | -0.52 | 0.60 |
| Maternal age [a] | -6.15 | (-34.97 to 22.68) | 14.5 | -0.42 | 0.67 |
| Maternal education [b] | 90.2 | (-277.48 to 457.88) | 184.9 | 0.49 | 0.63 |
| Pre-pregnancy BMI [c] | 125.02 | (-15.15 to 265.2) | 70.5 | 1.77 | 0.08 |
| Parity [a] | 96.81 | (-53 to 246.61) | 75.3 | 1.29 | 0.20 |
| Gender of baby | 132.27 | (-50.65 to 315.19) | 92.0 | 1.44 | 0.15 |

| | Adjusted (β) | (95% CI) | SD | t value | *p* value |
|---|---|---|---|---|---|
| Paternal age [a] | 17.43 | (-5.88 to 40.74) | 11.7 | 1.49 | 0.14 |
| Paternal education [b] | 76.6 | (-150.11 to 303.32) | 114.0 | 0.67 | 0.50 |
| Household earning [d] | -40.07 | (-223.5 to 143.36) | 92.2 | -0.43 | 0.67 |

a Continuous data were used for analysis

b Category was adjusted to combine the primary with secondary and above high school as dichotomous data

c Categorized data were s used for analysis

d Cut-off point based on regional standard salary of North Sulawesi, Indonesia in 2017 (sourced by Badan Pusat Statistik)

| | | | |
|---|---|---|---|
| SHS exposure | 1: Exposed | 2: Non-exposed | |
| SHS exposed place | 1: Inside of house | 2: Outside of house | |
| SHS exposed dose | 1: 1 to 6 cigarettes/day | 2: 7 to over 10 cigarettes/day | |
| Smoked before pregnancy | 1: Yes | 2: No | |
| Maternal education | 1: Completed until Secondary | 2: Completed until High School or more | |
| Pre-pregnancy BMI | 1: Under weight | 2: Normal | 3: Overweight |
| Gender of baby | 1: Boys | 2: Girls | |
| Paternal education | 1: Completed until Secondary | 2: Completed until High School or more | |
| Household earning | 1: Rupia 2.600.000/month or less | 2: Over Rupia 2.600.000/month | |

**Table 4.** Effects of Secondhand Smoke Exposure for Low Birth Weight by Exposure and Location

| | OR (95% CI) | *p* value | Adjusted OR (95% CI) | *p* value |
|---|---|---|---|---|
| SHS exposure | 2.02 (0.66 to 6.20) | 0.22 | 0.46 (0.06 to 3.64) | 0.56 |
| SHS exposed place | 1.83 (0.97 to 3.44) | 0.06 | 2.53 (0.87 to 7.43) | 0.06 |

Principal component analysis was used to construct and adjust the maternal age, maternal education, socioeconomic status, and parity.

| | | |
|---|---|---|
| LBW | 1: 2500 to 3999 g | 2: Less than 2500 g |
| SHS exposure | 1: Exposed | 2: Non-exposed |
| SHS exposed place | 1: Inside of house | 2: Outside of house |

**Table 5.** Effects of Secondhand Smoke Exposure for Exclusive Breastfeeding Condition

| | OR | (95 % CI) | *p* value | Adjusted OR | (95 % CI) | *p* value |
|---|---|---|---|---|---|---|
| SHS exposure | 0.80 | (0.45 to 1.43) | 0.45 | 1.06 | (0.15 to 7.65) | 0.95 |
| SHS exposed place | 0.96 | (0.67 to 1.37) | 0.81 | 0.83 | (0.24 to 2.83) | 0.76 |
| SHS exposed dose | 0.87 | (0.45 to 1.66) | 0.67 | 0.74 | (0.31 to 1.81) | 0.51 |
| Smoked before pregnancy | 1.24 | (0.34 to 4.53) | 0.74 | 0.36 | (0.03 to 5.06) | 0.45 |
| Maternal age [a] | 1.03 | (0.99 to 1.09) | 0.17 | 1.14 | (1.01 to 1.29) | 0.04 |
| Maternal occupation | 1.02 | (0.89 to 1.17) | 0.77 | 0.95 | (0.76 to 1.18) | 0.63 |
| Maternal education [b] | 1.43 | (0.68 to 3.03) | 0.35 | 0.65 | (0.13 to 3.18) | 0.59 |
| Socioeconomic status | 0.90 | (0.64 to 1.28) | 0.56 | 1.04 | (0.56 to 1.93) | 0.89 |
| Household earning | 1.02 | (0.59 to 1.78) | 0.94 | 0.91 | (0.36 to 2.30) | 0.84 |
| Types of household | 1.17 | (0.65 to 2.11) | 0.59 | 1.73 | (0.60 to 4.96) | 0.31 |
| Types of delivery | 1.24 | (0.69 to 2.23) | 0.48 | 0.69 | (0.26 to 1.81) | 0.45 |
| Parity [c] | 0.88 | (0.64 to 1.22) | 0.44 | 0.59 | (0.26 to 1.32) | 0.20 |

| | OR | (95 % CI) | *p* value | Adjusted OR | (95 % CI) | *p* value |
|---|---|---|---|---|---|---|
| Marital status | 0.69 | (0.45 to 1.07) | 0.10 | 0.28 | (0.09 to 0.89) | 0.03 |

a Continuous data were used for analysis

b Category was adjusted to combine the primary with secondary and above high schools dichotomous data

c Categorized data were used for analysis

| | | | |
|---|---|---|---|
| Breastfeeding condition | 1: Exclusive | 2: Any or only formula | |
| SHS exposure | 1: Exposure | 2: Non-exposure | |
| SHS exposed place | 1: Inside of house | 2: Outside of house | |
| SHS exposed dose | 1: 1to6 cigarettes/day | 2: Over 7 cigarettes/day | |
| Smoked before pregnancy | 1: Yes | 2: No | |
| Maternal education | 1: Completed until Secondary | 2: Completed more than High School | |
| Maternal occupation | 1: Housewife | 2: Working | |
| Socioeconomic status | 1: Low | 2: Middle | 3: High |
| Household earning | 1: Rp. 260000/month or less | 2: Over Rp. 2600000/month | |
| Types of household | 1: Nuclear family | 2: Joint family | |
| Types of delivery | 1: Virginal delivery | 2: Cesarean section | |
| Parity | 1: 1st time | 2: 2nd time or more | |
| Marital status | 1: Married | 2: Single (divorced/bereaved) | |

## Association between SHS and maternal mental health

There was also no significant association between SHS exposure and depressive symptoms. However, both results of univariate and logistic regression analysis showed social economic status were associated with postpartum depressive symptoms (AOR = 0.29, 95% CI = 0.14 to 0.62, p < 0.01). For the univariate analysis, there was no significant association between postpartum depressive symptoms and household. However, multiple logistic regression results indicated that mothers who did not live with their parents were at higher risk of postpartum depressive symptoms. The EPDS total score showed a similar trend (AOR = 0.23, 95% CI = 0.07 to 0.76, p = 0.02) (Table 6).

**Table 6.** Effects of Secondhand Smoke Exposure for Postpartum Depressive Symptoms

| | OR | (95 % CI) | *p* value | Adjusted OR | (95 % CI) | *p* value |
|---|---|---|---|---|---|---|
| SHS exposure | 1.29 | (0.71 to 2.34) | 0.40 | 5.18 | (0.57 to 46.60) | 0.14 |
| SHS exposed place | 1.07 | (0.73 to 1.55) | 0.74 | 0.68 | (0.19 to 2.47) | 0.56 |
| SHS exposed dose | 1.53 | (0.77 to 3.05) | 0.22 | 0.82 | (0.32 to 2.08) | 0.67 |
| Smoked before pregnancy | 2.06 | (0.54 to 7.92) | 0.29 | 0.28 | (0.02 to 4.89) | 0.39 |
| Maternal age [a] | 0.97 | (0.92 to 1.02) | 0.29 | 1.03 | (0.91 to 1.16) | 0.64 |
| Maternal education [b] | 0.53 | (0.23 to 1.21) | 0.13 | 0.41 | (0.08 to 2.03) | 0.27 |
| Socioeconomic status | 0.51 | (0.35 to 0.74) | <0.01 | 0.29 | (0.14 to 0.62) | <0.01 |
| Household earning | 1.46 | (0.82 to 2.58) | 0.20 | 1.93 | (0.71 to 5.28) | 0.20 |
| Types of household | 0.77 | (0.43 to 1.41) | 0.40 | 0.23 | (0.07 to 0.76) | 0.02 |
| Types of delivery | 1.02 | (0.55 to 1.87) | 0.96 | 1.78 | (0.61 to 5.19) | 0.29 |
| Parity [c] | 0.90 | (0.51 to 1.58) | 0.70 | 0.58 | (0.18 to 1.88) | 0.36 |
| Marital status | 1.27 | (0.81 to 1.98) | 0.29 | 2.51 | (0.95 to 6.65) | 0.06 |

†Cut-off point is 9/10 based on using the Edinburgh Postpartum Depression Scale translated into languages other than English

a Continuous data were used for analysis

b Category was adjusted to combine the primary with secondary and above high schools as dichotomous data

c Categorized data were used for analysis

| | | | |
|---|---|---|---|
| Score of EPDS | 1: Less than score 9 | 2: Over score 10 | |
| SHS exposure | 1: Exposure | 2: Non-exposure | |
| SHS exposed place | 1: Inside of house | 2: Outside of house | |
| SHS exposed dose | 1: 1to6 cigarettes/day | 2: Over 7 cigarettes/day | |
| Smoked before pregnancy | 1: Yes | 2: No | |
| Maternal education | 1: Completed until Secondary | 2: Completed more than High School | |
| Socioeconomic status | 1: Low | 2: Middle | 3: High |
| Household earning | 1: Rp. 260000/month or less | 2: Over Rp. 2600000/month | |
| Types of household | 1: Nuclear family | 2: Joint family | |
| Types of delivery | 1: Virginal delivery | 2: Cesarean section | |
| Parity | 1: 1st time | 2: 2nd time or more | |
| Marital status | 1: Married | 2:Single divorced/bereaved) | |

## DISCUSSION

### Main findings of this study

This research found that 97% household active smokers had a chance to smoke outside the house in Tomohon. In other words, it might define that non-smokers, mostly women and children, easily get SHS exposure outside the house. Moreover, maternal SHS exposure and SHS exposure outside the home during pregnancy were significantly associated with the risk of reduced birth weight in Tomohon. Also, there was a weak trend between SHS exposure outside the home and LBW.

Naeye (1987) found there was a weak trend for small placentas associated with LBW and that exposure to SHS during pregnancy negatively affected the placenta, increasing the risk for LBW. The possibility of older age mothers being well-educated about breastfeeding conditions, marital status, and maternal mechanism was associated with the cytokine's potential pathway. Exposure increased the risk for LBW. The mechanism was associated with the cytokine's potential pathway. Exposure to SHS increased cytokines, and it was related to lower placental weight (Niu et al., 2016). Generally, mothers exposed to inside SHS had the possibility of longer exposure times and a higher dose than mothers with outside exposure. Besides, mothers exposed to inside SHS might have inhaled more concentrated smoke compared to outside SHS exposure. Also, our research showed that over 85% of mothers are housewives in SHS exposure groups. It might be shown that exposure of women to SHS from active household smokers is more accessible inside the house.

However, Indonesian houses typically have good cross-ventilation—, where the average temperature is around 30 degrees Celsius throughout the year. Therefore, almost every house has ventilation holes other than windows. Therefore, the smoke might easily pass out from the house and be diluted by natural ventilation systems even if someone smoked inside the house. Thus, we created a hypothesis that women might have a longer and more chance to be exposed to SHS outside in Indonesia. This hypothesis is based on the public transportation systems in Indonesia. The Indonesians use small buses called micro for public transportation, and everyone can catch and ride it easily everywhere, and some passengers and drivers are often smoking inside the micro. Also, many men are smoking in masses at community meetings and parties. Thus, pregnant women are

easily exposed to SHS throughout public places, and pregnant women might be exposed to SHS even longer than inside their homes.

Our findings showed no direct statistical significance between SHS exposure and breastfeeding conditions or postpartum depressive symptoms. The findings in this study were different from the findings in our systematic review (Suzuki et al., 2019a; 2019b). However, we found that lower socioeconomic status increases the odds of depressive symptoms. The association between socioeconomic status and smoking was found in a previous study in Finland (Laaksonen et al., 2005). Also, other reviews showed that lower socioeconomic status countries, especially developing countries, had a higher prevalence of smoking (Hiscock et al., 2012). According to existing knowledge of these associations, lower socioeconomic status mothers might be exposed to higher tobacco smoking concentrations than higher socioeconomic status mothers. Moreover, there were associations of postpartum depressive symptoms with single marital status and the nuclear family. We hypothesized that single mothers and mothers in a nuclear family might have had no one to help and support them in the early demanding postpartum period. Also, for depressive symptoms and mothers' education level, there was an association between higher educated mothers and the risk of depressive symptoms. Well-educated mothers have more knowledge but also higher expectations of themselves compared to lower educated mothers. Perhaps, well-educated mothers feel a considerable challenge for baby's care, or some events happen that mothers never experienced nor expected. Then, they do not know how to cope, and it might be very stressful for them. Therefore, well-educated mothers possibly felt more nervous compared to lower educated mothers. A published study documents the association between current smoking and suicidal ideation (Hughes, 2008); smoking increases the risk of depression, anxiety, stress, and other mental health problems compared to those who quit smoking (Taylor et al., 2014). Another study reported that nicotine is the factor of depressive symptoms. However, the direct association between smoking and depressive symptoms was not clarified (Markou et al., 1998). There was an age factor. If mothers knew the benefit of breastfeeding for babies, mothers were more motivated to breastfeed (Hillenbrand and Larsen, 2002). Therefore, maternal age and breastfeeding conditions might be associated.

Of course, it would be possible to prevent adverse outcomes from SHS exposure if active smokers quit smoking in public places. According to the WHO's framework on tobacco control, it helps manage and implement tobacco control in each country. Furthermore, relatively new tobacco control packages include measures and resources. It includes six components and forms the acronym MPOWER (World Health Organization, 2008). Under the MPOWER implementation, many people will be saved from tobacco-related problems ( Dubray et al., 2015; Ngo et al., 2017; Levy et al., 2018). However, Indonesia did not embrace the WHO Framework Convention on Tobacco Control (World Health Organization, 2012). They implemented their national tobacco program and several MPOWER components; however, some components have not yet been achieved, especially a smoke-free law and anti-tobacco mass media campaigns.

The one suggestion from these results is for the public health centers to promote a "stop smoking in public places" campaign. This campaign should include several aspects, such as promoting prevention education at pregnant women's checkups. Targeting teenagers at primary and secondary schools is crucial for preventing SHS exposure because teenagers already start smoking in Indonesia (World Health Organization, 2012). Furthermore, the smoker has some

social benefits, especially for men (Kaufman et al., 2015); additionally, smoking is known to show men's masculinity as one of the cultures in Indonesia (Nichter et al., 2009). Therefore, education must also address this and provide alternatives for socializing and self-image. In Indonesia, public health centers function as primary healthcare institutions; everyone has sickness or health problems. Also, public health centers serve as community health centers. The community health centers are connected to the community by the public health center's staff. Thus, everyone has more accessible access to the community health center than the public health center, which might be too far away and not accessible. Thus, a 'stop smoking' campaign might have more impact if promoted locally by the community health centers.

### Limitations

There were several limitations to this study. First, it used under the minimum sample size for analysis. Then, we calculated the target sample size as 348. Unfortunately, we could not fulfill it, and there was only approximately 67% of the data for analysis. However, we used regression analysis to reduce some biases and confounding factors as much as possible and showed some of the effect of SHS exposure in Tomohon. While the results are general, perhaps if we had achieved the target sample the results might be different.

Second, the data about SHS exposure situations during pregnancy were collected from self-reports from postpartum women and the questionnaire distributed at two to four months postpartum; therefore, it may include recall bias and performance bias. Performance bias might be minimized because the results of this study had no direct benefit to participants; therefore, they had nothing to gain by obscuring the truth. We considered both recall bias and performance bias.

Third, cotinine levels in the body indicating SHS exposure were not verified. The SHS exposure status measured was only from the self-report questionnaire. Also, the number of non-SHS-exposure women was approximately half compared to SHS exposures. Therefore, more participants and reliable data by testing urinary, blood, or hair cotinine levels are required for future research.

## CONCLUSION

In conclusion, maternal SHS exposure during pregnancy was associated with reducing infants' birth weight compared to non-maternal SHS exposure in Tomohon. However, there were no statistically significant associations between maternal SHS exposure and breastfeeding condition at two to four months and postpartum depressive symptoms. Further research is required in other areas in North Sulawesi province and should focus on interventions to prevent SHS exposure at home and in public places.

Also, one of our suggestions is to accept and follow WHO tobacco frameworks or smoke-free policy, especially in a public place, which may decrease the chance of SHS exposure of women, children, and other non-smokers. Besides, it is most important to educate fathers as to how SHS is harmful to women and children. Therefore, some promotion will be needed to hold and inform them in puskesmas about adverse effects of SHS and to consider the smoking place. Moreover, parent perinatal education classes will be held led by puskesmas and then educating both women and their partners might be helpful to reduce smokers inside the house.

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Original Research

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# FACTOR RELATED TO PERFORMANCE OF PAPRINGAN BATIK WORKERS, BANYUMAS REGENCY DURING THE COVID-19 PANDEMIC

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**ABSTRACT**

**Introduction**: The COVID-19 pandemic has an impact on various sectors including small medium enterprise. One of the small medium enterprises affected by the COVID-19 pandemic is Batik Papringan in Banyumas Regency. The decline in income due to the pandemic caused batik to experience a decline in performance. The decline in performance also had an impact on the amount of batik and the income generated. **Aims:** to determine the factors related to the performance of Batik Papringan Workers in Banyumas Regency. **Methods:** The research was conducted with a sample of 48 batik workers. The instrument is questionnaire. The questionnaire in this research is a self-developed questionnaire which was developed from a validated and reliable questionnaire. The analysis was performed using chi-square to examine the relationship between the 2 variables and logistic regression to determine the factors most associated with performance. **Result:** The results showed that in the bivariate test, age and work satisfaction were factors related to performance, while in the multivariate test the most related factors were work satisfaction. The p value of the relationship between work satisfaction and performance is 0.049. **Conclusion:** The conclusion of this study work satisfaction is the factor most related to the performance of batik makers that needs to be improved. The solution that can be done is to apply strategies and tricks in marketing batik products to consumers so that consumers are more interested in buying batik. The more batik is sold, the more worker satisfaction increases.

**Keywords:** Factor, Performance, Worker

## INTRODUCTION

The COVID-19 pandemic has caused global economic uncertainty in several countries, including Indonesia (Nasution et al., 2020). As of July 9, 2020, The Indonesian Ministry of Health reported 70,736 positive confirmed cases with 3,417 deaths (Indonesian Ministry of Health, 2020). Sukmana and Yuniarti (2020) say those who are confirmed positive for COVID-19 can show clinical symptoms or not but will show positive results for COVID-19 based on laboratory tests. The clinical symptoms caused by COVID-19 are many kinds from shortness of breath, cough, fever, nausea, headache, diarrhea and abdominal pain. This will be exacerbated when people infected with COVID-19 are comorbid (have comorbidities such as hypertension, diabetes, heart, lungs and so on). Apart from having health impacts, COVID-19 has a domino effect, in various sectors such as the economy, tourism, trade, investment and social affairs. The impact of COVID-19 on the economic sector has led to a downturn in small medium enterprises (SME). Azimah et al. (2020) said that the impact of COVID-19 on the SME sector was enormous. The government's lockdown policy suddenly stopped economic activity accompanied by a decrease in demand for products and supplies worldwide.

One of the SMEs that have long existed in Indonesia is batik. Various regions in Indonesia produce batik according to their distinctive patterns or motifs. Banyumas is one of the batik-producing districts. The area in Banyumas Regency which is known as the center of batik is Papringan District. The resulting batik is often referred to as Batik Papringan. Batik Papringan Banyumas is a batik

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product produced by workers who are members of the joint business group and batik home industry workers in Papringan, Banyumas Regency. Based on the results of interviews conducted by researchers, Batik Papringan workers experienced a decline in income during the COVID-19 pandemic. The decline in income experienced by Batik Papringan workers was caused by a decrease in the consumer demand for Batik Papringan. The decrease in the amount of income experienced by workers causes a decrease in the motivation and job satisfaction of Batik Papringan workers. Batik Papringan workers are less enthusiastic about working and less satisfied with the results of their current work due to decreased income during the COVID-19 pandemic.

Worker performance is a very important aspect of work. The performance will not be optimal if you only rely on production equipment or machines without paying attention to aspects of humans or workers. Maximum workforce performance is expected to achieve optimal productivity levels according to standards (As'ad, 2001). Performance is the act of carrying out tasks by workers within a certain and measurable time. Problems in the work environment related to work productivity are not only about machines, work environment, money, and equipment but also concerning human resources who manage production factors (Suharnomo and Mas'ud, 2005). High human performance cannot be separated from the factors that influence it. According to Simanjuntak (2005), three factors influence performance, namely individual, organizational, and management factors. Individual factors are factors that come from within the individual himself, namely health, education, experience, achievement, and needs. Organizational factors are job descriptions, positions, work relationships, and salaries or wages. Management factors are conceptual skills, interacting with other people, and technical skills. Laminia and Muniroh (2018) state that motivation can also be a factor in one's performance. This is in line with Elvina and Chao (2019) who state that there is an effect of individual motivation on employee performance at VTB Bank Russia. Motivation is something that can move and make someone passionate about something. Kuswati's (2020) research showed that there is significant relationship between motivation and work performance at Majalengka Regency Education Office.

Motivation has a close relationship with a person's behavior. Motivation can make how a person initiates behavior, directs, supports, and strengthens. Motivation in a person is the power to create something to achieve goals and self-satisfaction. Motivation plays an important role in job satisfaction, achievement, opportunities for advancement, recognition from other individuals, career development, and responsibility. The results of research show that there is a significant relationship between work motivation and the performance of employees at PT KAO Indonesia. Performance is the result of a complex process that is influenced both within and outside of the worker (Jaya and Ningsih, 2018). This is in line with Mensah and Tawiah (2016) who state that there is a relationship between work motivation and performance in mining workers in Ghana. This study shows that intrinsic motivation gives job satisfaction and affects at doing a good job.

Job satisfaction is the psychological and physiological aspects of employees satisfaction with job environmental factors, in other words, as employee subjective responses to the working environment (Lee et al., 2017). According to Luthans (2006), a person's job satisfaction can be seen from several indicators, namely the job itself, salary or income, opportunities for promotion, supervision, and co-workers. Job satisfaction greatly affects a person's commitment to providing the best performance for his workplace. Satisfaction can make workers give their best effort to achieve company or workplace goals. Job satisfaction is directly linked to employee

engagement. The literature confirms that satisfied employees perform better and contribute to the overall success of an organization (Shmailan, 2016). This is in line with the research of Subariyanti (2017) which showed that there is a relationship between job satisfaction and the performance at the workers of PTLR BATAN. In addition, Rosmaini and Tanjung (2019) said that there was an effect of job satisfaction on employee performance at the workers of Department of Public Works and Public Housing at Aceh Tamiang Regency.

The period of the COVID-19 pandemic, which is a new thing for all citizens of the world, has a broad impact, including on the economy, especially UMKM workers such as batik. The motivation and job satisfaction of the batik workers, one of which is the Papringan Batik worker, needs to be studied. This is because motivation and job satisfaction are factors that are thought to affect the performance of the Papringan batik. The study of work motivation, job satisfaction, and performance is expected to be useful for increasing the productivity and income of Batik Papringan workers in Banyumas Regency.

## METHOD

Research on work motivation, job satisfaction, and performance of Batik Papringan workers, Banyumas Regency, was conducted with a cross-sectional research design. The research was conducted by taking the population, namely all Batik Papringan workers who were still productive, while the research sample was determined by inclusion criteria. The inclusion criteria consist of female batik workers in the southern region in Papringan and not being sick when the study was conducted. The respondents of this research are females in the southern region because batik workers in the northern region of Papringan were shown to be valid and reliable test respondents. The exclusion criterion was not wishing to be research respondents. The research was conducted using a questionnaire instrument. This questionnaire is a self-developed questionnaire tested to other batik workers in the northern region of Papringan. The researcher asked several question items to the respondent. Based on the validity and reliability using Pearson correlation test, it showed that p value of the item questionnaire is <0.05 and Cronbach's alpha value is 0.80. The questionnaire consists of three types, work motivation, work satisfaction, and performance. The item of work motivation questionnaire consists of 10 questions, work satisfaction consists of nine questions, and performance consists of nine questions. Data from the variables of work motivation, work satisfaction, and performance are categorized as good if above the mean or median value, while categorized as not good if below the mean or median value. Based on the univariate test, it showed that good work motivation is >38, bad work motivation <38; good work satisfaction is >35, bad work satisfaction is <35; good performance >31, bad performance is <31. Data were analyzed using SPSS 23 software and bivariate chi-square test. Apart from the variables of work motivation, job satisfaction, and performance, the characteristics of Batik Papringan workers were also examined and which consisted of age, education, years of service, and length of work. The characteristics of each variable are described into frequency distribution and percentage. After all variables were tested bivariate, a multivariate test was carried out by including variables that had a significance value (p) <0.25. The analysis test used on multivariate is logistic regression test. The logistic regression was used to determine the most influencing variable to the performance of Batik Papringan workers based on the odds ratio n p value of each variable.

This research is conducted based on the permission of the ethics commission of Faculty of Health Sciences Universitas

Jenderal Soedirman. The number of the ethics letter is 324/EC/KEPK/3/2021.

## RESULT

**Table 1.** Characteristics of Batik Papringan Workers

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age (Years)** | | |
| 6-15 | 1 | 2.08 |
| 16-25 | 2 | 4.17 |
| 26-35 | 7 | 14.58 |
| 36-45 | 17 | 35.42 |
| 46-55 | 12 | 25.00 |
| 56-65 | 7 | 14.58 |
| 66-75 | 2 | 4.17 |
| Total | 48 | 100 |
| **Education** | | |
| Elementary School | 36 | 75 |
| Junior High School | 8 | 17 |
| Senior High School | 4 | 8 |
| Bachelor Degree | 0 | 0 |
| Total | 48 | 100 |
| **Work Period (Years)** | | |
| 1-10 | 12 | 25.00 |
| 11-20 | 17 | 35.42 |
| 21-30 | 6 | 12.50 |
| 31-40 | 9 | 18.75 |
| 41-50 | 4 | 8.33 |
| Total | 48 | 100 |
| **Work Duration in a Day** | | |
| 1-4 | 13 | 27.08 |
| 5-8 | 34 | 70.83 |
| 9-12 | 1 | 2.08 |
| Total | 48 | 100 |

Based on Table 1, most of the Batik Papringan workers have a primary school education, as many as 36 workers (75%). There are no Batik Papringan workers who take the lecture bench. Besides, as many as eight workers (17%) have junior high school education and as many as four workers (8%) are a senior high school.

**Table 2.** Distribution of Work Duration in Batik Papringan Workers, Banyumas

| Work Duration in a Day | Frequency (n) | Percentage (%) |
|---|---|---|
| 1-4 | 13 | 27.08 |
| 5-8 | 34 | 70.83 |
| 9-12 | 1 | 2.08 |
| Total | 48 | 100 |

Based on Table 1, most of the Batik Papringan workers have a working period of 11-20 years, as many as 17 workers (35.42%). Besides, as many as 12 workers (24%) have worked for 1-10 years. Batik Papringan workers have at least a 41-50 years work period, namely four workers (8.33%). Based on the results of interviews conducted by researchers, a small proportion of Batik Papringan workers have

made batik since childhood (when they were in elementary school). Therefore, until now the elderly batik workers have a very long working period, namely between 41-50 years.

Based on Table 1, most Batik Papringan workers have a working length of 5-8 hours/day, as many as 34 workers (70.83%). Besides, 13 workers (27.08%) worked 1-4 hours/day, namely 13 workers (27.08%) and one worker (2.08%) had 9-12 hours/day of work. day.

The following are the results of the data normality test using Kolmogorov Smirnov:

**Table 3.** Data Normality Test Results with the Kolmogorov-Smirnov Test

| Variable | Signification (p) |
|---|---|
| Work motivation | 0.263 |
| Work satisfaction | 0.175 |
| Performance | 0.297 |

The results of the data normality test indicate that the data are normally distributed; therefore the data categorization of the variables is based on the mean value. Age, education level, work period, work duration, work motivation, work satisfaction, and performance are categorized as good or above the mean and not good if they are below the mean. The relationship between age, education level, work period, work duration, work motivation, and work satisfaction with performance was measured by the bivariate test using the chi-square test. Based on the univariate test, it showed that good work motivation is >38, bad work motivation <38; good work satisfaction is >35, bad work satisfaction is <35; good performance >31, bad performance is <31. This value is obtained from the value of mean of each variable.

The variables are categorized into groups consisting of: age (not productive yet, productive, and less productive, education level (elementary school, junior high school, senior high school, and bachelor degree), work period (long and short), work duration (≥ 8 hours a day and <8 hours a day), work motivation (high and low), and work satisfaction (high and low).

The univariate analysis is conducted to know the frequency and percentage of each variable to work satisfaction. The univariate analysis showed that majority the workers are still productive (42 workers). But in the majority, all of them have good enough performance at their job. Only one worker is not productive yet and two workers are less productive. In the majority, the education level of the workers is elementary school. The workers who have elementary school are 36 workers with good enough performance are 31 workers. The work motivation and satisfaction majority is high.

**Table 4.** The Frequency Distribution of Age, Education, Work Period, Work Duration, Work Motivation, and Work Satisfaction to Performance of Batik Papringan Workers, Banyumas

| Variable | Performance | | | | Significance |
|---|---|---|---|---|---|
| | Good | | Good Enough | | |
| | f | % | f | % | |
| a. Age | | | | | |
| Not productive yet (<15 years old) | 1 | 100 | 0 | 0 | 0.023 |
| Productive (15-64 years old) | 6 | 14 | 37 | 86 | |
| Less Productive (>64 years old) | 2 | 50 | 2 | 50 | |
| Total | 9 | 18.8 | 39 | 81.2 | |
| b. Education Level | | | | | |

| Variable | Performance | | | | Significance |
|---|---|---|---|---|---|
| | Good | | Good Enough | | |
| | f | % | f | % | |
| Elementary School | 5 | 13.9 | 31 | 86.1 | 0.285 |
| Junior High School | 3 | 37.5 | 5 | 62.5 | |
| Senior High School | 1 | 25 | 3 | 75 | |
| Bachelor Degree | 0 | 0 | 0 | 0 | |
| Total | 9 | 18.8 | 39 | 81.2 | |
| c. Work Period | | | | | |
| Short (<3 years) | 5 | 29.4 | 12 | 70.6 | 0.161 |
| Long (>3 years) | 4 | 12.9 | 27 | 87.1 | |
| Total | 9 | 18.8 | 39 | 81.2 | |
| d. Work Duration | | | | | |
| ≥ 8 hours a day | 1 | 29.4 | 8 | 70.6 | 0.515 |
| < 8 hours a day | 8 | 12.9 | 31 | 87.1 | |
| Total | 9 | 18.8 | 39 | 81.2 | |
| e. Work Motivation | | | | | |
| High | 4 | 16 | 21 | 84 | 0.073 |
| Low | 5 | 21.7 | 18 | 78.3 | |
| Total | 9 | 18.8 | 39 | 81.2 | |
| f. Work Satisfaction | | | | | |
| High | 6 | 14.3 | 36 | 85.7 | 0.036 |
| Low | 3 | 50 | 3 | 50 | |
| Total | 9 | 18.8 | 39 | 81.2 | |

Variables that had a p-value <0.25 were entered for the multivariate test with logistic regression. The variables that have a p-value <0.25 are age, work motivation, and job satisfaction. The results of the logistic regression multivariate test showed that the variable most related to performance was job satisfaction. The following are the results of the logistic regression multivariate test of age, work motivation, and job satisfaction with performance:

**Table 5.** Multivariate Logistic Regression Test Results of Age, Work Motivation and Job Satisfaction with Performance on Papringan Batik Workers, Banyumas Regency

| Variable | Significance (p) | Odds Ratio (OR) |
|---|---|---|
| Age | 0.325 | 0.001 |
| Work Motivation | 0.608 | 0.615 |
| Work Satisfaction | 0.049 | 8.644 |

The results of the logistic regression multivariate test showed that job satisfaction was the variable most related to the performance of Batik Papringan workers in Banyumas Regency with a significance value (p) of 0.049 and OR 8.644. This showed that employees of Batik Papringan, Banyumas Regency, who have good job satisfaction have a performance of 8,644 times better than workers who have less good job satisfaction. This is means that the more the work satisfaction of the Batik Papringan workers, the more the performance also of the
Batik Papringan workers.

## DISCUSSION

The results showed that there was a relationship between the age of the workers and the performance of the Batik Papringan workers, Banyumas Regency. This is in line with the results in which Handayani et al. (2018) state that there is a significant relationship between age and performance

of health workers at inpatient department of Batusangkar Hospital. Productive ages have higher productivity and performance compared to workers of an old age. Workers who are still of productive age have better physical and health than workers who are not yet or less productive Aprilyanti (2017). The results showed that most of the Batik Papringan workers, Banyumas Regency were productive (15-64 years), as many as 43 workers (89.58%). This is reinforced by Notoadmodjo (2009) who states that workers aged 45-60 years will start to pursue and improve the quality of their work. Workers aged 25-44 years will establish themselves in the job they choose and are not interested in choosing another job if they are not pressed.

The results of the bivariate test using the chi-square show that there is a relationship between job satisfaction and the performance of Batik Papringan workers, Banyumas Regency, with a significance value (p) = 0.036 <0.05. This is in line with Bakotić (2016) who states that there is a relationship between job satisfaction and performance in workers in Croatian companies. Employers should take initiatives to motivate employees by improving their work environment. As employees are motivated, their job performance will increase, and they will achieve the desired outcomes and goals of the job. Thus, increasing the employers' satisfaction (Al-Omari and Okasheh, 2017). The results of research by Kusuma and Said (2017) showed that there is a significant relationship between job satisfaction and performance in vocational school teachers in Batu City, Malang. The results of the analysis show that of the 185 SMK teachers who were respondents, 117 teachers stated that they had high job satisfaction and performance. The higher the job satisfaction, the higher the resulting performance in a workplace or organization.

Workers who are not satisfied with their work will show poor performance and become a barrier for workers to achieve success (Shmailan, 2016). However, the results of the bivariate analysis of job satisfaction and performance of Batik Papringan workers, Banyumas Regency, show that workers who have high job satisfaction have poor performance. This is thought to be due to the workers' abilities in completing a job that is not good enough. Batik Papringan workers, Banyumas Regency, during the COVID-19 pandemic experienced a decline in demand, causing a decrease in income. The decrease in income caused workers to do batik work not as their main livelihood or in other words as a side job. This caused workers not to spend all their abilities to make batik as much as possible because of decreased income. Ability that is not optimal causes a decrease in the performance of batik makers. This is in line with Kumala et al. (2018) who said that a person will perform well if he has two things, ability and motivation. Competence affects the performance of vocational school teachers in Batu City, Malang. Yaşar et al. (2013) stated that competence is related to the performance of workers in various industries in Turkey including banking, cargo, communications, food and catering, finance, publications, retail, technology, and tourism. Competence is the workability of each individual including knowledge, skills, and attitudes by existing standards.

Kartika and Sugiarto (2016) stated that there is a relationship between competence and the performance of office administration employees at Satya Wacana Christian University (SWCU) Salatiga. Apart from the ability (competence), workers who have high-performance satisfaction but underperformance are thought to be caused by batik infrastructure and inadequate environmental conditions. The results of observations made by researchers indicate that the infrastructure and work environment of the batik is still far from standard. This can be seen from the batik makers who do not use comfortable (ergonomic) chairs when making batik, poor lighting in the batik production area,

the place for batik making that does not apply the 5Rs (compact, neat, clean, care, diligent), the workplace is narrow, the work attitude is bent and static for a long time, and do not use Personal Protective Equipment (PPE) when making batik. This unsafe behavior and unsafe work environment make the performance of the batik not optimal even though the batik already has high job satisfaction. The lack of knowledge and attitudes of batik makers about Occupational Health and Safety makes workers feel that the behavior and conditions of their current work environment are up to standard and comfortable to use. This is in line with Singh and Ahuja (2014) who stat that implementing housekeeping can increase worker motivation, worker productivity, prompt delivery of goods, safety, reduce machine breakdowns, customer complaints, and worker absenteeism among workers in the Toyota production system in India. Besides, Bayuaji et al. (2017) said that sufficient lighting will improve individual performance. Insufficient lighting will increase fatigue, thereby reducing visual abilities and affect the performance of Universitas Islam Indonesia (UII) students. Furthermore, Makhbul et al. (2013) stated that there is a correlation between an ergonomic workplace and work stress on electronic goods operator workers of the Malaysian International Trade and Industry Agency.

The results of the analysis using the bivariate chi-square test showed that there was no relationship between the level of education and performance of Batik Papringan workers, Banyumas Regency. According to Mahmudi (2005), performance is influenced by several factors, including personal factors (knowledge, skills, abilities, self-confidence, motivation, and commitment), leadership factors (encouragement, enthusiasm, direction, and support from superiors), team factors (enthusiasm and support from colleagues), system factors (work systems, work facilities, organizational culture), and situational factors (pressure and changes in the external and internal environment). The absence of a relationship between the level of education and the performance of Batik Papringan workers, Banyumas Regency, is thought to be due to the lack of skills and infrastructure, and the majority of respondents who have elementary school education (SD). Education level is often defined as the level of knowledge. Sutrisno et al. (2017) state that knowledge as a component of competence often fails to predict human resource performance. Knowledge scores for certain fields accompanied by an increase in education level are not successful in measuring the knowledge and skills that should be carried out on the job. This is in line with Sayekti and Nugraha (2014) who state that the performance of foreman tapping at PT Perkebunan Nusantara VII is influenced by abilities which include not only knowledge but also skills at work. Besides, the research results also show that there is a relationship between compensantion and motivation in which motivation is also measured by workplace condition. The unsupportive work environment for the batik makers in Papringan, Banyumas Regency, has resulted in decreased skills and performance.

The results of the analysis using the bivariate chi-square test showed that there was no relationship between tenure and performance. The absence of a relationship between tenure and performance at batik makers in Papringan, Banyumas Regency, is thought to be due to decreased income during the COVID-19 pandemic. This is in line with the research of Azimah et al. (2020) which states that there is a link between the COVID-19 pandemic and a decrease in turnover and income for market traders in Klaten and Wonogiri cities. Indayani and Hartono (2020) said that, during the COVID-19 pandemic, Indonesian society experienced a decline in growth. This has an impact on decreasing

income and increasing the number of unemployed.

The results of the bivariate test using the chi-square show that there is no relationship between the length of work and performance of batik makers in Papringan, Banyumas Regency. The absence of a relationship between the length of work and performance is thought to be caused by the batik making taking up less use of their daily working hours because they often do other activities while making batik. The multitasking between the roles of the batik and the housewife makes the batik workers less focused and maximal in making batik. The role of being a housewife, taking care of children and families makes women who work as batik workers expend more energy when compared to women who do not play multiple roles. This is in line with Iswari and Pradhanawati (2018) who state that there is a strong and positive correlation between multiple roles and the performance of female employees at PT Phapros Tbk. Multiple roles affect employee performance results as much as 13.6%. Moreover, Japlani (2020) also stated that there is a positive correlation between dual role conflicts in nurses and the performance of nurses at Metro City Hospital. Family and work demands can reduce a woman's physical and psychological strength.

The results of the analysis using the bivariate chi-square test showed that there was no relationship between work motivation and performance of Batik Papringan workers, Banyumas Regency. The absence of a relationship between work motivation and performance is thought to be caused by the COVID-19 pandemic, which made the demand for batik products decrease, causing the income of batik makers to also decline. The COVID-19 pandemic has an impact on various sectors including the people's economy. This is in line with Rosita (2020) who states that there is a decrease in income at MSMEs engaged in food and beverages, wood and rattan handicraft business units, wholesale and retail tourism, motorcycle repair, and transportation. Nasruddin and Haq (2020) stated that the existence of large-scale restrictions on physical activity caused economic losses. People who work in the informal sector feel confused about fulfilling their daily needs. Large scale social restrictions have caused offices and industries to experience restrictions on operations and production, causing losses. Since this instruction, the transportation sector lost passengers and food order customers have also decreased, so that they have difficulty fulfilling their daily needs.

The government also has to think of a solution to this condition. The decision and rule must include two aspects, health and economic. The rule has to have impact in increasing the health and economic level. People have to be healthy and also have income to survive. Health protocol must be conducted under the strict supervision and cooperation among many stakeholders, both government and society. This cooperation is expected to be the solution of COVID-19 pandemic in the world. The strength of this research is that there is still little research on performance of informal sector workers, especially batik workers. This also can give benefits to batik workers on how to increase performance in order to increase income each month. The weakness of this research is only a few variables were measured. Next time, researchers can measure others variables related to performance such as incentive and workload.

## CONCLUSION

There are several factors related to the performance of Batik Papringan workers, Banyumas Regency, namely age and job satisfaction. The factor most related to the performance of the batik is job satisfaction. Most of the batik makers have high job satisfaction with poor performance. This is because the batik makers are satisfied even though they do not spend all their abilities and skills due to insufficient demand and income during the COVID-19 pandemic.

Therefore, even though the batik worker is not giving their s best performance, the batik worker is already satisfied with the performance that has been produced. The period of the COVID-19 pandemic had an impact on the economy and finances of Papringan batik makers, Banyumas Regency. Therefore, we need strategies and tricks on how to do marketing that can attract consumers to buy their products.

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Original Research

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# BEHAVIOR OF EXCLUSIVE BREASTFEEDING AND ASSOCIATED FACTOR AMONG MOTHERS IN THE FORMAL SECTOR, INDONESIA

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**ABSTRACT**

**Introduction:** Based on data from the Strategic Plan (Strategic Plan of the Ministry of Health) in 2018 nationally, coverage of infants obtained exclusive breastfeeding in 2018 which is 68.74%. Based on data on the coverage of exclusive breastfeeding at Puskesmas Kelurahan Utara, 45.5% is still below the Indonesian government's national target. **Aims:** Determine the factors related to exclusive breastfeeding behavior in Posyandu RW 06 Puskesmas Kelurahan Utara Kembangan Utara West Jakarta. **Methods:** This study uses a quantitative research type with a cross-sectional design. The study population was all mothers who had babies aged 7 to 12 months with a sample size of 94 mothers with stratified sampling as the sampling technique.. Data analysis was performed using the chi-square test. **Result:** Univariate results were the highest proportion of mothers who gave exclusive breastfeeding (66%), good knowledge (72.3%), working mothers (51.1%) and supporting families (55, 3%). There is a relationship between maternal knowledge (PR = 2,308, 95% CI: 1,362-3,909), and family support (PR = 5,365, 95% CI: 2,437-11,811) with exclusive breastfeeding behavior in Posyandu Puskesmas Kelurahan Kembangan Utara West Jakarta. **Conclusion:** Mothers give exclusive breastfeeding because it is easy to give without the hassle of making formula milk and the cost is cheap so that mothers can save on expenses without having to buy milk formula and baby's weight always increases every month. It is hoped that you can add material and provide education about the role of the family in breastfeeding exclusively when the mother controls the womb with the family.

**Keywords** : Exclusive breastfeeding, family support, knowledge, mother's occupation

## INTRODUCTION

Exclusive breastfeeding is a natural first food for babies. Exclusive breastfeeding contains all the nutrition a baby needs for the first thousand days of life. Breastfeeding has many benefits not only for the health of the baby but also for the mother. By breastfeeding, it means providing the best nutrition for the healthy growth and development of a baby. In order to reduce infant morbidity and mortality, UNICEF and WHO recommend that babies only be breastfed (ASI) for at least six months, and breastfeeding is continued until the baby is two years old. In order for mothers to maintain exclusive breastfeeding for six months, WHO recommends initiating breastfeeding within the first hour of life, babies only receive breast milk without additional food or drink, including water, breastfeed as requested or as often as the baby wants, and do not use bottles or pacifiers (WHO, 2005).

The United National Children's Foundation (UNICEF) states that as many as 44% of the world's newborns get breast milk within the first hour of birth, but fewer babies under the age of six months are breast milked exclusively. Exclusive breastfeeding coverage in Central Africa is 25%, Latin America and the Caribbean as much as 32%, East Asia as much as 30%, South Asia as much as 47%, and developing countries as much as 46%. Overall, less than 40% of children under the age of six months are fed breast milk exclusively. The WHO target in 2025 is to increase exclusive breastfeeding for the first six months at least 50% (WHO, 2015).

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Colostrum is one of the ingredients in exclusive breastfeeding which is rich in antibodies because it contains protein for endurance and is useful for killing high numbers of germs so that exclusive breastfeeding can reduce the risk of death in infants. Yellowish colostrum is produced on the first to the third day. The fourth to the tenth day of breastfeeding contains less immunoglobulin, protein, and lactose than colostrum but the fat and calories are higher with whiter milk color. Apart from containing food substances, breast milk also contains certain enzymes that function as absorbent substances that will not interfere with other enzymes in the intestine. Formula milk does not contain these enzymes so that the absorption of food depends entirely on the enzymes present in the baby's intestine (Indonesian Ministry of Health RI, 2018).

The target of the Ministry of Health's Strategic Plan (Renstra) regarding exclusive breastfeeding in 2018 is 47%, but in Indonesia there are six provinces that have not reached the target, in addition, there are nine provinces that have not collected data. Nationally, the coverage of infants receiving exclusive breastfeeding in 2018 is 68.74%, the highest percentage of coverage of exclusive breastfeeding is in West Java Province (90.79%), while the lowest percentage is in Gorontalo Province (30.71%).

In Indonesia, 31.36% of 37.94% children are sick, because they do not receive exclusive breastfeeding. Exclusive breastfeeding can reduce infant mortality due to infection by 88%. In addition, breastfeeding also contributes to a reduction in the risk of stunting, obesity and chronic disease in the future (Indonesian Ministry of Health RI, 2018).

According to the Dinas Kesehatan Provinsi DKI Jakarta (2017), the number of babies who received exclusive breastfeeding was 20,583 babies 0-6 months from a total of 34,888 babies 0-6 months or only around 59.5% who received exclusive breastfeeding. There was a decrease of 7.7% when compared to the number of babies who were exclusively breastfed in 2015 amounting to 67.1% of the total number of babies. One of the factors affecting exclusive breastfeeding in Jakarta decreasing is due to the large number of housewives who work and help to seek family income sources. The area with the lowest percentage of exclusive breastfeeding was in the West Jakarta area of 41.70%.

The consequences of not giving exclusive breastfeeding are that it can cause diseases related to the baby's weak immune system, such as malnutrition, obesity, stunting, low intelligence quotients (IQ) and can cause death (Roesli, 2000). Factors that can affect breast milk exclusively include maternal characteristics (knowledge, education, occupation, age, parity and attitude), environment (information disclosure, facilities and infrastructure), family support and support from health workers. All of these factors have their own contribution in creating the expected behavior in exclusive breastfeeding ((Indonesian Ministry of Health RI, 2014).

Previous research says good knowledge will make it easier for someone to change behavior including the practice of breastfeeding, so it states that there is a relationship between respondents' knowledge of breastfeeding and exclusive breastfeeding (Sriningsih, 2011). Apart from other factors that can influence exclusive breastfeeding, one of the success factors of breastfeeding is work. The results of this study indicate that there is a relationship between maternal work and exclusive breastfeeding (Khoiriah et al., 2018). Another factor that influences the behavior of exclusive breastfeeding is family support, this factor is in accordance with previous research which states that there is a relationship between family support and exclusive breastfeeding (Mamangkey et al., 2018).

The Kembangan District Health Center is located in Kembangan Utara

Village, precisely on Jl. Kembangan Raya Rt. 005/002 Kembangan Utara Village, Kembangan District, West Jakarta Administrative City. Kembangan Sub-District Health Center leads six village health centers. Puskesmas Kelurahan Kembangan Utara is a health center with the lowest exclusive breast milk coverage of 45.5% , still far from the national target of 80%. Puskesmas Kelurahan Kembangan Utara Has nine RW. Where RW 6 has four posyandus and has the largest baby population compared to other RWs. One of the impacts that occurred in infants aged 6-12 months was 21 people with malnutrition, 75 obesity and 12 stunting (Puskesmas Kecamatan Kembangan, 2018).

## METHODS

This research uses quantitative research design with cross-sectional research design, namely research in which variables including risk factors and variables including effects are observed at the same time by using interviews with questionnaire measuring instruments. The dependent variable in this study is the behavior of exclusive breastfeeding, while the independent variables are knowledge, work and family support.

In this study, a sample of 94 mothers who had babies aged 7 to 12 months based on four posyandus were 26 samples of Posyandu Cambodia 1, 15 samples of Cambodia 2, 43 samples of Cambodia 3 and 10 samples of Cambodia 4. The sampling technique used in this research is stratified sampling, which is a sampling technique stratifying the population first, which identifies the general characteristics of members of the population which then determines the strata or layers of the population units. The inclusion criteria in this study were mothers who came to posyandu at RW 06 (Cambodia 1, Cambodia 2, Cambodia 3 and Cambodia 4) who had babies aged 7 to 12 months and were willing to be respondents. The exclusion criteria in this study were mothers who were not willing to be interviewed and mothers who did not have babies.

This research has passed the ethical review from the Research Ethics Commission of Esa Unggul University with Number: 0092-20.093 / DPKE-KEP / FINAL-EA / UEU / II / 2020.

## RESULTS

According to the results of research for exclusive breastfeeding behavior in Posyandu RW 06 Puskesmas Kelurahan Kembangan Utara West Jakarta Year 2019 categories are giving exclusive breastfeeding, if the mother breastfeeds the baby from birth until the baby is six months old and does not provide exclusive breastfeeding and if the mother provides food other than breast milk <6 months. In the variable data, knowledge is divided into two categories, namely, bad knowledge and good knowledge. In the variable data, maternal work is divided into two categories, namely, mothers who work and mothers who do not work. In the variable data, family support is divided into two categories, namely, not getting family support and those who get family support.

**Table 1.** Distribution of Exclusive Breastfeeding Behavior, Knowledge, Work and Family Support at Posyandu RW 06 Puskesmas Kembangan Utara Village, West Jakarta in 2019

| Variable | Category | Frequency N | Percentage % |
|---|---|---|---|
| | Not Exclusive Breastfeeding | 32 | 34.0 |
| | Exclusive Breastfeeding | 62 | 66.0 |

| Variable | Category | Frequency N | Percentage % |
|---|---|---|---|
| **Exclusive Breastfeeding Behavior** | **Total** | **94** | **100** |
| **Knowledge** | Bad | 26 | 27.7 |
| | Well | 68 | 72.3 |
| | **Total** | **94** | **100** |
| **Profession** | Work | 46 | 48.9 |
| | Does Not Work | 48 | 51.1 |
| | **Total** | **94** | **100** |
| **Family Support** | Does Not Support | 42 | 44.7 |
| | Support | 52 | 55.3 |
| | **Total** | **94** | **100** |

**Table 2.** Analysis of Relationship between Knowledge, Work and Family Support with Exclusive Breastfeeding Behavior at Posyandu RW 06 Puskesmas Kelurahan West Jakarta North Development in 2019

| Independent Variable | Category | Exclusive Breastfeeding Behavior | | | | Total | | P-value | PR (95% CI) |
|---|---|---|---|---|---|---|---|---|---|
| | | Not Exclusive Breastfeeding | | Exclusive Breastfeeding | | | | | |
| | | N | % | N | % | N | % | | |
| **Knowledge** | Bad | 15 | 57.7 | 11 | 42.3 | 26 | 100 | 0.006 | 2.,308 (1.362-3.909 |
| | Well | 17 | 25.0 | 51 | 75.0 | 68 | 100 | | |
| **Profession** | Work | 15 | 32.6 | 31 | 67.4 | 46 | 100 | 0.945 | 0.921 (0.524-1.,619) |
| | Does Not Work | 17 | 35.4 | 31 | 64.6 | 48 | 100 | | |
| **Family Support** | Does Not Support | 26 | 61.9 | 16 | 38.16 | 42 | 100 | 0.000 | 5.365 (2,.437-11.811) |
| | Support | 6 | 11.5 | 46 | 88.5 | 52 | 100 | | |

Based on the results of Table 1, it can be known that, from 94 respondents, the study obtained the highest proportion of mothers who gave exclusive breast milk as many as 62 babies (66%), while the lowest proportion were in mothers who did not give breast milk exclusively, as many as 32 babies (34%) .

This study is in line with research conducted by Khoiriah et al. (2018) which found that the proportion of mothers who gave exclusive breastfeeding was more than those who did not provide exclusive breastfeeding, namely 59 mothers (62.8%).

Based on the results of Table 1 it can be known that, from 94 respondents in the study, the highest proportion was found in mothers who had good knowledge as many as 68 mothers (72.3%), while the lowest proportion was mothers who had bad knowledge as many as 26 mothers (27.7%).

Based on the results of Table 1 it can be known that, from 94 respondents in the study, the highest proportion was found in mothers who did not work, as many as 48 mothers (51.1%), while the lowest proportion was mothers who worked as many as 46 mothers (48.9%).

Based on the results of Table 1, it can be known that, from 94 respondents in the study, the highest proportion of mothers who received family support was 52 mothers (55.3%), while the lowest proportion was 42 (44.7%) mothers who did not get family support. Table 2 shows the results of the bivariate analysis on the chi-Square test that there is a relationship between knowledge and exclusive breastfeeding behavior (P-value 0.006) and the results of the analysis found that the prevalence ratio (PR) value was 2.308 with 95% CI: 1.362-3.909, which means mothers who have bad knowledge have a 2,308 times risk of not giving exclusive breastfeeding compared to mothers who have good knowledge.

There was no relationship between maternal employment and exclusive breastfeeding behavior (P value 0.945) and the analysis found that the =PR)= was 1/0.921 with 95% CI: 0.524-1.619 meaning that working mothers were more at risk 1/0.921 times, because they do not provide exclusive breast milk compared to working mothers. There is a relationship between family support and exclusive breastfeeding behavior (P-value 0.000) and the results of the analysis found that the PR was 5.365 with 95% CI: 2.437-11.811, meaning that mothers who do not get family support are at risk of 5.365 times not giving breast milk exclusively compared to mothers who get family support.

## DISCUSSION

The health and survival of children is very important, one of which is by feeding babies and children. According to the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), it is recommended that mothers who breastfeed their babies at least one hour after giving birth, breastfeed exclusively for the first six months and continue to breastfeed for two years so that the baby's nutrition is fulfilled. Coarse, semi-coarse and soft foods are given to children from the first six months of age. Early initiation of breastfeeding takes place approximately the first hour after birth, as several studies have shown a significant impact on overall neonatal mortality. Breast milk is mandatory. During the first six months of life it contains very good nutrition including the vitamins and minerals that the baby needs, meaning no fluids or other foods are needed. In addition, breast milk carries antibodies from mothers that help combat the disease, protecting the baby from diarrhea and acute respiratory tract infections. Exclusive breastfeeding stimulates the baby's immune system, strengthens bonds and responses to vaccinations and can provide cognitive benefits as well.

Continuing breastfeeding after six months, accompanied by sufficient amounts nutritionally sufficient, safe and solid food, half solid and soft accordingly, also helps ensure good nutritional status and protects against disease. Optimal breastfeeding in children under the age of two is estimated to have the potential to prevent 1.4 million deaths in toddlers in the development of the world each year (Cai, Wardlaw, & Brown, 2012).

### Univariate Analysis

According to the results of research that has been done to find out the picture of exclusive breastfeeding behavior in Posyandu RW 06 Puskesmas Kembangan Utara, West Jakarta, in 2019, the highest proportion of mothers who gave exclusive breastfeeding was 62 babies (66%). This study is in line with research conducted by Khoiriah et al. (2018) which found that the proportion of mothers who gave exclusive breastfeeding was more than those who did not provide exclusive breastfeeding, namely 59 mothers (62.8%). Nabunya, Mubeezi, and Awor (2020) found the prevalence of exclusive breastfeeding in this study was 42.8%. It decreased from 85.7% among children aged zero months to 24.6% among children aged five months. Factors related to EBF in this study were

infant age, mother's job position at work, intention to exclusively breastfeed, attend ANC at least four times, and proper breastfeeding (Nabunya, Mubeezi, & Awor, 2020). This is in accordance with the findings of another study conducted in Ethiopia which showed that the prevalence of EBF was 48%, which is also lower than 52% at the national level (Egata & Tigistu Amanuel, 2015;Mogre, Dery, & Gaa, 2016).

The behavior of exclusive breastfeeding is breastfeeding without additional fluids from the time the baby is 30 minutes after birth until the baby is six months old (Purwoastuti et al, 2015). Exclusive breastfeeding is breastfeeding the best food for babies from breast milk to babies aged six months and continue to provide breast milk and nutritious complementary foods according to the needs of growth and development until the baby is 24 months old (Indonesian Ministry of Health RI, 2010).

According to Gibney (2015), mothers can face difficulties during breastfeeding, without proper help and support, and generally it will result in stopping breastfeeding. These difficulties include breast engorgement, sore nipples, blocked milk ducts (lactiferous ducts), mastitis or breast abscess, candida albicans infection, nipple retraction (flat, deep nipple) and breast milk stopped flowing.

According to Soetjiningsih (2014), ASI is one of the elements of the GOBI-FFF that UNICEF has launched in the effort to help children survive; its use must be encouraged, including in Indonesia. The role of breast milk in the prevention and therapy of acute diarrhea in children is because breast milk contains various components that are important both in prevention and in acute allergy therapy, so that children who drink breast milk suffer from diarrhea less frequently than children who drink formula milk. Research in Canada has shown that breast milk protects babies against gastrointestinal and respiratory infections in the first six months of life. Likewise, research in California shows that the incidence of diarrhea in children who drink breast milk is 50% lower than those who drink formula milk.

Exclusive breastfeeding is not only important for the health of mothers and babies but can provide benefits for families, the environment and even for the country. Therefore it is important to make various efforts to increase exclusive breastfeeding (Fikawati, 2018).

Breastfeeding for newborns is very beneficial because it can protect the baby from cause of death. In addition to benefiting the baby, breastfeeding also benefits the mother because it can reduce postpartum bleeding and reduce the risk of developing breast cancer. However, although breastfeeding and breastfeeding are very beneficial, it is estimated that 85% of mothers in the world do not breastfeed immediately after the baby is born (Widodo, 2003).

The target of the Ministry of Health's Strategic Plan (Renstra) regarding exclusive breastfeeding in 2018was 47%; in Indonesia there are six provinces that have not reached the target of the Ministry of Health's Strategic Plan (Renstra) in 2018, in addition, there are nine provinces that have not collected data. Nationally, the coverage of infants receiving exclusive breastfeeding in 2018 is 68.74%, the highest percentage of coverage of exclusive breastfeeding is in West Java Province (90.79%), while the lowest percentage is in Gorontalo Province (30.71%).

According to the results of the questionnaire to mothers many mothers give exclusive breast milk because it is easy to give without the difficulty of making formula milk and its low cost so that the mother can save expenses without having to buy formula milk and the baby's weight always goes up every month. From the results of the interview to the kia in charge of the high level of mothers who provide exclusive breast milk, the extension program during pregnancy discusses the understanding of exclusive breast milk and

the benefits of breast milk in the Puskesmas Of North Kembangan Village as well as the monitoring and treatment of nifas mothers to be educated about exclusive breast milk. Exclusive breast milk coverage in North Kembangan Village Health Center is 45.5%. However, for exclusive breast milk coverage in Puskesmas Kelurahan Kembangan Utara it has not reached 80%.

According to the results of research to find out the picture of maternal knowledge about exclusive breast milk in Posyandu RW 06 Puskesmas Kelurahan Kembangan Utara West Jakarta Year 2019 it obtained the highest proportion of mothers who have good knowledge as many as 68 mothers (72.3%). This research is in line with research conducted by Rubinem (2012) which found a higher proportion of mothers with better knowledge compared to mothers (58, 58%) who had poor knowledge.

The knowledge of an object has different levels of intensity or number (Notoatmodjo, 2003). The results showed that the highest proportion of mothers with a good level of knowledge was 68 mothers (72.3%). As for good knowledge in mothers, namely mothers who know about the meaning of exclusive breastfeeding, it was as much (98.9%); what foods are given to babies aged 0-6 months (77.7%); according to the mother, if the baby is given exclusive breastfeeding, the baby will (92.6); what is meant by colostrum (43.6%); according to the mother, what are the signs that the baby is sufficiently breastfed (94.7%); the mother knows the benefits of breastfeeding for the baby (67.0%); the mother knows the benefits of breastfeeding For the mother (91.5%); if there is still little milk that comes out, what should the mother do (59.6%); according to the mother, how many times should the baby be breastfed in a day (62.8%); and according to the mother, the milk that comes out on days 7 to 10 days were called (37.2%).

According to the results of research to find out the picture of maternal work in Posyandu RW 06 North Kembangan Village West Jakarta Year 2019 it obtained the highest proportion of mothers who do not work as many as 48 mothers (51.1%). This research is in line with research conducted by Okawary et al. (2015) which obtained the highest proportion of mothers who did not work more than working mothers as many as 30 mothers (55.6%).

According to Roesli (2000), work is an activity carried out to support one's own life and for the family, besides that the work environment can exchange information between friends in the workplace so that it can increase knowledge. The results showed that the highest proportion of mothers who did not work was 48 mothers (51.1%). Based on the results of the research questionnaire at Posyandu RW 06 Puskesmas Kembangan Utara Village, West Jakarta, it was found that there were more mothers who did not work than mothers who worked. According to the results of interviews conducted with several mothers, namely mothers who did not work from the start (housewives) and with mothers who worked before having children, it was explained that mothers who did not work initially worked but after having children these mothers preferred to care for their children at home and enjoy the development of children in their childhood. Because they think that childhood cannot be repeated.

According to the results of the research that has been conducted to determine the description of family support at Posyandu RW 06 Puskesmas Kembangan Utara, West Jakarta, in 2019, the highest proportion of mothers who received family support was 52 mothers (55.3%). This research is in line with research conducted by Eugenie et al. (2015), which found that the highest proportion of mothers who received family support was more than 68 mothers who did not get family support (83%).

Family support is a real manifestation in the form of verbal information, suggestions, assistance or the

behavior of the recipient. Someone gets social support so emotionally feels relieved, feels cared for, gets valuable advice or a pleasant impression on himself (Friedman, 2010).

The success of breastfeeding is largely determined by the husband's role because the husband will help determine the let down reflex, which is strongly influenced by the mother's emotional state or feelings. Husbands can play an active role by providing emotional support and other practical aids, such as changing diapers, burping babies, carrying and calming an anxious baby, bathing babies and breastfeeding, taking babies for walks in the park and massaging babies. This important understanding of his girlfriend is the first step for a father to be able to support a mother to successfully breastfeed exclusively (Roesli Utami, 2009). The results showed that the highest proportion of mothers who received family support was 52 mothers (55.3%). Based on the results of the research questionnaire that family support is sometimes in the mother's family helping to do housework, which is the mother's daily task (37.2%); always in the mother's family to create an atmosphere full of affection in an effort to increase the mother's confidence to breastfeed (48.9%); and always in the family giving attention to nutritional intake for breastfeeding mothers (40.4%).

A husband has an important role in the success of breastfeeding mothers. The mother's feelings and enthusiasm for breastfeeding and to continue to provide the best for her child really depend on the role of the father to continue to maintain a conducive atmosphere. The process of breastfeeding is hampered when the conditions of the husband and mother are not harmonious, the mother does not receive the support of her husband, cannot communicate well, and the mother's feelings are not safe and comfortable (Hartono, 2009).

The results of family support obtained at Posyandu RW 06 Puskesmas Kembangan Utara Village, West Jakarta are supportive, because, with such support, families care about the growth and development of their babies and the fluency of breastfeeding and families who get knowledge about the benefits of breastfeeding will improve mothers if they want to switch to milk formula and can reduce family expenses.

**Bivariate Analysis**

According to the results of the study obtained, the mothers with the highest level of knowledge with the highest proportion who did not give exclusive breast milk was as many as 15 mothers (57.7%), while the mothers with the highest level of knowledge with the highest proportion who gave exclusive breast milk was as many as 51 mothers (75.0%). After the statistical test it showed there is a relationship between maternal knowledge and exclusive breastfeeding behavior. In the variable knowledge of mothers, it obtained a prevalence ratio (PR) value of 2.308; this showed that mothers with poor knowledge levels were 2,308 times more at risk of not providing exclusive breast milk than mothers with good knowledge. This is in line with research conducted by Rahmawati (2018) showing that there is a relationship between maternal knowledge and exclusive breastfeeding. Another research conducted by Rubinem (2012) showed there is a relationship between maternal knowledge and exclusive breastfeeding.

A person's knowledge of objects has different intensities. Sufficient knowledge and understanding of breastfeeding in terms of breastfeeding position, breast care, stimulating breast milk, the benefits and advantages of breastfeeding, will motivate mothers to breastfeed properly and will increase breastfeeding for babies (Maryunani, 2012).

According to the results of this study states there is a relationship between maternal knowledge and exclusive breastfeeding behavior. From the results of the questionnaire it was seen that there are

mothers who have poor knowledge about exclusive breast milk. Efforts made by puskesmas to improve the mother's knowledge are in the form of counseling pregnant women and educating new mothers with the delivery of material in the form of exclusive breast milk understanding, benefits of breast milk, what is colostrum breast milk, signs of babies having enough breast milk, if only a little breast milk comes, how many times the baby is breastfed and breast milk that comes out on the 7th day to 10 days. However, what is colostrum breast milk and breast milk that comes out on the 7th day to 10 days is not explained in the material. When the mother does not know what colostrum is then the mother will think the liquid breast milk that is clear color is a bit yellowish and the texture tends to be more viscous is breast milk liquid with less good quality.

The results found working mothers with the highest proportion who did not breast milk exclusively was as many as 15 mothers (32.6%), while mothers who did not work with the highest proportion who gave exclusive breast milk was as many as 31 (64.6%). The statistical test showed there was no relationship between the mother's work and exclusive breastfeeding behavior. On the variable maternal employment rate the PR was 0.921, this indicates that working mothers are 0.921 times more at risk of not providing exclusive breast milk compared to working mothers. This is in line with research conducted by Sriningsih (2011) showing that there is no relationship between maternal work and exclusive breastfeeding behavior. Another study that is in line is that conducted by Paschalia (2015) showing there is no relationship between maternal work and exclusive breastfeeding behavior.

For a working mother, it is a challenge in her efforts to provide exclusive breastfeeding. This is often an obstacle due to short maternity leave and delivery times. Mothers who started working before exclusive breastfeeding for the first six months was the reason ibbu not to give exclusive breast milk especially the mothers who live in the city (Prasetyono, 2009). The most dominant perceived behavioral control was related to the intention of exclusive breastfeeding (p=0.007; Odds Ratio 3.030; 95% CI 1.361-6.746) (Permatasari et al., 2018). These findings suggest that promoting universal coverage ANC could be effective in increasing ANC among this group because some studies have shown that women who attend four or more ANC visits tend to be wealthier. However, some also found low EBF due to work barriers (Eide et al., 2016; Malhotra, 2013; Saad-Haddad et al., 2016; Stewart-Glenn, 2008; Subramanyam, Kawachi, Berkman, & Subramanian, 2010).

The results showed that exclusive breastfeeding was not influenced by maternal occupation. This may be because there are other factors involved. Based on the results of the analysis between the work of the mother and the exclusive breastfeeding behavior, there is stratification with the knowledge in that if the mother is not working, if the knowledge is poor then the biggest proportion do not give exclusive breast milk, but for working mothers and mothers who do not work, if the knowledge is good then the biggest proportion give exclusive breast milk.

According to the results of the analysis between the work of mothers and the behavior of exclusive breastfeeding which is stratified with family support, it can be seen that mothers who work or do not work if the family does not support, the largest proportion do not provide exclusive breastfeeding, but for mothers who work or do not work, if the family supports the largest proportion provides exclusive breastfeeding.

It can be concluded that working mothers are not related to exclusive breastfeeding behavior but are influenced by family knowledge and support. Although there is no relationship between

maternal occupation and exclusive breastfeeding behavior, working mothers are at risk of not giving exclusive breastfeeding because of the condition of mothers who work as street vendors and mobile vegetable vendors, so there is no special room for expressing breast milk so that mothers choose formula milk for the baby.

Based on the results of the study, it was found that mothers who did not get family support with the highest proportion who did not provide exclusive breastfeeding were 26 mothers (61.9%), while mothers who received family support with the highest proportion who gave exclusive breastfeeding were 46 mothers (88.5%). After conducting a statistical test, it shows that there is a relationship between family support and exclusive breastfeeding behavior. In the family support variable, a prevalence ratio value was obtained of 5,365; this shows that mothers who do not get family support are 5,365 times more at risk of getting family support. In accordance with research conducted by Ramadani (2017), family support has an important role in exclusive breastfeeding behavior. Another study was also conducted by Rubinem (2012) which shows the main key to the success of exclusive breastfeeding, one of which is family support.

According to Friedman (2010), families are a strategic healthcare focus because families have a leading role in the healthcare of the whole family and family issues are interconnected; families can also be a place to make decisions in healthcare. Family support, especially sangai husband, affects exclusive breastfeeding of babies. Family support, namely the husband's participation, is very important for a mother in giving exclusive breastfeeding. When the mother experiences frustration due to breastfeeding, the husband simply gives advice to the mother to give formula milk. The main key to breastfeeding success is a strong will in the mother to breastfeed her child. Such abilities can arise from within themselves or the surrounding environment. Therefore psychologically, a mother supported by a husband or family will be more motivated to give exclusive breast milk to her baby (Fikawati et al., 2018).

The results of this study indicate that there is a relationship between family support and exclusive breastfeeding behavior. The results showed that the mother did not get family support did not provide exclusive breastfeeding. Based on the results of questionnaires to respondents, the form of family support that is lacking is such as the provision of reading materials such as books or magazines about exclusive breastfeeding and assistance to give breast milk to the baby. Inadequate forms of family support can be caused by a lack of knowledge possessed by the husband or immediate family, so that it is difficult to help or resolve problems regarding exclusive breastfeeding, and families who do not have time, which results in mothers feeling tired in caring for children and feeling unloved, so that the milk that is released is not smooth and maximal in breastfeeding. There is a need for cross-sector cooperation, by providing socialization about the role of the family, especially husbands, in supporting the success of exclusive breastfeeding.

## CONCLUSION

According to the results of research and discussion conducted at Posyandu RW 06 Puskesmas Kembangan Utara, West Jakarta in 2019, the following conclusions can be drawn: An illustration of the behavior of exclusive breastfeeding at Posyandu RW 06 Puskesmas Kembangan Utara, West Jakarta, in 2019, showed the highest proportion of mothers who gave exclusive breastfeeding was 62 babies (66%). An illustration of mother's knowledge about exclusive breastfeeding at Posyandu RW 06 Puskesmas Kembangan Utara, West Jakarta, in 2019, showed the highest proportion of mothers who had

good knowledge was 68 mothers (72.3%). Ianthe description of the work of mothers at Posyandu RW 06 Kembangan Utara Village, West Jakarta, in 2019, the highest proportion of mothers who did not work was 48 mothers (51.1%). An illustration of family support at Posyandu RW 06 Puskesmas Kembangan Utara Village, West Jakarta, in 2019 showed the highest proportion of mothers who received family support was 52 mothers (55.3%). There is a relationship between mother's knowledge and behavior of exclusive breastfeeding at Posyandu RW 06 Puskesmas Kembangan Utara Village, West Jakarta in 2019 (PR = 2.308). There is no relationship between maternal occupation and exclusive breastfeeding behavior at Posyandu RW 06 Puskesmas Kembangan Utara Village, West Jakarta in 2019 (PR = 0.921). There is a relationship between family support and exclusive breastfeeding behavior at Posyandu RW 06 Puskesmas Kembangan Utara Village, West Jakarta in 2019 (PR = 5,365). Based on the conclusions obtained from the results of the study, the researchers suggest : to increase the knowledge of mothers there maximally puskesmas should add enough baby breast milk material, how to store breast milk and breast milk composition and conduct question and answer sessions after being counseled and educated and improve family support; puskesmas should provide education about the role of family in providing exclusive breast milk when the mother controls the womb with the family.

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Original Research

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# STUDY OF VISUAL FATIGUE DUE TO EXTENDED GADGET USE DURING THE COVID-19 PANDEMIC

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**ABSTRACT**

**Introduction** Since the COVID-19 pandemic in Indonesia, many activities have been carried out online from home. This change in activity causes the frequency of gadget use to increase. Looking constantly at gadgets such as laptops, desktops, and mobile phones can risk visual problems or visual fatigue. **Aims:** this research is to describe visual fatigue and the factors that affect students due to the increasing use of gadgets. **Methods** This study is a quantitative study with a cross-sectional approach—collected data from April to June 2021. The sample in this study was 200 people. The variables are visual fatigue, viewing distance, eye breaks, and refractive error. Data were collected using a questionnaire distributed to respondents using google Forms. Data were analyzed by univariate and bivariate with 95% CI ($\alpha = 0.05$). **Result** The analysis showed that 87% of students experienced visual fatigue, 76% used gadgets at an unsafe distance, 92% did not rest their eyes, 39.5% had refractive errors. Statistical test results between visual fatigue with viewing distance (p-value = 0.53), eye breaks (p-value = 0.04) and refractive error (p-value = 0.44). There is a relationship between eye breaks and visual fatigue. Based on the results of this study, take eye breaks by applying 20-20-20, namely resting the eyes every 20 minutes by turning the eyes to see objects as far as 20 feet for 20 seconds when using gadgets to reduce the risk of visual fatigue.

**Keywords**: eye breaks, gadget, visual fatigue

## INTRODUCTION

The Covid-19 pandemic in Indonesia since the beginning of 2020 has changed the order of people's lives in various aspects, one of which is the education aspect. The learning process becomes learning from home. By the Circular of the Minister of Education and Culture dated March 9, 2020, all educational institutions carry out learning from home. The distance learning system uses information and communication technology. Learning from home is done online using learning applications or social networks without having to face to face but through available platforms. All forms of learning materials gave with online, communication online and tests are also online. Carrying out online learning causes changes in student activities, namely, the frequency of using digital devices or gadgets increases.

Eyes that constantly look at digital devices such as laptops, desktops, and mobile phones can cause visual problems or visual fatigue with symptoms such as itchy, watery, dry eyes, sore eyes, blurred eyes, and even headaches (Shrestha, Mohamed and Shaha, 2011). Signs of visual fatigue are visual or eye disturbances due to various stresses associated with digital devices in the optical system, including eye pain, dryness, glare, and accommodation dysfunction (Coles-Brennan, Sulley and Young, 2019). Nearly 90% of people who spend three or more hours in front of a computer a day experience visual fatigue. It is estimated that nearly 60 million people experience visual fatigue from digital device use globally, and about 1 million new cases occur each year. The prevalence of computer users who experience visual fatigue ranges from 64-90%. For computer workers worldwide, about 70% report experiencing vision

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problems (Al Rashidi and Alhumaidan, 2017).

People at greatest risk of visual fatigue spend two or more hours continuously in front of a computer or using digital devices every day. Increasing the duration of using digital devices can increase the risk of experiencing dry eyes. The risk increases if the time spent using digital devices is more than 4 hours (Mufti et al., 2019). Symptoms of visual fatigue are discomfort that includes blurred vision, difficulty focusing vision, pain or throbbing around the eyes, double vision, difficulty focusing vision, watery eyes, red eyes, sore eyes, nausea, and headaches. The ciliary muscles and extraocular muscles are the leading cause of eye fatigue due to prolonged accommodation, especially during close vision activities. The severity level of eye fatigue depends on the lighting intensity, the type of activity, and the work environment conditions (Ananda and Dinata, 2015).

According to the Occupational Health and Safety Unit of the University of Queensland, the causes of eye fatigue are work equipment factors such as the monitor screen display and the size of the object on the screen, the environment in the form of lighting and room temperature, work design factors in the form of object characteristics, and work duration, and for individual characteristic factors such as disease history. Meanwhile, based on a survey conducted by the American Optometry Association, several factors can cause eye fatigue, namely refractive errors, lighting intensity, eye rest, and object shape and length of viewing of objects (AOA, 2002). In a study conducted on students at the Engineering College of Bengaluru, it was found that the prevalence of CVS was 86.67%, 79.3% of respondents spent more than three hours in front of the computer, and 82% did not take regular breaks. There was a relationship between the duration of using digital devices (p=<0.001) and taking frequent breaks (p=<0.001) with CVS complaints (Ranganatha and Jailkhani, 2019).

In a study conducted in Malaysia, the prevalence of CVS was 68.1%, there was a significant relationship between gender (p = <0.001), age (p = 0.005), use of glasses (p = 0.005), and duration of computer use (p = 0.051 ) with complaints of CVS. Respondents at risk for CVS are female respondents, have an age of fewer than 27 years, use glasses and use a computer for more than 7 hours a day (Rahman and Sanip, 2011). Increased use of digital devices can affect the tear film and ocular surface. This happens because during the use of digital devices, the frequency of blinking decreases, there is an increase in tear evaporation which can harm the condition of the eye surface (Artime Rios et al., 2019). Using a computer for more or equal to 7 hours every day continuously carries a risk of two times more likely to experience visual fatigue than those with a duration of less than seven hours (Valentina, 2018).

The COVID-19 pandemic has had an impact on the lecture process, including at Andalas University. By the Circular of the Minister of Education and Culture, the Chancellor of Andalas University issued a circular letter to help prevent the spread of COVID-19 by conducting online recovery. Online learning is carried out using various applications such as Zoom, Microsoft Teams, and ilearn, which can be accessed by lecturers and students using digital devices such as laptops, computers, and mobile phones. This change in activity causes the frequency of use of digital devices or gadgets to increase. Students must use gadgets in every learning method, such as presentations, individual assignments, group assignments, and final assignments. Therefore, the use of gadgets in students increases with online lectures and causes a high incidence of visual fatigue. Based on an initial study conducted on 30 students, as many as 22 students (73%) experienced complaints of visual fatigue. In general, 95% of students spend more than four hours using digital devices every day. As many as 65% of students do not take eye breaks

when using digital devices, and 20% of students use glasses to correct refractive errors. So, the purpose of this research is to describe visual fatigue and the factors that affect students due to the increasing use of gadgets

## METHODS

This research is quantitative research with a cross-sectional approach. The study was conducted from April to June 2021. The sample in this study was 200 people. The variables are visual fatigue, viewing distance, eye breaks, and refractive error. Data were collected using a questionnaire distributed to respondents using google Forms. The instrument used to measure complaints of visual fatigue was measured using the CVSQ (computer vision syndrome questionnaire). Data were analyzed by univariate, and bivariate analysis using chi-square test with 95% CI ($\alpha = 0.05$). This study passed the ethical clearance and received ethical approval from the Research Ethics Commission, Faculty of Public Health, Andalas University with Certificate Number : 6/UN16.12/KEP-FKM/2021.

## RESULT

### Overview of Visual fatigue Complaints

Visual fatigue is measured by 15 questions about complaints experienced during and after using digital devices. The answer categories are never, sometimes and often or always, with the results being measured if the total score $\geq 6$ is categorized as experiencing visual fatigue (Ríos et al., 2019).

**Table 1.** Frequency Distribution of Visual Fatigue Complaints

| Visual Fatigue | n | % |
|---|---|---|
| Yes | 174 | 87 |
| No | 26 | 13 |

From the study results, which can be seen in Table 1, it is known that 174 students (87%) experienced complaints of visual fatigue due to the increased intensity of using gadgets. Symptoms that are often experienced are watery eyes (30%), heavy eyelids (36.5%), and headaches (36.5%), can be seen in Table 2.

**Table 2.** Frequency Distribution of Complaints of Visual Fatigue

| Symptoms | Percentage | | |
|---|---|---|---|
| | Never | Sometimes | Often/ Always |
| The eyes feel hot | 27.5 | 55.0 | 17.5 |
| Eyes itch | 30.5 | 51.5 | 18 |
| Watery eyes | 16 | 54 | 30 |
| Eyes blink excessively | 52 | 35.5 | 12.5 |
| Rosy eyes | 27.5 | 60 | 12.5 |
| Pain in the eyes | 31.5 | 44.5 | 24.0 |
| Eyelids feel heavy | 26 | 37.5 | 36.5 |
| Eyes feel dry | 31 | 43.5 | 25.5 |
| Blurred vision | 21 | 50.5 | 28.5 |
| Double vision | 62.5 | 28.5 | 9 |
| Difficulty focusing when looking closely | 57.5 | 30.5 | 12 |
| Sensitive to light | 32.5 | 45.0 | 22.5 |
| Visible colored circles around the object being viewed | 69.5 | 22.5 | 8 |
| The view feels worse | 42 | 37 | 21 |
| Headache | 10 | 53.5 | 36.5 |

### Viewing Distance

The results of the study found that 152 students (76%) viewing distance with unsafe that can be seen in Table 2. Of the 200 students, when using the gadget is 150

people (75%) with a distance of less than 46 cm, 48 people (24%) between 41 - 61 cm, and two people (1%) with a length of more than 61 cm.

**Table 3.** Frequency Distribution of Viewing Distance when Using Gadgets

| Viewing Distance | n | % |
|---|---|---|
| Unsafe | 152 | 76 |
| Safe | 48 | 24 |

**Eye Breaks**

For the variable of eye breaks, it is said to do eye breaks when applying eye rest that is every 20 minutes by turning the eye to see objects as far as 20 feet for 20 seconds when using gadgets. From the results of the study, it is known that only 16 people (8%) did eye rest and 184 people (92%) do not rest their eyes while using gadgets.

**Table 4.** Frequency Distribution of Eye Breaks

| Eye Breaks | n | % |
|---|---|---|
| No | 184 | 92 |
| Yes | 16 | 8 |

**Refractive Error**

The refractive error variable can be seen from the condition if students use glasses to correct refractive errors. Of the 200 students, 79 people (39.5%) had refractive errors.

**Table 5.** Frequency Distribution of Refractive Error

| Refractive Error | n | % |
|---|---|---|
| Yes | 79 | 39,5 |
| No | 121 | 60,5 |

**Analysis of the Relation between Viewing Distance, Eye Breaks and Refractive Errors with Symptoms of Visual Fatigue**

The results of the study can be seen in table 6. Students who experience complaints of visual fatigue are greater at an unsafe viewing distance (88.2%) than a safe viewing distance (83.3%). Based on the results of statistical tests obtained p-value = 0.530 (> 0.05). It shows that there is no relation between monitor distance and visual fatigue. Then, students who experience visual fatigue complaints are more in respondents who do not rest their eyes (88.6%) than respondents who rest their eyes (68.8%). The results of statistical tests, obtained p-value = 0.04 (≤ 0.05). It shows that there is a relationship between eye breaks and visual fatigue. And then, students who experience visual fatigue complaints are more in respondents who have refractive errors (89.9%) than those who do not have refractive errors (85.1%). Statistical test results obtained p-value = 0.446 (> 0.05). It shows that there is no relationship between refractive errors and complaints of visual fatigue.

**Table 6.** The Relation between Viewing Distance, Eye Breaks and Refractive Errors with Visual Fatigue

| Variable | Category | Visual Fatigue | | | | Total | | p value |
|---|---|---|---|---|---|---|---|---|
| | | Yes | | No | | | | |
| | | n | % | n | % | n | % | |
| Viewing Distance | Unsafe | 134 | 88.2 | 18 | 11.8 | 200 | 100 | 0.530 |
| | Safety | 40 | 83.3 | 8 | 16.7 | 200 | 100 | |
| Eye Breaks | No | 163 | 88.6 | 21 | 11.4 | 200 | 100 | 0.040 |
| | Yes | 11 | 68.8 | 5 | 31.3 | 200 | 100 | |
| Refractive Errors | Yes | 71 | 89.9 | 8 | 10.1 | 200 | 100 | 0.446 |
| | No | 103 | 85.1 | 18 | 14.9 | 200 | 100 | |

## DISCUSSION

### Visual Fatigue

Visual fatigue is a problem related to eyes and vision caused by prolonged use of computers, laptops, iPads, and mobile phones. when seeing far or near, eye irritation, dry eyes, difficulty focusing, back and neck pain, sensitivity to light, and double vision (Anshel, 2005). The most frequently used digital devices by students are laptops and mobile phones. The most common visual fatigue symptom experienced by respondents was a headache, 53.5% with occasional intensity and 36.5% often. The results of this study are supported by research conducted on students at the Engineering College of Bengaluru. It was found that the prevalence of CVS was 86.67%. Headache is the complaint most complained by respondents, namely 83.5% (Ranganatha and Jailkhani, 2019).

During the COVID-19 pandemic, the prevalence of eye fatigue in students was higher than in the general public. Eye fatigue occurs as a result of online learning, and it worsens eye health (Kaya, 2020). Increasing the duration of using digital devices can increase the risk of dry eyes. If the time spent is more than four hours, it will increase the risk (Mufti et al., 2019). There are three categories of duration of use of digital devices, namely light (less than two hours), moderate (two to four hours), and heavy (more than four hours) per day (Mathew et al., 2017). Increased use of digital devices can affect the tear film and ocular surface because of the frequency of blinking decreases during the use of digital devices. There is an increase in tear evaporation which can harm the condition of the eye's surface (Artime Rios et al., 2019).

### Viewing Distance

Visibility is affected by screen size, character size, and the visual attention required to perform a task effectively. The Occupational Safety and Health Administration (OSHA) recommends a 45-60 cm computer viewing distance (Gowrisankaran and Sheedy, 2015). The monitor distance is categorized as a safe distance if the eye distance from the monitor is 46 – 61 cm and unsafe if the eye and monitor distance is < 46 cm and > 61 cm (Putri and Mulyono, 2018). Results of the study, 76% of students used digital devices with an unsafe distance from the monitor to their eyes, as many as 150 people (75%) with a distance of less than 46 cm and 2 people (1%) with a distance of more than 61 cm. The results of this study are supported by research conducted on undergraduate medical students, more students with eye-to-monitor distances that do not match as much as 56% (Noreen et al., 2021).

The eye's point of view can be seen at the eye's position against the top of the digital device screen. A good screen position is at eye level or lower than the eye. The recommended angle for using digital devices is 10°-20° downwards (Sugarindra and Allamsyah, 2017). When looking down, the ocular surface exposed is reduced, thereby reducing tear evaporation. If the viewing angle is greater towards the top, then users of digital devices will lift their heads, causing muscle tension in the neck and reducing the frequency of blinking and tear production (Darmaliputra and Dharmadi, 2019). The slight imbalance between the computer screen and its surroundings is also an essential factor to consider. Screens with dark backgrounds often require low levels of light. To reduce glare and reflections on a computer screen can use a screen filter, but filters are used as an adjunct, not a substitute for poor room lighting, must adjust Screen brightness and contrast to balance the lighting (Loh and Reddy, 2008).

Lighting for activities using a computer is 500 lux for the task area or on the work desk and 300 lux for the space around the work desk. The horizontally lighting on the work desk should not

exceed 500 lux because it can cause changes in contrast on the screen of digital devices. It becomes difficult for the eyes to see characters or images on the net. The light source coming from behind the digital device screen, such as light coming from the window, can be adjusted by changing the location of the digital device so that the light behind the digital device is not brighter than the light from the digital device screen. The next step is to use lamps whose lighting is diffuse to reduce reflections on surfaces that can cause glare (Osterhaus, Hemphala and Nylen, 2015).

**Eye Breaks**

In this study, 184 respondents (92%) did not take eye breaks, and only 16 respondents (8%) did eye breaks. Eye rest in this study breaks the eye by following the 20-20-20 rule. That is, after using a digital device for 20 minutes, it is better to take your eyes off the object by looking at a thing as far as twenty feet (6 meters) for 20 seconds. In a similar study conducted on students in China during the COVID-19 pandemic, 56% did not know and did not take eye breaks (Li et al., 2021). Other studies on computer operators also found that more workers did not take eye breaks, namely 82.5% (Firdani, 2020). Eye rest is essential when using digital devices to reduce eye strain by diverting eye focus from the screen to relax the eye muscles (Rahman and Sanip, 2011) .

Taking short but frequent breaks for 5-10 minutes is better than resting for a long time of 2-3 hours. Taking a break for 5-10 minutes from the computer is recommended to use digital devices that work for 1-2 hours continuously (Bali, Neeraj and Bali, 2014). Changes in blinking patterns when looking at digital screens lead to an increasing prevalence of dry eye. Several studies report that blinking rates are reduced during computer use. Blinking frequency is 22 times per minute when relaxing, ten times per minute when looking at a book, and seven times per minute when looking at a digital device screen. There is a decrease in the frequency of blinking when text size and contrast are reduced or task or work requests increase (Rosenfield and Mcoptom, 2016).

To reduce stress on the eyes and increase productivity, take a brisk walk around the workplace, change sights and stretch your muscles. Working without rest for more than 4 hours is associated with eye strain. To restore the eye's accommodative system, prevent eye spasms, and subtract visual fatigue be with a short rest from activity in front of digital devices (Loh and Reddy, 2008).

**Refractive Errors**

Refractive errors can be corrected using glasses, but poor correction can be one of the risks of eye fatigue in digital device users. Users of digital devices who use glasses usually complain of headaches in the frontal area (Alma and Asniar, 2019). Activities that use digital devices require intense visual training, which can cause eye symptoms, especially for those who wear glasses. Correction errors in eyeglass users can cause eye fatigue because using digital devices is a type of close work on a screen that sees letters formed by small dots. It causes working harder to keep the image in focus on eyes that already have some problems (Rahman and Sanip, 2011).

In uncorrected refractive errors, the perceived blur is often continuous. However, if the perceived blur is intermittent, the accommodative disturbance may be the underlying cause. In addition, sub-optimal text quality and poor contrast and resolution can result in blurred perception for users (Gowrisankaran and Sheedy, 2015). The frequency distribution of respondents with refractive errors in this study was 79 people (39.5%). This study is in line with research that showed that 39% of students in Manado had refractive errors (Sumakul, Marunduh and Doda, 2020).

**Relations Viewing Distance with Visual Fatigue**

Analysis of the relationship between viewing distance and visual fatigue complaints shows no relationship between viewing distance and visual fatigue. The results of this analysis are in line with research conducted by Putri and Mulyono (2018) which also states that there is not only a relationship between viewing distance and visual fatigue. The cause of the absence of this relationship may be due to other factors such as the increased duration of use of digital devices so that most respondents experience eye fatigue. Digital device screens are placed at an ideal distance of 60 cm for a computer or laptop and 30 cm for smartphones (Bali, Neeraj and Bali, 2014).

In contrast to the results of research conducted by Tawil et al. (2018) on medical and business students at King Saud University, it found that there was a significant relationship between computer use at close range (<40 cm) with eye complaints and the highest prevalence in medical students. In addition to the viewing distance, prolonged use of gadgets will cause increased stress on the eyes, which is higher than working without using digital devices. It occurs due to excessive accommodation and convergence activity in the eyes when using digital devices. Excessive accommodation and convergence of the eyes due to the adjustment of the distance between the eyes and the digital device screen and the characters and images displayed on the digital device screen.(Permana, Koesyanto and Mardiana, 2015)

Visual fatigue can also occur when the eyes are focused on objects for a long time with the distance to the eyes closed so that the eye muscles have to work harder to see objects that move at very close distances. Bright lighting can increase the likelihood of eye fatigue. This condition causes the eyes to adapt by accommodating for a long time, resulting in a decrease in the accommodation power of the eye. Prevention efforts to reduce complaints of eye fatigue are by paying attention to the distance between the eyes and the monitor screen (Putri and Mulyono, 2018). In addition, the contrast on the monitor screen that is not right will increase the chances of fatigue complaints in users. Another effort to reduce eye fatigue is by placing the monitor screen in places that do not cause light from other sources, such as light from windows or lamps that can dazzle the eyes. The increase in the use of digital devices in the future will impact the eyes if users are not aware of it. Suppose users of digital devices are aware of and use digital devices safely and prioritize eye health. It will save users of laptops and other gadgets from wearing glasses.

**Relations Eye Breaks with Visual Fatigue**

Based on the study results, it was found that there was a relation between eye breaks and visual fatigue complaints in students with a p-value of 0.04. Similar to research conducted on employees of the Port health office in Medan, it was found that there was a significant effect of applying eye rest to the incidence of computer vision syndrome with a p-value of 0.001 (Anggrainy, Lubis and Ashar, 2020). Supported by research by Alghamdi and Alrasheed (2020), eye rest by doing a 20-second rest scheme every 20 minutes by looking at objects at a distance of 20 feet or 6 meters has been shown to reduce symptoms of eye fatigue and the impact of excessive use of gadgets . Taking breaks when using digital devices tends to relax the accommodating system. eyes that experience pressure from doing close work, thereby reducing eye fatigue and headaches (Akinbinu and Mashalla, 2014).

The Occupational Safety and Health Administration (OSHA) recommends that users of digital devices take at least 10 minutes of rest every hour or 15 minutes after working with digital

devices continuously. Eye rest is essential because eye fatigue complaints can arise due to reduced tear flow caused by significant reflections or glare on digital device screens. When staring at a computer screen, the frequency of blinking will decrease from its normal state so that the eyes become dry and irritated (Arianti, 2017). Taking eye breaks can reduce the impact of exposure to blue light produced by digital screens. Research shows that exposure to blue light on digital device screens poses minimal risk, but this has only been tested on short-term exposures, and it is not yet known for the risks associated with long-term exposure. Blue light with a short wavelength does not focus on the center of the retina, but in front of the retina, so prolonged exposure to blue light can cause eye fatigue and nearsightedness with symptoms of double vision so that it can cause inability to concentrate and affect work productivity (Zhao et al., 2018)

### Relations Refractive Errors with Visual Fatigue

Based on the study results, it was found that there was no relationship between refractive errors and complaints of visual fatigue in students. In contrast to research conducted on PSSKPD students class 2017-2018 Udayana University, there is a relationship between refractive errors and complaints of eye fatigue with p-value 0.033 (Munif, Yuliana and Wardana, 2020). The cause of the absence of this relationship may be due to other factors such as the increased duration of use of digital devices so that most respondents experience eye fatigue. Refractive error is a disorder of refraction of light in the eye so that light is not focused on the retina but in front or behind the retina and may not be at a single focal point. People with myopia have a punctum remotum (far point) that is close so that the eyes are always in a state of convergence, causing eye fatigue. Refractive errors in myopia, hypermetropia, astigmatism can cause eye fatigue because they continuously accommodate to see the subject more clearly (Prayoga, 2014). Visual fatigue is felt more quickly in people who have refractive errors. Even if the person already uses glasses or contact lenses, visual fatigue can still occur because the eyes rarely blink when focusing on the monitor screen, causing the eyeball to dry quickly, causing friction between the lens and the eyelid contact (Munif, Yuliana and Wardana, 2020).

## CONCLUSION

There is a relationship between eye breaks and visual fatigue, and there is no relationship between viewing distance and refractive error with visual fatigue. Recommended taking eye breaks by applying the 20-20-20 rule, which is to rest the eyes every 20 minutes by turning your eyes to look at objects twenty feet away for twenty seconds when using gadgets to reduce the risk of eye fatigue, and use gadgets with an ideal distance of 60 cm for computer or laptop use and 30 cm for smartphone use.

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Original Research

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# GROWTH AND DEVELOPMENT ON INFANTS AGED 0-24 MONTHS WITH A HISTORY OF LOW BIRTH WEIGHT (LBW) IN DR. SOETOMO GENERAL HOSPITAL SURABAYA

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**ABSTRACT**

**Introduction:** Low birth weight (LBW) is the baby's condition with a birth weight of <2500 grams. Babies with LBW tend to have the body not strong as normal babies, so growth or development disorders are often obtained. The condition ensues because the immaturity of some organs will affect the growth and development. Monitoring growth and development through the growth chart and the Denver II. Age 0-24 represents a critical period so that the time is right for the early detection of disorders. **Aims:** Determine growth according to W/A, H/A, W/H, and HC/A and development according to personal-social, fine motor, language, and gross motor. LBW infants aged 0-24 months Dr. Soetomo General Hospital Surabaya. **Methods:** Quantitative research using descriptive-analytic study and retrospective approach with a cross-sectional method. The sample was 81 babies who used a total population sampling technique with the medical record. Data processing used univariate and bivariate analysis chi-square. **Results:** The development dominated by delays measured using 4 domain (personal-social(59.3%), fine motor skills(61.7%), language(66.7%), and gross motor skills(85.2%)). Growth dominated by normal and above based on H/A(60.5%), W/H(55.6%), and H/A(50.6%); except W/A dominated below normal (55.6%). There was no relation between LBW with growth and development based on all domains, except personal-social domains. **Conclusion:** This study may prove that not all babies with LBW have growth disorder seen from all domains and the development dominate by delay on all domains. There is no relation between LBW with all domains of growth and development except personal-social.

**Keywords**: Denver II, development, low birth weight, growth, growth chart

## INTRODUCTION

Growth and development in infants aged 0-24 months reached a golden period with the intake of balanced nutrition, but the history of LBW which is a condition in birth weight <2500 grams, is considered for the high risk of impaired growth and development because of the low maturity of the organs which have an impact on the adaptation of the baby with the environment as well as fatal a baby in the future (Minarti and Mulyani, 2014). Growth is constantly changing, quantitative, and irreversible, which is closely related to the size, number, dimensions of the levels of cells and organs that can be seen physically and can measure by the unit weight, length, age of the bones, and as the metabolic balance. While the development is the process of increasing the ability of the structure and function of the psychomotor development of the individual, which concerns the differentiation of cells, tissues, organs, and organ systems with specific functions and can be seen in aspects of functional abilities, such as cognitive,

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motor, social, emotional, language, and moral (Balasundaram and Avulakunta, 2021).

Babies with low birth weight can be caused due to the development and growth disorder while in the uterus, which is commonly known as intrauterine growth restriction (IUGR). Babies with a history of IUGR may be born 37 weeks before pregnancy or within 259 days from the first day of a woman's last menstrual period. This is commonly known as preterm birth or preterm birth (PTB). The cause of this condition is multifactorial contribute, especially maternal, fetal, and placental factors. Maternal factors for example, extra-uterine infection, chorioamnionitis, trauma, and family history such as hypertension can cause pre-eclampsia/eclampsia. Fetal factors could be IUGR, fetal infection, and anomalies. Placental factors such as placental abruption and placenta previa. The underlying etiology is various, but the result is the same that is inadequate uterine-placental perfusion resulting in reduced or absent fetal nutrition (Cutland et al., 2017).

Low birth weight is one indicator of the health or insurance of the community because the impact is not only perceived by babies but also by parents (Cutland et al., 2017). Low birth weight infants' risk of death in the first month of life is twenty times greater than infants born with normal birth weight (Mahayana et al., 2015). Low birth weight babies impact the increased risk of chronic diseases such as cardiovascular and diabetes also immatureness of several organ systems affecting intracranial bleeding, respiratory disorders, sepsis, blindness, and gastrointestinal disorders. Low birth weight infants lead cause of all deaths of children under five years old worldwide (Villar et al., 2012).

The birth of a baby with LBW in Indonesia in 2015 is quite high in the world: more than 497 thousand births and was rated the second highest cause of neonatal death in Indonesia, equal to 32.4%. LBW ranked in Surabaya fifth highest in East Java as much as 855 birth. LBW includes the problem that can't be underestimated and needs special attention in many countries, particularly developing countries or countries with low socio-economic development (Ministry of Health, 2018; Central Bureau of Statistics of East Java, 2019; WHO, 2019).

In Indonesia, especially in RSUD Dr. Soetomo Surabaya, no research regarding the growth and development of infants aged 0-24 months with a history of LBW based on the domain of weight according to age (W/A), height according to age (H/A), weight according to height (W/H), and head circumference according to age (HC/A) for the growth as well as on the development based on the domain of personal social, fine motor, language, and gross motor. In addition, this study is also to determine the relationship between LBW with the overall domain of growth and development.

## METHODS

This study is a quantitative research using descriptive-analytic design and retrospective approach with cross-sectional methods to determine growth and development of babies aged 0-24 months with a history of low birth weight in Dr. Soetomo General Hospital Surabaya. The sample of 81 patients from a total population of 91 patients in Growth and Development Division of Dr. Soetomo General Hospital Surabaya period January-December 2019 by the inclusion criteria is patients with growth and development disorders The data were conducted from December 2020 to January 2021 in the Growth and Development Division of Dr. Soetomo General Hospital Surabaya. Retrieval of data using total sampling technique with secondary data derived from the instrument growth chart

and Denver II in the patient's medical record. The variables of this study consist of the independent variables of infants aged 0-24 months with a history of LBW and the dependent variable is the growth and development of the baby. Data analysis was performed using univariate and bivariate analysis chi-square in SPSS. This study received an Ethical Exemption from the Health Research Ethics Committee of Dr. Soetomo General Hospital Surabaya 0187/LOE/301.4.2/XI/2020.

## RESULT

The number of patients diagnosed with LBW aged 0-24 months in Growth and Development Division RSUD Dr. Soetomo Surabaya in the period January-December 2019 who meet the inclusion criteria is total of 81 patients. The characteristics of the subject of 81 patients in the Growth and Development Division Dr. Soetomo presented in Table 1 is dominated by babies with LBW (<2500 grams) a total of 68 patients (84%) and 13 patients (16%) is VLBW (1000-1500 grams), and not obtained in patients with ELBW (<1000 grams). Babies with LBW dominated males as much as 44 patients (54.3%) and female 37 patients (45.7%).

The growth and development of the patient based on the domain and its relationship with LBW were tested using chi-square test statistics. On the data of patients, the majority had impaired growth based on the W/A with normal and below normal (underweight and severely underweight) 45 patients (55.6%) as well as patients with a bodyweight of normal and above normal (possible risk of overweight) a total of 36 patients (44.4%). Based on the H/A normal and above normal dominated with a total of 49 patients (60.5%) as well as data on patient height below normal (stunted and severely stunted) a total of 32 patients (39.5%). Based on the W/H, patient's normal and above normal (possible risk of overweight, overweight, and obese) dominated as many as 45 patients (55.6) as well as data on patient nutritional below normal (wasted and severely wasted) a total of 36 patients (44.4%). Based on the HC/A, this was dominated by the size of normal as much as 41 patients (50.6%) and the microcephaly as many as 40 patients (49.4%). The development based on the personal-social domain is dominated by the delay of as many as 48 patients (59.3%), while the normal total was 33 patients (40.7%). Based on the domain of fine motor, this was dominated with patient delay as many as 50 patients (61.7%), while the normal total was 31 patients (38.3%). The language domain is dominated by patient delay as many as 54 patients (66.7%), while normal had 27 patients (33.3%). Based on the domains of gross motor this was dominated with patient delay as many as 69 patients (of 85.2%) while normal was as many as 12 patients (14.8%).

Data on the relation of low birth weight with growth based on the W/A obtained p=0.457; based on the H/A obtained p=0.186, based on the W/H obtained 0.892, based on the HC/A obtained p=0.143, in the entire domain of the growth of the obtained p>0.05, which means there is no relationship. Data on the relationship of low birth weight with the development based on the domain of personal social obtained p=0.023; based on the domain of fine motor obtained p=0.070; based on the language domain of the obtained p=0.341; and based on the domains of gross motor obtained p=0.095. In the entire domain of development except personal social it obtained p>0.05; there is no relationship and in the domain of personal social achieved p<0.05, which means there is a relationship.

**Table 1.** General Characteristics of Patients

| Variable | Frequency (n) | Percent (%) |
|---|---|---|
| **Classification** | | |
| LBW | 68 | 84.0 |
| VLBW | 13 | 16.0 |
| ELBW | 0 | 0 |
| **Gender** | | |
| Male | 44 | 54.3 |
| Female | 37 | 45.7 |

**Table 2.** The Result of Bivariate Analysis

| Variable | Low Birth Wight | | p-Value |
|---|---|---|---|
| | Frequency (n) | Percent (%) | |
| **Growth** | | | |
| **W/A** | | | |
| Above normal (possible risk of overweight) and normal | 36 | 44.4 | .457 |
| Below normal (underweight/ severely underweight) | 45 | 55.6 | |
| **H/A** | | | |
| Above normal and normal | 49 | 60.5 | .186 |
| Below normal (stunted/ severely stunted) | 32 | 39.5 | |
| **W/H** | | | |
| Above normal (obese/ overweight/ possible risk of overweight) and normal | 45 | 55.6 | .892 |
| Below normal (wasted/ severely wasted) | 36 | 44.4 | |
| **HC/A** | | | |
| Microcephaly | 40 | 49.4 | .143 |
| Normal | 41 | 50.6 | |
| **Development** | | | |
| **Personal Social** | | | |
| Normal | 33 | 40.7 | .023 |
| Delay | 48 | 59.3 | |
| **Fine Motor** | | | |
| Normal | 31 | 38.3 | .070 |
| Delay | 50 | 61.7 | |
| **Language** | | | |
| Normal | 27 | 33.3 | 0.341 |
| Delay | 54 | 66.7 | |
| **Gross Motor** | | | |
| Normal | 12 | 14.8 | .095 |
| Delay | 69 | 85.2 | |

## DISCUSSION

The research results presented in Table 1 show babies with low birth weight dominate (birth weight <2500 grams) as much as 84%. The results of other findings gave the same results, namely the prevalence of the babies with low birth weight in UPT Puskesmas Babat obtained the majority results in the weight category of less than 2500 grams, which is 54.5% (Izzah, 2018).

In this study, infants with BBLR can experience accelerated growth up to the age of two years, but not all give the same results because growth disorders are not only determined by low birth weight but also influenced by constitutional heredity (varies by race, genetics, gender, and birth defects), hormonal factors (insulin, thyroid, sex hormones and steroids), also environmental factors during in the uterus and postpartum (nutrition, injury, socioeconomic, climate, physical activity, and disease) (Nutrisiani, 2010).

The corresponding Table 2 data results found that the growth of LBW infants based on W/A dominated below-normal weight at 55.6%. There was no significant association between LBW and growth based on W/A (p = 0.457). The same results obtained in the Seberang Ulu I subdistrict found babies with low birth weight were dominated by below normal by 72,2% (Sari et al., 2020). However, a different study at Rwanda Hospitals found that most LBW infants were normal, 61.9%, and found no meaningful association between low birth weight and growth based on W/A (p=0.323) (Kirk et al., 2017).

IUGR (Intra Uterine Growth Retardation) is one of the causes of low birth weight and has a very significant relationship. The baby has a high risk of deficiency or nutritional deficit at birth, resulting in growth disorders and death during the first year of life (Zoleko-Manego et al., 2021). This condition occurs because of the optimal function of the digestive organs and the activation of digestive enzymes such as lactase sucrase that is not balanced. In addition, the ability of gastric emptying time and the function of sucking and swallowing have not been managed perfectly. Because of that, infants with low birth weight often present necrotizing enterocolitis (NEC) and diarrhea (Nasar, 2016). Underperforming body performance system in low-birth weight babies can be overcome by the intervention of post-birth, early detection, and proper growth management to catch up with delays. Nutrition and a healthy lifestyle are indispensable in preventing infectious diseases that result in growing barriers (Zoleko-Manego et al., 2021). Disorders of growth of body weight are also influenced by biological factors of the baby, the health of the baby, mother, and household, household environment, as well as local health services (Ntenda, 2019).

The results of the growth data in Table 2 are dominated by the normal and above normal, 60.5% and there is no correlation between LBW with H/A. This is in line with the survey data of the national Riskesdas 2013, which represent the 33 provinces in Indonesia with the results of the domination of LBW babies with the normal height of 50.7% (Badriyah, 2019). However, the results are different on the research in the Village of Umbulrejo, Gunung Kidul, Yogyakarta, which is dominated by stunted babies as much as 71.9% and the presence of a significant relationship between LBW with the incidence of H/A in toddlers (p=0.056) (Murti et al., 2020).

Birth weight in infants is a strong indicator of body size later in life (Barker, 2004). In his research, Aramico et al. (2016) found that infants with Intra Uterine Growth Retardation (IUGR) find it difficult to pursue growth to normal form during

childhood. Therefore, babies with a history of low birth weight have the chance to have a below normal height such as stunting. Babies with stunting often have developmental restrictions, especially cognitive and motor functions, in the future. In addition, stunting also affects social aspects of daily life (Casale et al., 2014). Failure to grow in infants with a history of low birth weight can occur because there is no perfect catch-up growth. The explanation is not in accordance with the research results at Dr. Soetomo General Hospital Surabaya, which is that infants with low birth weight are dominated by babies with normal and above normal height. The pathogenesis underlying height disorders in low birth weight infants has not obtained further explanation. However, some other factors potentially affect the baby's height in the next period, such as the care after birth of nutrients in breast milk, complementary feeding, and recurrent infections. Environmental or social factors are such as health, education, political stability, population density, social support, income, and the behavior of hygiene. Prenatal factors are such as socio

economic conditions, nutrition, and diseases of the mother and the baby during pregnancy (Aramico et al., 2016)

Research data in Table 2 obtained that most of the nutrition of low birth weight infants is normal to above normal55.6% and dis not obtain the relation between LBW with the W/H. A previous study in Education Hospital Laussane Switzerland obtained a total of 56,3% had normal nutrition; moreover, there is a meaningful relationship between infants' birthweight with BMI (Jornayvaz et al., 2016) A research of 82 villages in the City of Vellore, India found most of the nutrition of babies with low birth weight entry in the categories was below normal, 34.7%, and did not find a meaningful relationship between birth weight with a BMI of infants (p=0.468) (Chakraborty et al., 2014)

Changes in the body's metabolism post-birth as a form of adaptation response to ominous environments that result in malnutrition in the intrauterine period impact the increased risk of metabolic diseases in the future. This situation is reinforced by parental mistakes in gaining growth improvements in infants with low birth weight to overcome growth disorders. Diet early in life affects the plasma concentration of leptin in the body in the future, which is closely related to obesity, insulin resistance, and type 2 diabetes (Barker, 2007; Jornayvaz et al., 2016). Low birth weight babies have less lean body mass, which interferes with the body's energy production and insulin performance in the body. Additionally, hormones related to appetite control, such as high levels of ghrelin, leptin resistance, and low level of adiponectin, will affect weight gain in the first month of life (Kyriakakou et al., 2008). Moreover, infants with higher socioeconomic family backgrounds have the potential to have access to high-energy foods with low physical activity, making them susceptible to weight gain later in life (Jornayvaz et al., 2016). Nutrition is influenced by birth weight and several other factors, such as parental education, shelter, and the environment, which can change parental parenting and affect the child's diet (Rahayu et al., 2015).

Table 2 shows the growth of head circumference in infants of low birth weight is predominantly normal as much as 50.6%, which is not much different to the amount of normal and no relationship was found in LBW with HC/A (p=0.143). The same results in the study of Rwanda Hospital found as much as 90.5% of the head circumference of LBW babies was normal and there was no relationship between birth

weight with head circumference (p=0.863) (Kirk et al., 2017).

Head circumference has the highest predictive value for birth weight. Head circumference is often used as a guideline in identifying or detecting neonates with low birth weight. Babies born with small size are likely to have smaller organs, especially the brain. In the fetus in the uterus, brain growth is very rapid. Poor nutritional conditions in pregnant women can cause fetal brain cells to decrease, especially in the cerebrum (Septira and Anggraini, 2016). The hypothalamus pituitary axis (HPA Axis) regulates normal responses to stress. Psychosocial stressors during pregnancy, maternal immune activation (MIA), and HPA modification can significantly impact fetal brain development (Khan and Leventhal, 2021). The manifestation of brain size shows the head circumference and is likely to affect cognitive levels in infants (Septira and Anggraini, 2016).

The cause of developmental delay or disorders is same as growth, most are idiopathic. The underlying pathophysiology is not known for sure but epidemiological studies have proposed several mechanisms that cause developmental delays to be differentiated into four groups. The prenatal group is due to family genes assumed to perform an important role in developmental delays, cerebral dysgenesis, vascular disorders such as bleeding or occultism, complications due to infection, medications, and toxins. The perinatal group are prematurity, perinatal asphyxia, and metabolic diseases such as bilirubin disorders. The postnatal group are infections, metabolic disorders, anoxia, trauma, and vascular. In other groups, social, mental health disorders in the mother, idiopathic, and other environmental stressors could cause developmental delays. Developmental delay can occur when failure reaches a stage compared with peers from the same population. It is caused by disturbances in one domain, the combined domain, or global (mostly affecting the development area's domain). Therefore, early detection and intervention are necessary to avoid long-term disability (Khan and Leventhal, 2021).

Based on the research results in Table 2, the development of LBW infants based on the personal-social domain delays is as much as 59.3% and there is a relationship of low birth weight infants with a delay of personal social reliance. The same results found in Wonosobo Regency obtained a total of 73.1% of LBW infants under two years experience interference (Ashar et al., 2021).

The domain of personal social reliance cannot stand alone and will always depend on other domains such as gross motor, fine motor, and language. Such as the example of the baby, who initially sits down and grabs a moving object, this activity is a task for the baby to try to interact, stabilize the body's physiological and social sensitivity which are all affected by the ability to communicate, language, and the social and cognitive development. So, when a baby with disorders of the personal social domain is found it can be ascertained that the baby has suffered a developmental disorder in the other domain (Holloway and Long, 2019). The cause of the delay of the personal social domain in infants is also influenced by the stimulus and the quality of interaction of the baby with the parents. In addition, the parents' confidence and freedom they give from an early age are also appropriately influential on the domain. Freedom and trust will help the baby in exploration efforts (Wayan et al., n.d.). Factors of pregnancy also affect the delay, such as knowledge of the mother while pregnant, the quality of nutrition and sanitation during pregnancy, and visits to health services are very

influential on the condition of the baby (Westgard and Alnasser, 2017).

The research results contained in Table 2 show the development of LBW infants based on the motor domain is dominated by the fine motor delay as much as 61.7% while the gross motor is 85.2% and also shows there is no relationship between LBW with motor development (fine motor p=0.070 and gross motor p=0.095). The results of the research are in line with the findings in Puskesmas Babat, that LBW infants have impaired fine motor as much of 72.7% and gross motor as much as 77.3% as well as the relationship between LBW with the development of both fine motor and gross motor (fine motor p=0.007 and gross motor p=0.019) (Izzah, 2018). The findings of different research in Wonosobo Regency majority of LBW infants were that 73.1% had normal motor development and did not reveal any significant relationship between LBW and the status of infant motor development (p=0.97) (Ashar et al., 2021).

Based on the research results in Table 2, development of LBW infants based on the domain of language dominated the delay by 66.7% and no correlation was found between LBW with the language domain (p=0.341). Other research findings in the RSB Rachmi Yogyakarta were as much as 87.5% of LBW infants have speech and language disorders and obtained a relationship between LBW with developmental disorders of speech and language (p=of 0.027) (Sari, 2015). In addition, other studies in the area of Wonosobo give other results that were dominated by normal babies by 90.4%, and it was also found that there is no significant relationship between LBW with the language skills of the baby (p=0.17) (Ashar et al., 2021).

In premature low birth weight infants, optimal maturation in the brain and nervous system does not occur, so that it can lead to growth disorders such as functional impairment and motor disorders. Babies with low birth weight are often found to have the weight and size of the lower brain and the acquisition of a deficit of brain cells, particularly in the frontal and posterior seen from the size of the head circumference of a baby, tends to have little effect on neural development and the impact on motor and language development (Scharf et al., 2016). A baby with a neuromuscular disorder often presents with a gross motor delay but not all are accompanied with a fine motor delay (Lurio et al., 2015). Gross motor skills are responsible for movement and balance, such as run, walk, and jump. Gross motor is the first domain that the baby must master because with this the baby will be helped to interact with the environment to provide an opportunity to enrich the other domain of the development, in particular the domain of language. Therefore, a baby experiencing delays in the gross motor stage at higher risk of developmental delay at the four other domains. Fine motor factors are associated with the dexterity of such a view, response writing, typing, drawing, and manipulating objects and are closely related to the language domain because the coordination of the lips, tongue, and facial muscles affects the ability to speak (Ribeiro et al., 2017). Intervention treatment, duration of hospital stay, and medical complications of neonates, such as septicemia, intraventricular hemorrhage, chronic lung diseases, apnea, and bradycardia, can have a negative impact on brain development and contribute to highlight the deficits in neurobehavioral in the long term, which have a bad effect on speech development with delayed language (Ribeiro et al., 2011).

In this research on the growth and development of low birth weight infants aged 0-24 months in the Growth and Development Division of Dr. Soetomo General Hospital, Surabaya the results

obtained that low birth weight has more impact on development than infant growth with evidence of the dominance of disorders occurring in the domain of development. This is contrary to the theory of growth and development that growth and development are not separate and also the processes occur simultaneously and are related. However, the results of this study are in line with the theory that the rate of growth and development is different for each individual because the data are taken from several individuals at different ages but at the same time (Inggriani, Rinjani and Adila, 2019).

## CONCLUSIONS

Results obtained in this study showed that infants with low birth weight were more influential on the development than the baby's growth, with a demonstrated predominance of the disorder occurring in the development domain. In addition to that, no relationship was found between low birth weight infants with all domains growth and development except the domain of personal social obtained a relationship.

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Original Research

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# INPATIENT CARE UTILIZATION AMONG ELDERLY IN INDONESIA: A CROSS-SECTIONAL STUDY FROM INDONESIA FAMILY LIFE SURVEY

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**ABSTRACT**

**Introduction:** The increasing number of the elderly is worrying. It is a concern in public health issues. The elderly have higher susceptibility to chronic diseases. **Aims:** To identify the factors affecting inpatient care utilization among the elderly population in Indonesia. **Methods:** Data from the 2014 Indonesian FamilyLife Survey were used, representing 83% of the Indonesian population. Additionally, Andersen's theory of healthcare service utilization model was applied. This study applied a cross-sectional design. The sample consisted of 5,325 respondents 60 years in age or older. The chi-square test and multivariate analysis using a multiple logistic regression test were used to analyze the data. **Result:** This study found 222 of its respondents utilized inpatient care (4.2%). The characteristics that had a significant correlation with the utilization of inpatient care were women, middle-school education, high education, Sumatera region, urban area, health insurance ownership, low economy status, middle economy status, high economy status, very high economy status, sick perception, smoking habit and obesity. **Conclusion:** The most dominant predictor was the high economy status. The health-insured elderly are able to receive inpatient care without bearing the financial burden. The government should provide health insurance for the elderly in Indonesia.

**Keywords:** Elderly, healthcare, inpatient care, Indonesian Family Life Survey, utilization

## INTRODUCTION

Population aging has become a significant problem that is widely debated in various nations around the globe. The elderly demographic has been increasing in developed and developing countries, decreasing fertility and mortality rates and increasing life expectancy are factors that influence population aging. The proportion of those over 60 years in age is on the rise across the world. In 2017, there were 962 million people aged over 60 years old. It is approximated that 79% of the elderly will live in developed areas by 2050. According to WHO data, the highestpercentage of the elderly population in Southeast Asia is in Singapore at 19.5%. While Indonesia is ranked 6th out of 13 countries in Southeast Asia, which is 8.6% of the elderly population, it is also estimated that in 2050 there will be around 19% of the elderly population; this number is quite large. The highpopulation of the elderly is in line with the increasing life expectancy. Getting old is something that happens to every human being, but how to get old but still keep the body healthy and fit is a challenge for everyone (World Health Organization, 2017). The elderly make up 8.04% of the Indonesian population, the elderly morbidity rate is 28.62%, and only 7.17% of the sick and elderly utilized inpatient healthcare. These statistics are fairly concerning (Statistik Indonesia, 2015).

According to WHO on Global Health and Aging, currently there has been an "epidemiological transition"; in the past the main cause of death was infectious diseases, but now non-communicable diseases have become the main causes of death, especially in adults and the elderly, this is the biggest burden on the population. global health. Chronic non- communicable diseases are caused by lifestyle, diet and increasing age. Age is a consistent risk associated with illness aswell as death, the health status of the elderly is not as good as when they were young. The

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decline in the function of the organs of the elderly causes the elderly to tend to suffer from diseases. The World Health Organization analyzed 23 low- and middle-income countries, wherein the financial costs of three non-communicable diseases (diabetes, stroke, and heart disease) were calculated. Some of the aforementioned will majorly affect health service utilization for the elderly.

In a number of nations, healthcare expenditures have posed a threat to household finances intended to be put toward fundamental physiological needs (Igarss, 2014). Global health challenges have shifted onto the elderly population at risk for non-communicable diseases (Yang et al., 2013; Wang and Chen, 2014). The elderly are correlated with multiple morbidities (Wolff, Starfield and Anderson, 2002), higher mortality rates (Gijsen et al., 2001), and higher utilization of inpatient care (Wolff, Starfield and Anderson, 2002). In low-income countries, variables contributing to healthcare service usage include sex, age, education, marital status, chronic diseases, possession of health insurance, and urban residency (Srivastava and McGuire, 2015). Alternative factors that affect the elderly's inpatient care use are socioeconomic status based on education level or income (Dubikaytis et al., 2010; Walkom and Lo, 2012), health insurance ownership (Filipski, Zhang and Chen, 2015), health perception and chronic condition (Stirbu et al., 2011; Filipski, Zhang and Chen, 2015).

Health issues in the elderly are more complicated because they are at increased risk for chronic diseases, which may lead to differing healthcare utilization tendencies in comparison with the youngerpopulation. As a result, the usage of health services may diverge. In the process of health transition, Indonesia will face a rapid rate of demographic aging. The increase in the elderly population in Indonesia raises serious concerns about the utilization of health services for them. Age affects individuals' needs in utilizing health services. Older people are at increased risk for chronic disease when compared to the younger demographic. Studies on the elderly's utilization of inpatient care in Indonesia remain limited despite their importance for policy- making. This study's aim was to investigate the factors affecting utilization of inpatient care for the elderly population in Indonesia.

## METHODS

The study took data from the 2014 Indonesian Family Life Survey (IFLS). IFLS is a constantly on-going survey intended to identify the socioeconomic and health conditions of Indonesian households. The 2014 IFLS represented 83% of Indonesian households across 13 provinces (all provinces in Java, Bali, NTB, South Sulawesi, South Kalimantan, South Sumatra, Lampung, West Sumatra, and North Sumatra). The IFLS sample wascollected using multistage random sampling (Strauss, Witoelar and Sikosi, 2016).

This study utilized a cross-sectional design. The inclusion sample was respondents aged 60 or older. There was a total of 5,325 subjects selected. The dependent variable in this study is outpatient visits. Outpatient visit use was scored 'yes' if the individual reported having visited a public hospital, public health center (Puskesmas), private hospital, clinic, health worker, or doctor's practice or had been visited by a health worker or doctor for outpatient care in the past four weeks. The variable was scored 'no' if this was not the case.

This study's independent variables included sex, location, region, occupation, education status, marital status, economic status, nutritional status, health perception, chronic disease history, health insurance ownership, and smoking habits.

Inpatient visits are respondent visits to health services for inpatient to Government Hospitals (General/Special)or Puskesmas or private hospitals or private clinics during the last 12 months. The variable code is 1 if yes and 0 if no visit. Gender is divided in male and female. Education is the last formal school

level ever completed by respondents consisting of no school, elementary, junior high, high school, diploma, college divided into three categories, 0 if education is low (no school, elementary), 1 if secondary education (junior high school, high school) ), 2 higher education (Diploma and college). Marital status is the respondent's marital status which consists of unmarried, married, living together, divorced, living separately and divided into two categories, namely 1 if Married 0 if Other (living together, divorced, living separately).

Employment is the respondent's activity to earn income in order to fulfill daily life which consists of the formal and informal sectors. divided into two categories, namely 1 if working in the formal sector (self-employed with permanent employees, private employees, government employees) 0 if working in the informal sector (self-employed, self-employed with the help of household members, freelance workers in agriculture, freelance workers in non-residents). agriculture, unpaid family workers).Region is the province where the respondent lives which is divided into three regions, namely Java & Bali, Sumatra and the Eastern Region. This variable is divided into three categories, namely 0 if the respondent lives in the Eastern Region, 1 if the respondent lives in Java & Bali, 2 if the respondent lives in Sumatra.

The location of the area is the respondent's place of residence consisting of villages and cities, divided into two categories, namely 1 if the respondent lives in the city and 0 if the respondent lives in the village. Ownership of Health Insurance is health insurance ownership of respondents consisting of ASKES, ASTEK, health insurance from companies, clinics for employees, private health insurance, JAMKESMAS, JAMKESDA, ASKES SOCIAL, independent insurance) divided into two categories namely 1 if the respondent has insurance health and 0 if respondent doesn't have health insurance.

Economic status in the proxy uses per capita expenditure (PCE). The household expenditure of the respondentfor a month is calculated from the total expenditure of the respondent's household divided by the number of household members. Furthermore, after the figure is known, then it is divided into five groups, namely the bottom 20% (very poor) to top 20% (very rich). divided into 5 categories, namely 0 if quantile 1 (very poor), 1 if quantile 2(poor), 2 if quantile 3 (intermediate), 3 ifquantile 4 (rich), 4 if quantile 5 (very rich). Historyof Chronic Disease is respondent's data regarding if in the last five years the respondent has been diagnosedby a health worker of the following diseases: hypertension, stroke, asthma, cancer, diabetes, tuberculosis hypertension, chronic lung disease, liver, arthritis, gout, heart, kidney failure. divided into two categories, namely 0 if the respondent hasa chronic disease and 0 if not.

Health Perception is the respondent's view of the health condition he feels during the interview. It is divided into two, namely 0 if the respondent considers himself very healthy, healthy and 0 if sick (unhealthy, sick). Smoking habits are respondents who have the habit of smoking tobacco using a pipe, smoking self-rolled tobacco, or smoking cigarettes/cigars, divided into twocategories, namely 0 if the respondent hasa smoking habit and 0 if the respondent does not. Nutritional Status in the state of the body as a result of food consumption and absorption can be measured by weight and height by calculating the Body Mass Index (BMI), divided into four categories, namely 0 if the respondent is thin (bmi <18.5), 1 if the respondent is normal (bmi 18.5 -22), 2 if the respondent is fat (bmi 23 -24.99), 3 if the respondent is obese (bmi>25).

Statistical software SPSS 23 was used to analyze data. Data were analyzed descriptively and analytically. Methods of analysis include univariate/descriptive analysis, bivariate analysis using chi-square test with significance levels of $p < 0.05$ and confidence interval (CI) of 95%, and multivariate analysis using multiple logistic regression test.

This study has been approved by the Ethics Review Center of the Faculty of Public Health, Sriwijaya University, with the ethical qualification letter Number 105/UN9.1.10/KKE/2018.

## RESULTS

This study found that 4.2% of the elderly respondents used inpatient healthcare services. Most of them had lesser educational backgrounds, weremarried, had occupations in informal sectors, resided in Bali and Java, resided inrural areas, and did not have health insurance. Also, they were mostly of the lowest economic status, did not have a history of chronic diseases, were sick, had smoking habits, had a normal nutritional status. Table 1 shows respondents' characteristics.

Table 2 displays the results of the bivariate analysis on the correlationbetween the elderly's utilization of inpatient care and the independent variables. We used chi-square to see association between dependent variable and independent variable. We found that the variables having an association with the elderly's utilization of inpatient care utilization were sex, location, region (Sumatera), educational background (middle-high), economic status, nutritional status (obesity), health perception, health insurance, history of chronic disease, and smoking habits.

The multivariate analysis identified the predictor of the elderly's utilization of inpatient health services. Table 3 showsthe final model used multiple logistic regression from the factors that contribute to the elderly's utilization of inpatient care.We can show that females had higher risk for inpatient care utilization than male subjects. Females have probability 1.32 times to utilize inpatient care.

Location was a factor that was found to significantly influence the elderly's utilization of inpatient care. Urban area residents had a higher chance of using inpatient care than rural area residents. Respondents who lived in urban have probability 1.45 times to utilize inpatient care. Health insurance was also found to be a significant factor affecting the elderly's utilization of inpatient care. Those with health insurance were more likely to use inpatient care. Respondents who have health insurance have probability 2.20 times to utilize inpatient care.

Household economic status is another factor significantly impacting the elderly's utilization of inpatient care. The higher their status, the higher the chances for them to utilize inpatient care. Those in the very rich tier were the most likely to utilize inpatient care. Respondents whohave high economic status have probability
4.37 times to utilize inpatient care.

Another significant factor for utilization of inpatient care was history of chronic diseases. The elderly population with a history of chronic diseases were more prone to utilizing inpatient care than those without chronic diseases. Respondents who have history of chronic disease have probability 2.18 times to utilize inpatient care.

The elderly with unhealthy perceptions were less likely to utilize inpatient care than those with healthy perceptions. Healthy perceptions significantly influenced the elderly's utilization of inpatient care. Lastly, it wasless probable for smokers to utilize inpatient care than non-smokers.

**Table 1.** Characteristics of respondents

| Variable | n=5.325 | % |
|---|---|---|
| **Inpatient visit** | | |
| Yes | 222 | 4.2 |
| No | 5,103 | 95.8 |
| **Sex** | | |

| **Variable** | **n=5.325** | **%** |
|---|---|---|
| Female | 2,274 | 42.7 |
| Male | 3,051 | 57.3 |
| **Education** | | |
| Low | 4,239 | 79.6 |
| Middle | 900 | 16.9 |
| High | 186 | 3.5 |
| **Married status** | | |
| Married | 3,777 | 70.9 |
| Others | 1,548 | 29.1 |
| **Job** | | |
| Formal | 663 | 12.5 |
| Informal | 4,662 | 87.5 |
| ***Region*** | | |
| Sumatera | 1,020 | 19.2 |
| Java & Bali | 3,513 | 66 |
| East region | 792 | 14.9 |
| **Area location** | | |
| Urban | 2,535 | 47.6 |
| Rural | 2,790 | 52.4 |
| **Health insurance ownership** | | |
| Yes | 2,298 | 43.2 |
| No | 3,027 | 56.8 |
| **Economic status** | | |
| Poorest | 1,473 | 27.7 |
| Poor | 1,131 | 21.2 |
| Middle | 996 | 18.7 |
| Rich | 843 | 15.8 |
| Richest | 882 | 16.6 |
| **Chronic disease** | | |
| Yes | 525 | 9.9 |
| No | 4,800 | 90.1 |
| **Health perception** | | |
| Healthy | 1,785 | 33.5 |
| Sick | 3,540 | 66.5 |
| **Smoking habit** | | |
| Yes | 2,751 | 51.7 |
| No | 2,574 | 48.3 |
| **Nutritional status** | | |
| Thin | 984 | 18.5 |
| Normal | 2,364 | 44.4 |
| Fat | 816 | 15.3 |
| Obesity | 1,161 | 21.8 |

**Table 2.** Bivariate Analysis of Inpatient Visit

| Variables | Inpatient Visit | | PR | 95% CI | |
|---|---|---|---|---|---|
| | Yes % | No % | | Lower | Upper |
| **Sex** | | | | | |
| Female | 5.0 | 95.0 | 1.42** | 1.09 | 1.83 |
| Male | 3.5 | 96.5 | 1 | | |
| **Education** | | | | | |
| Low | 3.7 | 96.3 | 1 | | |
| Middle | 5.7 | 94.3 | 1.57*** | 1.14 | 2.17 |
| High | 8.1 | 91.9 | 2.29*** | 1.32 | 3.98 |
| **Marriage Status** | | | | | |
| Married | 4.1 | 95.9 | 0.91 | 0.69 | 1.20 |
| Others | 4.5 | 95.5 | 1 | | |
| **Occupation** | | | | | |
| Formal | 5.0 | 95.0 | 1.23 | 0.86 | 1.76 |
| Informal | 4.1 | 95.9 | 1 | | |
| **Region** | | | | | |
| Sumatera | 6.2 | 93.8 | 2.42*** | 1.46 | 3.99 |
| Java & Bali | 3.9 | 96.1 | 1.50 | 0.94 | 2.93 |
| Eastern area | 2.7 | 97.3 | 1 | | |
| **Area Location** | | | | | |
| Urban | 5.4 | 94.6 | 1.81*** | 1.39 | 2.36 |
| Rural | 3.0 | 97.0 | 1 | | |
| **Health Insurance Ownership** | | | | | |
| Yes | 6.1 | 93.9 | 2.29*** | 1.75 | 2.99 |
| No | 2.7 | 97.3 | 1 | | |
| **Economic Status** | | | | | |
| Poorest | 1.6 | 98.4 | 1 | | |
| Poor | 3.7 | 96.3 | 2.33*** | 1.40 | 3.87 |
| Middle | 3.6 | 96.4 | 2.26*** | 1.34 | 3.82 |
| Rich | 5.0 | 95.0 | 3.17*** | 1.90 | 5.27 |
| Richest | 8.8 | 91.2 | 5.18*** | 3.68 | 9.33 |
| **History of Chronic Disease** | | | | | |
| Yes | 10.9 | 89.1 | 3.16*** | 2.37 | 4.21 |
| No | 3.4 | 96.6 | 1 | | |
| **Health Perception** | | | | | |
| Sick | 3.4 | 96.6 | 0.59*** | 0.46 | 0.77 |
| Healthy | 5.7 | 94.3 | 1 | | |
| **Smoking Habit** | | | | | |
| Yes | 3.4 | 96.6 | 0.67*** | 0.52 | 0.88 |
| No | 5.0 | 95.0 | 1 | | |
| **Nutritional Status** | | | | | |
| Thin | 3.0 | 97.0 | 0.92 | 0.60 | 1.41 |
| Normal | 3.3 | 96.7 | 1 | | |
| Fat | 4.4 | 95.6 | 1.35 | 0.90 | 2.02 |
| Obese | 6.7 | 93.3 | 2.11*** | 1.53 | 2.91 |

*p<.05; **p<.01; ***p<.001

**Table 3.** Multivariate analysis of factors affecting inpatient care utilization among the elderly

| Variables | Sig. | Exp(B) | 95% C.I | |
|---|---|---|---|---|
| | | | Lower | Upper |
| **Sex (Male)** | | | | |
| Female | 0.152 | 1.32 | 0.90 | 1.94 |
| **Region (East Region)** | | | | |
| Java & Bali | 0.135 | 1.44 | 1,89 | 2,32 |
| Sumatera | 0.001 | 2.37 | 1.42 | 3.97 |
| **Area Location (Rural)** | | | | |
| Urban | 0.015 | 1.45 | 1.07 | 1.95 |
| **Insurance (No)** | | | | |
| Yes | 0.000 | 2.20 | 1.64 | 2.94 |
| **Economic status (Poorest)** | | | | |
| Poor | 0.004 | 2.20 | 1.64 | 3.94 |
| Middle | 0.003 | 2.19 | 1.29 | 3.71 |
| Rich | 0.000 | 2.57 | 1.53 | 4.32 |
| Very Rich | 0.000 | 4.37 | 2.70 | 7.06 |
| **Chronic Diseases (No)** | | | | |
| Yes | 0.000 | 2.18 | 1.55 | 3.05 |
| **Health perception (healthy)** | | | | |
| Poor | 0.015 | 0.70 | 0.53 | 0.93 |
| **Smoking habit(No)** | | | | |
| Yes | 0.252 | 0.80 | 0.54 | 1.17 |

## DISCUSSION

We found that 4.2% of participants utilized inpatient care. Those with chronic diseases tend to utilize more healthcare services with the intention to be cured (Nafiu et al., 2011). In other words, the older an individual is, the higher their risk for chronic disease (Boyd and Fortin, 2010). Most of the elderly population who did utilize inpatient care were female, resided in Sumatera and urban areas, had middle-high educational backgrounds, had occupations in the informal sector, had a high income, had health insurance, had health perceptions, had a history of chronic diseases, were obese, and were not smokers.

This study's analysis indicated that elderly women utilized inpatient care more than elderly men. This was consistent with results from previous studies (Dias, Severo and Barros, 2008). Elderly women were prone to having worse health than elderly men (Gong, Kendig and He, 2016). Obese females used inpatient care more than males (Vals, Kiivet and Leinsalu, 2013). Regional differences may also affect the elderly's inpatient care utilization. Varying regional population densities, disease endemics, degrees of trust, andgovernment policies are all possible contributors. Elderly residents in urban areas were more likely to utilize inpatient care. This can be attributed to easier access (Vals, Kiivet and Leinsalu, 2013). Urban area residents were more likely to have health insurance than rural residents. As a result, utilization of inpatient care wouldbe more common in urban areas in comparison with rural areas (Liu et al., 2007).

Elders with health insurance have a higher possibility of using inpatient care. This finding was similar to that in previousstudies (Kim and Lee, 2016). The elderly population who do not have health insurance and are of middle-low economic status may pass over inpatient care even when needed (Insaf, Jurkowski and Alomar, 2010). Inpatient care is relatively expensive when compared to

outpatient care, which could delay the uninsured elderly's utilization of it (Thabrany, 2003).

Economic status was found to be the primary predictor in determining the elderly's utilization of inpatient care. Those of the highest economic status were also the most likely to utilize inpatient care. A number of other studies had similarresults (Thabrany, 2003; Insaf, Jurkowski and Alomar, 2010; Kim and Lee, 2016). Utilization of healthcare was not only influenced by health factors, but also by economic status, which is what allows the elderly to utilize inpatient care (Stein etal., 2012). Income is another direct contributor to utilization of inpatient care. The higher an individual's income, the higher their chances of inpatient care utilization. Inpatient care's expensive cost in comparison with outpatient care may explain this (Lu et al., 2007).

The elderly with a history of chronic diseases were more likely to utilizeinpatient care. This finding was in line with those in other studies (Liu et al., 2007; Kim and Lee, 2016; Nafiu et al., 2011). Having a history of chronic diseases may impact daily life activities, such as bathing, walking, or dressing, which could encourage inpatient care utilization (Zacharias et al., 2005; Schafer and Ferraro, 2007). Other studies found that those with chronic diseases, a lower economic status, and lacking health insurance are likely to utilize inpatient care (Blackwell etal., 2009). The elderly with sick perceptionwere less likely to utilization inpatient care. This was consistent with results from other studies (Exavery, 2010; Gong, Kendig and He, 2016). Through interviews, elderly respondents with chronic diseases and health perceptions confirmed they had a history of using inpatient care (Onyeneho et al., 2016). Smoking habits were another influential factor on the elderly's utilization of inpatient care. According to this study'sresults, the elderly smokers were less likely to use inpatient care. This result was in line with findings in other studies (Sari et al., 2017). Lung cancer is known as the most common, dangerous chronic disease caused by smoking. Lung cancer patients were found to have the longest average inpatient stays (43 days), with 22 years being the longest history of smoking (Ross, Trung and Phu, 2007). Over half of the respondents had quit smoking due to worsening health conditions. Those whohad quit smoking by the time of the interview had utilized more inpatient care than respondents who still smoked (Baha and Le Faou, 2010).

## CONCLUSION

We found that 4.2% elderly utilized inpatient care. Elderly living in Sumatera, urban, health insuranceownership, economic status, having chronic disease and poor health perception had association with the elderly's utilization of inpatient care utilization. High economic status would increase inpatient care utilization. It is expected that the government would ensure that elderly could own health insurance for helping them to access healthcare.

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Original Research

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# AVAILABILITY OF INFRASTRUCTURE AND CLEAN AND HEALTHY LIVING BEHAVIOR IN PUBLIC AND PRIVATE JUNIOR HIGH SCHOOLS: A COMPARATIVE STUDY

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**ABSTRACT**

**Introduction:** Students can achieve a high level of health and obtain good learning achievements by maintaining clean and healthy living behavior (PHBS). **Aims:** analyze differences in knowledge, attitudes, and practice in private and public junior high school students regarding PHBS. **Methods:** This research used a comparative design. The study subjects were grade IX students from a private and public junior high school in Surabaya with total sample of 185 students. The observed variables were knowledge, attitude, and practice on clean and healthy living behavior. Data were statistically analyzed using Independent T-test for the continuous data, and chi-square test applied to the categorical data. **Result:** showed that the average knowledge score of private and public junior high school students is still sufficient (34.5±12.3), while attitude (63.7±10.4) and practice (53.4±6.4) regarding clean and healthy living behavior (PHBS) in private and public junior high school students were categorized as positive and good. Statistical analysis revealed that there was different score for knowledge of PHBS between students in private and public junior high school (p = 0.002), but score of attitude and practice were not different between two groups, with p-value of 0.084 and 0.746, respectively. **Conclusion:** It concluded that knowledge on clean and healthy living seems not followed by the attitude and practice in daily living of students in state and private junior high school students.

**Keywords**: attitudes , clean and healthy living behavior, knowledge, practice

## INTRODUCTION

One of the efforts to create quality human resources who are able to compete is the need for health surveillance measures. Health surveillance can be started from the pre-school level, elementary school (SD), junior high school (SMP), and senior high school (SMA) (Lina, 2016). So far, health surveillance has also been carried out by the government in the community on school students. The Ministry of Health together with other cross-sector related School Health Units (UKS) carried out various efforts through UKS activities, including health screening and periodic checks, provision of blood-added tablets for young girls, fostering healthy school canteens, immunization, and fostering school health cadres (Surabaya Health Office, 2019). This activity is carried out by the primary healthcare center in the school environment which has a routine schedule for conducting health screening and checking the implementation of Clean and Healthy Behavior (PHBS) in schools including at the junior high school level (Surabaya Health Office, 2019).

In addition, to prevent health problems, internal efforts are also made, namely from students; students are expected to be able to carry out clean and healthy behaviors in their daily lives. According to the Indonesian Ministry of Health (2011), PHBS is a series of behaviors carried out by humans on the basis of awareness which are the result of the learning process and allow individuals, families, groups or communities to independently help themselves in maintaining health, and participate actively in the achievement of public health. PHBS contains all the behaviors that must be practiced in order to achieve the highest level of health. In practice, PHBS is

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implemented in several settings, one of which is at school educational institutions. PHBS within the scope of the school is an activity that aims to enable students, teachers and the school environment to adopt a healthy lifestyle to create a healthy school. The benefits of PHBS in schools are to create a clean and healthy environment, improve the learning process, and nourish students, teachers and the school environment.

More operationally, according to Becker (cited in Notoatmodjo, 2014), healthy behavior, including PHBS, includes knowledge, attitudes and practices. Healthy living habits at school can be done by washing hands with running water and using soap, providing clean and healthy latrines, regular and measured exercise, eliminating mosquito larvae, not smoking in school, weighing and measuring height every month, and throwing garbage in its proper place (Indonesia Ministry of Health, 2011).

According to Suryani (2017), the things that affect PHBS in students are knowledge, attitudes, facilities, school support (teachers), and parental support. Among these factors, the most dominant is the facilities at school. If school facilities are available, students will be encouraged to implement PHBS (Indonesian Ministry of Health, 2011). The knowledge and attitudes possessed by students have an effect on student practice regarding PHBS (Chandra, Fauzan and Aquarista, 2017).

In Indonesia, the types of schools are divided into two, namely private and public schools. According to Kusmananda and Priambodo (2017), many people in general have the opinion that public schools are better than private schools. However, not all public schools are better than private schools. According to the Ministry of Education and Culture (2020), in the scope of the City of Surabaya in 2020 there are 63 public junior high schools and 261 private junior high schools, each of which has different characteristics. It is hoped that all junior high schools in Surabaya already have the availability of facilities and infrastructure for PHBS properly in line with the PHBS assessments that are carried out by the primary healthcare center on a regular basis.

Problems related to health behavior in junior high school are still quite high. The 2015 survey provided an overview of health risk behaviors among students aged 12-18 years in Indonesia, among others: 36.3% of students had a bad habit of washing hands, 44.6% of students had a habit of not eating breakfast, 32.1% of students had a lack of physical activity, and 4.4% of students had ever consumed alcoholic beverages (Center for Research and Development of Public Health Efforts, 2015). In addition, the 2019 *Global Youth Tobacco* survey found that among students aged 13-15, 19.2% of students consisting of 38.3% boys and 2.4% girls are currently smokers. This figure has increased in the last five years, namely in 2014, students aged 13-15 years who became smokers amounted to 18.3%, consisting of 33.9% boys and 2.5% girls (Health Promotion of Indonesia Ministry of Health, 2019; World Health Organization, 2020 )

In addition, referring to previous research , Listiyani (2013) found that there was no difference in the knowledge of public and private elementary school students regarding PHBS ($p=0.999$; $\alpha=0.05$). Furthermore, Adjitama and Wahjuni (2019) found that there was no difference in practice regarding PHBS students of Islamic Junior High School of Al-Irsyad Al-Islamiyyah and Public Islamic Junior High School of 1 Kediri City ($p=0.661$; $\alpha=0.05$). Based on this background, it is also necessary to know the differences in knowledge, practices and attitudes of PHBS among public and private junior high school students, as well as how the availability of PHBS infrastructure in these schools supports students.

Students can achieve the highest degree of health by maintaining a clean

and healthy life. Students can avoid disease and have a healthy physical and mental condition, so that students can participate in the learning process optimally and secure a good learning achievement (Indarti, 2017). Therefore, the researchers examined the availability of PHBS facilities and infrastructure in public and private junior high schools and the level of knowledge, attitudes and practices of students' PHBS in the two types of schools.

## METHOD

The research design used in this study is a comparative design or comparison with the online survey method, namely the Google Form. The population is the ninth grade students of one of the selected private and public junior high schools in Surabaya, amounting to 413 people consisting of 271 public students and 142 private students. Responden dijangkau dengan menghubungi wali kelas untuk membagikan link kuesioner di grup kelas masing-masing. Respondents were reached by contacting the homeroom teacher to share the questionnaire link in their respective class groups. The inclusion criteria of this study are that respondents are ninth grade students who are enrolled in the targeted private and public junior high schools and are willing to take part in a series of studies. Meanwhile, the exclusion criteria were students were not willing to be respondents and refused to participate at the beginning or in the middle of the research. Total respondents obtained from the data collected were 227 respondents consisting of 77 private students and 154 public students. After that, data cleaning was carried out and obtained a sample of 185 students who met the inclusion criteria, namely 57 private students and 128 public students respectively. Data collection was carried out in September-October 2020.

The variables studied were the availability of PHBS facilities and infrastructure in both schools as well as the knowledge, attitudes, and practices of students regarding PHBS. Furthermore, the data were analyzed quantitatively and qualitatively. The quantitative analysis used the Independent T-test and chi-square difference test, while the qualitative analysis was based on the observation of the availability of PHBS facilities and infrastructure in two schools. The instrument for the availability of facilities and infrastructure for PHBS in educational institutions uses the observation sheet used by the primary healthcare center to evaluate the implementation of PHBS in schools (Health Office of Surabaya City, 2020). Furthermore, for the student's PHBS knowledge, attitude and practice instruments were adapted from the research instrument using a questionnaire (Situmorang, 2015).

The measurement of the variable availability of school facilities and infrastructure is based on the school PHBS assessment guidelines from the Health Promotion of Health Office of Surabaya City, which can be classified as follows: 1$^{st}$ category: if the number of "yes" answers is 1-2 (red strata), 2$^{nd}$ category: if the number of answers is "yes 3-4 (yellow strata), 3$^{rd}$ category: if the number of "yes" answers is 5-6 (green strata), and 4$^{th}$ category IV: if the number of "yes" answers is 7-8 (blue strata) (Health Office of Surabaya, 2020). This variable is measured by comparing the eight predefined indicators with the facts of the school in question. Each indicator filled in will be assessed by checking "Yes" and a value of 1. The indicators include: (1) facilities and infrastructure for students to wash their hands with running water and use soap with a maximum component of two classes 1) having a place for washing hands with soap (CTPS); (2) the facilities and infrastructure for students to consume healthy snacks in the school canteen with components of healthy snacks sold in school canteen or stalls meeting the requirements as a healthy and clean canteen; (3) the facilities and infrastructure

for students to use clean and healthy latrines or toilets with a toilet or latrine component that meet clean and healthy requirements and an adequate number, i.e. 1 toilet for 50 students; (4) facilities and infrastructure for students to exercise regularly and measured with the component that there is a regular exercise schedule for students; (5) facilities and infrastructure to eradicate larvae in the school environment with components being no larvae in the toilet tub and scheduled eradication of mosquito nests (PSN) activities at least once a week; (6) facilities and infrastructure for students and teachers who do not smoke in schools with component of smoking ban in schools as evidenced by the prohibition of smoking in the school room or area by the leadership as well as the existence of promotional media on smoking prohibition in school environments; (7) facilities and infrastructure for students to measure body weight and height every six months with the component of each student having a School Child Health Card Book (KMS) or student health check register, and there is a schedule for checking the health of school children regularly; and (8) facilities and infrastructure for students to throw garbage in a place with components of trash bins that meet the requirements and the number of trash bins is adequate, i.e. 1 class 1 bin. The more scores that are qualified, the better the school level or strata in implementing PHBS.

Furthermore, the total questions on the questionnaire on PHBS school amounted to 56 questions consisting of 20 questions on PHBS knowledge, 20 questions on PHBS attitudes, and 16 questions on PHBS practices. The highest score of PHBS knowledge that students can achieve is 53 with the following classification: low knowledge, if the correct answer is <56% of the total score (<30); sufficient knowledge, if the answer is 56-75% of the total score (30-39); good knowledge, if the correct answer is ≥ 75% of the total score (≥40). Furthermore, the highest score of PHBS attitudes that can be achieved by respondents is 80 with attitude classifications including: negative attitude, if the respondent's score is <50% of the total score (<40) and positive attitude if the score obtained is ≥50% of the total score (≥40). The highest score of practice regarding PHBS that can be achieved by respondents is 64 with the category as follows: low practice, if the answer score is <56% of the overall score (<36); sufficient practice, if the answer score is 56-75% of the score. Overall (36-47); and good practice, if the answer score is ≥56% of the overall score (≥48) (Arikunto, 2006; Sudjana, 2012). Before the research was carried out, the researcher h obtained a certificate of passing the ethical test from the ethics committee of the Faculty of Dentistry, Airlangga University with a diploma number: 318 / HRECC.FODM / VII / 2020.

## RESULT

Based on Table 1, respondents from each school with an average age of 15 who came from private junior high schools were 57 students (47.6%) and from public schools were 128 students (52.4%). The respondents of this study were only ninth grade students. According to gender, students from private schools consisted of 27 male students (47.4%) and 30 female students (52.6%), while students from public schools consisted of 61 male students (47.4%). 7%) and 67 female students (52.3%).

Table 2, 3 and 4 list the results of the observations at the two schools that were used as research locations. Based on Table 2, the information obtained from schools shows that public junior high school has twice the number of students compared to private junior high school students. In addition, both schools already have a School Health Units (UKS) room, but private junior high schools do not yet have teachers trained on implementing UKS (Table 3).

**Table 1.** Characteristics of Respondents Based on Gender and Age

| Variable | Private (n= 57) | Public (n=128) | Total (n=185) |
|---|---|---|---|
| | n (%)/average±SD | n (%)/average±SD | n (%)/average±SD |
| Gender | | | |
| Male | 27 (47.4%) | 61 (47.7%) | 88 (47.6%) |
| Female | 30 (52.6%) | 67 (52.3%) | 97 (52.4%) |
| Age (years) | 15 ±1 | 15 ±1 | 15 ±1 |

**Table 2.** The Number of Students in Private and Public Junior High Schools

| | Private Junior High School | Public Junior High School |
|---|---|---|
| Total | 599 students | 1074 students |
| Male | 362 students | 576 students |
| Female | 237 students | 498 students |

Data Source: School Register, 2020

**Table 3**. Facilities and Infrastructure School Health Units in Private and Public Junior High Schools

| | Private Junior High School | Public Junior High School |
|---|---|---|
| Trained teacher for School Health Units | - | 3 teachers |
| School Health Units room | Available | Available |

Data Source: School Register, 2020

Then, based on the results of the calculation of the availability of PHBS facilities and infrastructure in Table 4: for indicator 1, the number of sinks in private junior high school is quite a lot, but the existence of several sinks is in the same location and placed at several points, so they are not centered at the front of the class, respectively, while in public junior high school the sinks are located at several points and at the front of each class as well. Then for indicator 2, the researcher could not assess the canteens in both of the schools, because when the observation took place, the canteen was not in operation. For indicator 3, the number of toilets in private junior high schools is not sufficient because there are only six toilets for students in the school, but the number of students is 599. Furthermore, the number of toilets in public junior high school is adequate, namely there are 20 toilets with a total of 1,074 students. For indicator 4, private and public junior high schools have carried out a routine and regular exercise schedule for all students through Physical Education, Sports and Health (PJOK) lessons which were held for each class, which, during the pandemic, the students carried out at their homes. Before the pandemic, the two schools also had a gymnastics agenda with teachers and other school residents which were held on Fridays. For indicator 5, the water tub in the toilet of private junior high school is quite clean, but during the pandemic the cleaning was not carried out too regularly, also for some student bathrooms there were mosquito larvae. However, according to the teacher's representative, before the pandemic, there was a schedule of eradication of mosquito nests (PSN)

activities which was carried out once a week by involving student participation in turn, each class every week, while for public junior high school, the toilets in this pandemic were clean, because the water tub in the toilet is emptied, so it doesn't cause mosquito larvae to appear. In this school there is also a regular PSN implementation which is carried out once a week in conjunction with the implementation of mutual cooperation in the school environment.

**Table 4**. Comparison of the Availability of PHBS Facilities and Infrastructure in Private and Public Junior High Schools

| No | Indicator | Private | | Public | |
|---|---|---|---|---|---|
| | | Yes | No | Yes | No |
| 1. | Facilities and infrastructure for washing hands (maximum 2 classes have 1 Handwashing with Soap (CTPS) place) | | v | v | |
| 2. | Facilities and infrastructure for consuming healthy snacks in the school canteen (healthy snacks sold in the canteen meet the requirements and the school canteen also qualify as a healthy and clean canteen) | - | - | - | - |
| 3. | Facilities and infrastructure for using clean and healthy latrines or toilets (toilets or latrines meet the clean and healthy requirements and the number is adequate, i.e. 1 toilet for 50 students) | | v | v | |
| 4. | Facilities and infrastructure for regular and measurable exercise (there is a regular exercise schedule for students) | v | | v | |
| 5. | Facilities and infrastructure to eradicate larvae in the school environment (there are no larvae in water tub or toilet and there are scheduled mosquito nest eradication activities (PSN) at least once a week) | v | | v | |
| 6. | Facilities and infrastructure for school residents don't smoke at school (there is an appeal for the prohibition of smoking in the school room or area, by the headmaster as well as the existence of promotional media on smoking prohibition in the school environment) | | v | v | |
| 7. | Facilities and infrastructure for students to measure body weight and height every 6 months (student having a School Child Health Card Book (KMS) or student health check register, and there is a schedule for a health check of school children regularly) | | v | | v |
| 8. | Facilities and infrastructure for students to dispose of garbage in its place (bins meet requirements with an appropriate number, i.e. 1 class 1 bin) | | v | v | |
| | Total | 2 | 5 | 6 | 1 |

Furthermore, for indicator 6, in the private junior high school there is no poster urging smoking in schools, but in the public junior high school one is available. For indicator 7, private and public junior high schools do not yet have the School Child Health Card Book (KMS) or student health check register which are used when routine examinations of student are carried

out from the primary healthcare center. The health check schedule is also based on the implementation of the primary healthcare center. Furthermore, for indicator 8, in the private junior high school there is no waste separation between wet and dry types of waste, while in the public junior high school, there is already waste separation and this school has implemented zero plastic in the school environment, so there is no use of plastic packaging in school, especially in the school canteen.

Based on the results of these observations, the questions about availability of PHBS facilities and infrastructure in public junior high school that filled are six, which means that the availability of PHBS facilities and infrastructure in this school is classified as third category or green strata, while in private junior high school, the questions filled are twp., which means that the availability of facilities and infrastructure for PHBS in the private school is categorized as I or red strata (Table 4), so it can be interpreted that the availability of facilities and infrastructure in the public junior high school better than the private school.

**Table 5.** Comparison of Knowledge, Attitude and Practices on PHBS

| Variable | Private (n= 57) | Public (n=128) | Total (n=185) | *p-value* |
|---|---|---|---|---|
| Knowledge score | 28.9±12.2 | 36.5±11.8 | 34.5±12.3 | 0.002* |
| Attitude score | 61.7±9.7 | 64.6±10.6 | 63.7±10.4 | 0.084 |
| Practice score | 53.1±6.7 | 53.5±6.3 | 53.4 ±6.4 | 0.746 |

Note: Data are presented in (n (%)); *) significant results (p <0.05)

Furthermore, according to Table 5, the average acquisition score of knowledge on private and public junior high schools students is included in the sufficient knowledge category. Moreover, for the average attitude score, the average attitude score for these two school groups was included in the positive attitude category. Furthermore, for the average PHBS practice score, the average score for these two school groups was included in the good practice category, so from these results, it could be interpreted that the scores of PHBS knowledge, attitudes and practices in public junior high school students were better than private students.

Based on the results of statistical analysis with the Independent T-test difference test, (Table 5) a p-value of 0.002 (p <0.05) was obtained for the PHBS knowledge score of private and public junior high school students, p-value of 0.084 (p <0 , 05) for the PHBS attitude score of private and public junior high school students, and a p-value of 0.746 (p> 0.05) for the PHBS practice score for private and public junior high school students. This value indicates that there is a difference in the PHBS knowledge score between private and public junior high school students, but there is no difference in the PHBS attitude and practice scores.

Furthermore, based on Table 6, the level of knowledge of students regarding PHBS, in private junior high school students was mostly in the low category, namely 32 students (56.1%), while the public junior high school students were in the good category, namely 62 students (48.4%). The level of student attitudes regarding PHBS for most private and public junior high school students was in the positive category, namely 56 students (98.2%) and 125 students (97.7%), respectively. The level of student practice regarding PHBS in both private and public junior high school students was in the good category, namely 46 students (80.7%) and 104 students (81.3%) respectively.

**Table 6**. Differences in the Level of Knowledge, Attitudes, and Practice Regarding PHBS in Private and Public Junior High School Students

| Variable | Private (n=57) | Public (n=128) | Total (n=185) | *p-value* |
|---|---|---|---|---|
| Knowledge Level | | | | |
| Low | 32 (56.1%) | 44 (34.4%) | 76 (41.1%) | 0.014* |
| Sufficient | 9 (15.8%) | 22 (17.2%) | 31 (16.7%) | |
| Good | 16 (28.1%) | 62 (48.4%) | 78 (42.2%) | |
| Attitude Level | | | | |
| Negative | 1 (1.8%) | 3 (2.3%) | 4 (2.2%) | 0.799 |
| Positive | 56 (98.2%) | 125 (97.7%) | 181 (97.8%) | |
| Practice Level | | | | |
| Low | 1 (1.8%) | 1 (0.8%) | 2 (1.1) | 0.839 |
| Sufficient | 10 (17.5%) | 23 (17.9%) | 33 (17.8%) | |
| Good | 46 (80.7%) | 104 (81.3%) | 150 (81.1%) | |

Note: Data are presented in (n (%)); *) significant results ($p < 0.05$)

Based on the results of statistical analysis with the comparative chi square test (Table 6), the p-value was 0.014 ($p<0.05$) for the students' level of PHBS knowledge. The level of PHBS attitude obtained p-value of 0.799 ($p>0.05$). In addition, for the PHBS practice level, the p-value was 0.839 ($p>0.05$). This value indicates that there is a difference in the level of knowledge about PHBS in private and public junior high school students, but there is no difference in the level of attitude and practice of PHBS.

## DISCUSSION

PHBS guidance is needed so that PHBS in the school environment can run well. In educational institutions, PHBS guidance is placed through School Health Unit (UKS) activities. PHBS coaching is carried out through three activities, including empowerment, atmosphere building, and advocacy (Indonesian Ministry of Health, 2011).

Through empowerment activities, students are accustomed to maintaining personal and environmental hygiene. Teachers often remind students of the need to maintain cleanliness. The delivery of PHBS values is always inserted into every learning activities, for example when going to rest, after exercising, after playing, and after resting time, the teacher always reminds or orders students to wash their hands frequently to keep their hands clean at all times. This is to train children to keep their bodies clean at all times (Abidah and Huda, 2018).

Furthermore, the atmosphere building activity is carried out by appointing educators or teachers as the person in charge of UKS who has responsibility for UKS activities including the implementation of the PHBS program. The person in charge of the UKS is also obliged to attend meetings or outreach held by the primary healthcare center. In addition, to create an environmentally friendly school atmosphere, the use of media is also needed, for example, the installation of a smoking ban banner in the school environment. The use of media makes it easier for schools to convey information about the PHBS program to school residents, especially students (Abidah and Huda, 2018).

Furthermore, advocacy activities are carried out by administrators from districts or cities or provinces to the person in charge of educational institutions, educators and administrators of educational institutions in their cities, so that they can participate in PHBS development activities in their respective educational institutions. One example of this activity is that the person in charge of

educational institutions must provide policy or regulatory support and facilitate the practice of PHBS in educational institutions by providing supporting facilities. In addition, advocacy is also carried out to fund donors, including entrepreneurs, to help efforts to successfully develop PHBS in educational institutions (Kemenkes RI, 2011).

According to the results of observations, the existing PHBS facilities and infrastructure at private and public junior high schools are already readily available. However, there are several facilities that need to be improved on in their functions and cleanliness so that the implementation of PHBS in the next school can run optimally and can be used by students and other school members in practicing PHBS to the fullest. As in private junior high school, the availability PHBS facilities include a wash basin for washing hands, a bathroom with a toilet, a school health unit room, and a trash can. However, the existing bathroom is still lacking in cleanliness. In addition, trash cans have not been differentiated into organic and inorganic waste. Unlike in public junior high school, the bathrooms are clean, even during this pandemic, the water tubs are emptied. In addition, the trash cans at the school have also been differentiated.

According to the results of the interview also, the process of fostering PHBS implementation through empowerment in the environment of the two junior high schools is quite good, where teachers insert PHBS values to students in the curriculum taught in the classroom and can go through advice or reminders that are conveyed directly by the teacher to students throughout the school period. In changing student behavior, the presence of teachers is a very important factor in implementing health promotion. At school, teachers become role models for students; therefore, one of the factors driving students to get a good PHBS is the teacher. In the UKS in private junior high school, the school has not appointed and trained a UKS coordinator from local teachers. So far, student representatives who have participated in the Intra School Organization (OSIS) have been assigned to help carry out UKS activities. In addition, the use of health promotion media such as banners regarding smoking prohibition in schools is not yet available. In contrast to the implementation of UKS in public junior high school, the school has selected three local teachers to be trained as UKS coordinators who are responsible for UKS activities including the implementation of the PHBS program. These teachers include teachers of Physical Education, Sports and Health (PJOK), Islamic Religion, and Biology subjects. In addition, the use of banner media regarding smoking prohibition in schools has also been made available. The use of media such as banners can make knowledge of PHBS in students richer. There are still many students who have low knowledge of PHBS who are unable to explain that the sources of information about PHBS that are obtained by students at school and in the home environment are still minimal. As explained by Notoatmodjo (2012), knowledge can be obtained from the experiences of others that are shared with us, besides that it can come from books, friends, parents, teachers, radio, television, posters, magazines and newspapers (Wulandari and Pertiwi, 2018). This is in accordance with research from Nasiatin and Hadi (2019) which proves that the role of teachers is closely related to clean and healthy living habits (PHBS) in elementary school students.

Furthermore, the process of developing PHBS through building an atmosphere in private junior high school is still less optimal than in public junior high school. This can be assumed that from the results of observations regarding the implementation

Based on the results of observations and interviews, the researcher concluded that the availability of PHBS facilities and

infrastructure in private schools is still not running optimally, especially for UKS which are not yet fully functioning properly. Even though the existence of UKS allows students to practice hygiene and healthy living habits properly, this is in line with the results of the research by Simbolon and Simorangkir (2018) which is that there is a significant relationship between the implementation of UKS and the implementation of PHBS for students in elementary schools in the Pancur Batu Health Center Work Area, Deli Serdang Regency.

In addition, based on the results of statistical analysis, it was found that there was a significant difference ($p < 0.05$) in the scores and levels of knowledge about PHBS between private and public junior high school students. This is contrary to the findings of Listiyani (2013) which show that there is no significant difference between the type of school and the respondent's knowledge of healthy behavior because the level of knowledge in the two schools is equally good.

Furthermore, based on the results of statistical analysis, it was found that there was no significant difference ($p > 0.05$) in the scores and attitudes regarding PHBS between private and public junior high school students. This is different from the results of statistical analysis which state that the scores and levels of knowledge between private and public junior high school students are different. This contrasts with the results of research from Duroso (2011) which states that there is a relationship between students' knowledge and attitudes toward PHBS of Tlogo Cluster 3 Tamantirto Kasihan Bantul Public Elementary School students. The higher the knowledge about PHBS, the better the attitude of PHBS (Duroso, 2011). According to the results of the study, the level of knowledge of private junior high school students about PHBS is mostly lacking, while most state students are already good. For the PHBS attitude level, almost all students from the two types of schools had a positive attitude about PHBS.

Furthermore, based on the results of statistical analysis, it was also found that there was no significant difference ($p > 0.05$) in scores and levels of practice regarding PHBS between the schools. This is in accordance with the results of research from Adjitama and Wahjuni (2019) that there is no difference in practice regarding PHBS students of Islamic Junior High School of Al-Irsyad Al-Islamiyyah and Public Islamic Junior High School of 1 Kediri City. Based on the research results, most of the practices regarding PHBS in private and public junior high school students were both good. This shows that although PHBS facilities in private junior high school are less than public school, private students still have the awareness to do PHBS.

The level of knowledge and practices of PHBS private and public junior high school students are both good. This is consistent with research from Sulastri, Purna and Suyasa (2015) which states that there is a significant relationship between the level of knowledge and PHBS of school children in SDN areas of Puskesmas Selemadeg Timur II. This shows that a good level of knowledge will enable students to practice PHBS well.

## CONCLUSION

The availability of PHBS facilities and infrastructure in public junior high school is better than private junior high school. In addition, there are differences in the knowledge scores of public and private junior high school students, but for scores and attitudes and practice students toward PHBS there is no difference. It is suggested for both schools to further improve facilities and infrastructure as well as fostering the implementation of PHBS including empowerment, atmosphere building, and advocacy so that students can optimally practice PHBS in the school environment.

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Original Research

# GENDER SEGREGATION OF HEALTH MANAGERS IN DISTRICT HEALTH OFFICERS IN INDONESIA

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**ABSTRACT**

**Introduction:** Women dominate Indonesia's health system but there is no clear evidence how this is represented equally in the decision-making process. Globally, the healthcare system is challenged by gender segregation of health managerial position. **Aims:** This study is to explain the findings regarding patterns of male or female dominance in the particular division of the district health office. **Methods:** This study was an original research discussing gender segregation of male and female dominance as health managers in district health office. We listed the characteristics of health managers in two provinces with different kinship system. These characteristics were then compared with several gender segregation patterns i.e. work area; position requirement; dominant task coordination; workplace; emergency possibility; budget; percentage of the female manager based on matriarchy and patriarchy background. **Result:** Female managers of a matriarchal background dominate in General Secretariat (63.4%). Public Health and Community Empowerment (62.5%) and Healthcare Services (80%). A significant portion of men of a patriarchy background shows that men are dominating in two divisions, Disease Prevention and Control (57.8%) and Health Services (55.3%). The study proved the existence of the dominance of one gender in a specific job. This indicated the existence of gender segregation in the healthcare system. **Conclusion:** Female managers tend to be placed in domestic organization affairs while the male managers are generally responsible for interorganizational affairs, including jobs with high emergency responses.

**Keywords:** District Health Office, Gender segregation, Matrilineal, Patrilineal

## INTRODUCTION

Women represent approximately 70-75% of the global health workforce that dominate the caregiving and nursing profession (Boniol et al., 2019; WHO, 2019). Although women dominate the vast majority of the health workforce, they still tend to belong to a lower position than men who occupy most leadership positions (George, 2007; Shannon et al., 2019; Vong et al., 2019). Women's roles are also less likely to be in managerial, senior, and policymaking than their male counterparts in healthcare systems, whereas non-institutional care is often carried out by women (Exavery et al., 2013). These dynamics present that gender is a critical factor operating in the health workforce (Constance, 2014).

The concept of gender segregation introduced by Gross (1968) refers to the variability in the kinds of jobs men and women handle that is based on supply-side factors such as demand-side factors and personal choice (WHO, 2019). The word *segregation* refers not only to separate different categories based on a demographic characteristic such as race, gender, or class but also forms a basis for bias and discrimination that is a fundamental pathway to social inequalities. Gender segregation is a prevalent form of social inequality and jobs market rigidity that places men and women into work in culturally determined occupational roles

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dominated by their gender (Newman et al., 2011).

In general, gender segregation, which typically assigns men in technical or managerial jobs and women in caring and nurturing jobs, is an established source of inequality. A report from the International Labor Organization showed that Indonesian women are underrepresented in managerial-oriented positions, e.g., manager & legislator, but they are well represented in clerical, sales, and services positions (Schaner and Das, 2016). Women's underrepresentation in managerial-oriented jobs could reference the "glass ceiling" that reflect attitudes and social norms that restrict highly skilled women's career trajectories.

Indonesia's health system reflects the same challenge of health workforce gender segregation globally. The Indonesian Ministry of Health confirms that women dominated 70.9% of 1,072,598 health workers. Two sub-categories were dominated by men, including medical specialists (60.8%) and biomedical technologist (51.1%), whereas women dominated midwifery (100%) (Efendi, 2019). The increasing proportion of women pursuing midwifery and family practice professions versus men pursuing biomedical technologist professions and medical specialties has primarily resulted in the gender segregation of men and women in healthcare.

Only a limited number of studies discuss about the gender segregation among health workers in Indonesia. In addition, some studies have not adopted gender inequity context in women's take up in managerial or leadership roles. Addressing this gap, this study examines the specific pattern of male or female health managers' dominance in the particular division of district health office.

## METHODS

This study was an original research discussing gender segregation of male and female dominance as health managers in the district health office.

### Population and Samples

Two provinces were chosen based on their kinship system, matrilineal or patrilineal dominance. West Sumatra province represents a social system with a matriarchal background, whereas East Java represents a social system with a patriarchal background. We then surfed to all official websites of district health offices under those provinces' coordination. Only the district health office shows the officer position's detailed information and name included in the analysis. We obtained eleven districts in East Java (out of 38 districts) and six districts in West Sumatra (out of 19 districts).

### Data Collection

We listed the officer's name, title, sex, and district health managers' position by using secondary data from the official websites of district health. We identified the organizational structure of the district health offices to levelling the positions.

### Data Analysis

We created a dummy table based on the duties of each position in district health offices. This includes General Secretariat, Public Health and Community Empowerment; Disease Prevention and Control; Healthcare Services and Health Resources. We used this grouping as the basis of the job segregation. We made several comparisons between each duty based on the specific pattern of male or female dominance in the particular district health office division.

We used several comparison dimensions, i.e., work area, position requirement, dominant task coordination, workplace, emergency possibility, budget, percentage of the female manager based on matriarchal and patriarchal background, to describe each duty's power dimension.

According to the Indonesia Ministry of Health's job description, we summarized the job characteristics and compared women managers' percentage in each position. Gender segregation-related job task is predicted by a comparison between the specific pattern of male or female dominance in the particular division of the District Health Office.

### Ethical Clearance

This research has obtained approval ethical clearance from the Institute of Health Sciences Bhakti Wiyata Kediri with the number No: 41 / PP2M-KE / I / 2021.This research meets the requirements of the Ethical Guidelines issued by CIOMS (2016), including 1) Social Value, 2) Scientific value, 3) Distribution of Benefits and Burdens, 4) Risk, 5) Referral/Exploitation, 6) Confidentiality and Privacy, and 7) Informed consent.

## RESULT

### Gender Segregation Related Job Task

The district health office has duties to cover all five district health office tasks, i.e., four divisions of health affairs and one supporting administrative unit (see table 1). The number of female officers, both in the District Health Office with matriarchal or patriarchal background, is dominant with the job tasks' specific pattern.

**Table 1.** Job Characteristics and the Current Women Representativeness

| | **General Secretariat** | **Public Health and Community Empowerment** | **Disease Prevention and Control** | **Healthcare Services** | **Health Resources** |
|---|---|---|---|---|---|
| **Duties** | Administrative support | Program formulation and implementation | Program formulation and implementation | Program formulation and implementation | Program formulation and implementation |
| **Work areas** | All organizational elements at the District Health Office | Family health, community nutrition, environmental health, occupational health, and sports, surveillance and immunization | Prevention and control of communicable and non-communicable diseases including mental health | Primary health care and referral health services including its quality improvements | Pharmacy, medical devices, and household health supplies as well as the human resources |
| **Position requirement** | Bachelor degree from any major | Bachelor degree in health science | Bachelor degree in health science | Bachelor degree in health science | Bachelor degree in health science |
| **Dominant task coordination** | Internal<br>officers of DHO | External<br>1. Community<br>2. Healthcare providers | External<br>1. Community<br>2. Healthcare | External<br>Healthcare providers | External<br>1. Healthcare providers<br>2. Decision- |

| | General Secretariat | Public Health and Community Empowerment | Disease Prevention and Control | Healthcare Services | Health Resources |
|---|---|---|---|---|---|
| | | | providers | | makers of the district health budget |
| **Workplace** | Mostly in the office | Sometimes need to visit villages | Required to visit villages | Required to visit health facilities | Mostly in the office |
| **Emergency possibility** | Low | Low | High | Low | Low |
| **Budget** | Small to medium | Small to medium | Small to medium | Medium to big | Medium to big |
| **Percentage of the female manager** | | | | | |
| Matriarchy | 63.4% | 62.5% | 47.4% | 80% | 52.5% |
| Patriarchy | 58.10% | 52.9% | 44.2% | 44.7% | 57.1% |

This section aims to explain this study's findings regarding patterns of male or female dominance in the particular division of the district health office. Female managers in matriarchal backgrounds were dominating in General Secretariat (63.4%), Public Health and Community Empowerment (62.5%), and Healthcare Services (80%). Although women dominate in the three divisions, women have less of the Division of Disease Prevention and Control (47.4%) than their male counterparts. However, a significant portion of men in the patriarchal background shows that men dominate in two divisions: disease Prevention and Control (57.8%) and Healthcare Services (55.3%). It implies that women tend to be assigned less authoritative jobs and converge in emotive work, such as health and human services (Constance, 2014).

Each division has the same duties: compiling and implementing program plans and technical instructions, coordinating and collaborating with other institutions and agencies, supervision and controlling, evaluating and reporting, and doing other tasks assigned by the Head of the District Health according to their duties and functions. Employees' appointment to structural positions and available positions is carried out after meeting the requirements and competency standards to be held through a recruitment and selection process following laws and regulations.

In the General Secretariat, the officers' duties are to support district health office affairs activities. This division has work areas in the organization of all organizational elements in the health office, in which the qualifications and skills required are a bachelor's degree from any major. To organize or integrate different tasks and activities, the secretariat cooperates with an internal team of district health officer that mostly work in the office. The implementation of duties and activities in the General Secretariat shows the possibility of a low emergency. The budget allocated for secretarial

implementation is categorized as a small to medium budget.

The duties of the Public Health and Community Empowerment include the implementation of technical policy formulation in health sectors: family health and community nutrition, promotion and empowerment of public health, environmental health, occupational health, and sports. The minimum requirement in the Public Health and Community Empowerment division is a bachelor of health science. In carrying out their duties and building coordination, officers have to cooperate with the community and health service providers that sometimes need to visit the village. The possibility of an emergency that will be experienced by the officers is in a low category. Budget allocation for the Public Health and Community Empowerment division falls into the small to medium category.

The Disease Prevention and Control division has the duties of implementing the formulation of technical policies in prevention and control of infectious diseases, prevention and control of non-communicable diseases, mental health, and surveillance & immunization. The workforce needed to fulfill the Disease Prevention and Control division is a bachelor of health science. The Disease Prevention and Control division requires field skills and cooperation in relation to the community and health service providers, which requires visiting the village. In addition, it must be able to respond to the possibility of a high emergency in public health. The Disease Prevention and Control division requires a cost allocation which is in the small to a medium category.

The Health Service division has the duties of implementing the formulation of technical policies and implementing the program in primary health services, referral health services, special health services, and traditional health. The positions required to perform the Health Service division tasks and functions are a bachelor's degree in health science. To carry out tasks in the field of health services, the Health Service division coordinates and carries out cooperation in health service providers, which in its implementation requires to visit health facilities. The tendency of the possibility of emergencies in the implementation of the duties and functions of the health service division shows the low category. The allocation of funds to the Health Service division is included in the medium to big category.

Implementing the formulation of technical policies and the implementation of programs in pharmaceuticals, food and beverages, health facilities and devices, as well as human health resources, are all forms of duties of the Health Resources division. The officer needed in the Health Resources division is a bachelor's of health science that mostly works in the office. To manage the national health insurance system regarding the cost of health services for public health insurance participants, The Health Resource division needs to coordinate with healthcare providers and decision-makers of the district health budget. Allocation of funds that must be provided for utilized in the Health Resources division is the medium to big category. The possibility of an emergency in implementing the Health Service division's duties and functions also occurs in the division of health resources, which shows a low category.

## DISCUSSION

Even though the job requirement set by the Ministry of Health does not regulate gender exclusivity, there is a particular division dominantly occupied by a male or female officer. Why did it happen?

### Gender Stereotypes in the Workplace

A stereotype can be defined as belief about a set of characteristic, behaviors, and attributes of a lot of people

or certain groups that simplify representing a particular type of person (Critchley, Schwarz and Baruah, 2021; Manzi et al., 2021). Based on theory of the Stereotypes Content Models, stereotype is defined as attributes that represent social groups (e.g., men, women and ethnic groups), which include two dimensions; competence and warmth (Fiske et al., 2002). Women represent typically feminine communal characteristics (e.g. warm, caring, nurturing, considerate and friendly) and men represent typically agentic characteristics (dominant, confident, decisive, self-reliant, authoritative and assertive (Critchley, Schwarz and Baruah, 2021).

Male officers always dominate the job task related to disease prevention and control in matriarchal and patriarchal districts. Compared to job tasks in other divisions, the job task on disease prevention control is the most requiring fieldwork and immediate action in an emergency. For illustration, officers in this division should directly visit, observe, and make a brief report to their boss when there is an outbreak. The range of working time in this division is wide, which also requires more immediate action. These two terms, fieldwork and limited time off work, are correlated with the "masculine" term in the workplace. Let us compare with the General Secretariat division, which is dominated by female officers in both district health offices. This division mostly works with domestic affairs of the office. The job task is more clerical due to their task to manage the district health office's administrative workflow. The working time must be more flexible with the limited requirement to visit the villages.

The number of women in top managerial positions in the Public Health and Community Empowerment and the Health Resources divisions both in matriarchal and patriarchal districts are on the rise. This indicates the fact that women are well-educated and are still open to undertaking management roles. The Public Health and Community Empowerment division officers are required to be able to provide guidance, planning of health promotion guidance and control programs, Community-Based Health Programs (UKBM), community nutrition, information systems, and health development research and sometimes need to visit community or villages. The dominance of women in the Public Health and Community Empowerment division is formed from the social construction of gender stereotypes. Women are stereotyped as having communal characteristics and men as more agentic (Bloksgaard, 2011; Brescoll, 2016). Communal characteristics are essentially concerned with the welfare of other individuals, including attributes such as compassionate, kind, sentimental, helpful, and generous, whereas agentic characteristics portray a more self-assured, dominant, and confident tendency, including attributes such as aggressive, ambitious, independent, self-confident, taking charge and being in control (Hentschel, Heilman and Peus, 2019). Agentic characteristics have customarily been adjusted with a leadership role.

Women in the Public Health And Community Empowerment division are increasingly relied on to provide services to the community that functions as a bridge between the health system and society (Kok et al., 2017). They come from the communities they serve and are well-positioned to understand, and work within, cultural and gender norms and power dynamics (Theobald et al., 2015). The roles of women in health promotion consist of relational, structural, and cognitive dimensions. The relational dimension incorporates participation and communication based on shared values. Structural dimensions include social networks, affiliations, and solidarity. The cognitive dimension includes caring, belief, and having a place between family individuals, community individuals, and health promoter (Yuliani et al., 2019).

Stereotypes refer to perception of standard trends of males and females in judgments about men and women. Stereotypes of females and males typically have traits of women as feminine and men as masculine as well as their cultural roles that consider men as providers and women as homemakers (García-Ael, Cuadrado and Molero, 2018). The concepts of the stereotypes of men and women not only are different but tend to be oppositional. Men are seen as lacking what is thought to be most prevalent in women, and women are seen as lacking what is most prevalent in men (Rudman and Phelan, 2008; Heilman, 2012). There are various stereotypes related to the role of women and men in the workforce. Women are still described as incapable of handling multiple functions and tasks that have been handled by men.

## Cultural Stigma of Male and Female Role

Gender segregation in the district health office also continued when discussing the portion of budget allocation authorized by the officers in each division. We break down the segregation in the division level into subdivision level to get a clearer description of budget authorization. This breakdown indicates that the segregation also happens based on the budget size authorized by the manager. The allegation toward this segregation is the existence of cultural stigma of gender role in the society. In district health offices with matriarchal background, divisions and subdivisions with significant budget are mostly directed by female managers. Females tend to be placed as a manager in the Healthcare Service division and Healthcare Resources division. Matriarchal society follows matrilineal descent in their inheritance system. In matrilineal, property is transferred from the family line of mother. Females have power to manage the financial business of the family. An Indonesian woman is customary to take care of the family well and being a secondary income-earner. Indonesian women are also perceived as good at possessing control over financial resources and handling financial affairs and frequently within the household (Ramadan*i et al.*, 2017).

The dominance number of women in the Health Service division is not directly positive from gender equality. Their career paths after education and official duties are influenced by social demands, including the size of the gender roles they face in a patriarchal society. Family factors and gender perception roles contribute to women's career paths (Kruijthof *et* al., 1992; Shannon et al., 2019). For many women, decisions about their work location are always subject to vital considerations for getting family approval. Female health workers in Indonesia also receive social assessments in demonstrating their role in household building. This consideration takes precedence over consideration of their salary, career advancement, and their idealism as health workers serving people in need. The priorities for family needs and integrity, values that are deeply believed to be the foundation of Indonesia's communal society, have limited the options for working for women.

The Healthcare Service division is a job with inflexible working hours that are required to visit health facilities. The work schedule set in a way does not allow for adequate family time or dual responsibilities and may cause women to leave the workplace because of "inflexible and highly demanding workplaces" (Carbajal, 2018). In short, women need flexibility in working hours because of their role in their family. In a patriarchal society, housework is still considered the woman's domain. For working women, they shoulder additional responsibility for the workplace as well as at their domestic front. In contrast to female managers in matriarchal society, women have more opportunities to be a leader and decision-maker in their community (Selinaswati,

2019). Matriarchal societies have four levels of social patterns that include the social level, political level economic level, and spiritual-cultural level. At the social level, women in these societies pass down the clan's property, titles and social position based on the maternal line. At the political level, matriarchal societies may gather women and men to discuss domestic matters. The economic level relates to how women in these societies have managed and control resource production. Moreover, the last is the cultural and spiritual level, and societies may consider the world holy and believe that it should be protected and loved (Selinaswati, 2019).

## Gender Exclusivity

Male exclusivity in disease prevention and control division has been a barrier for females to be accepted in disease prevention and control division. The fact that the activities such as direct visits, observation, and making a quick report are exclusively the male domain offers no protection from gendered discourses of power (Smith,2019). In line with the women's domain in clerical tasks, allocating funds and managing resources are barriers for men to take on these roles. Men may be viewed as incapable because gender normative stereotypes that define masculinity are antithetical to the concept of handling financial affairs, clerical tasks, and managing resources. Gendered stereotypes about who should enter the district health divisions have led to the belief that men or women cannot fulfill the roles that are traditionally associated with the task of division. Gender exclusivity is often thought of as a problem stemming from a lack of female or male employee roles, but diversity issues can necessitate the need for more male or female workers too. Research has indicated that it is not beneficial when anyone gender dominates a profession. A report found that diversity among staff can boost innovation, and some experts have noted that the creativity sparked by diversity relates to the diversity of thought, experience, and knowledge as much as it does to gender.

## Gender Segregation in District Health Division

Sex and gender play an essential role in the health workforce. Sex is a term utilized to allude to the natural and physiological contrasts between men and women, whereas gender is used to allude to men and women's societal roles and expectations (Habib et al., 2020). In the workplace, women and men can have different job assignments and work tasks. The gendered segregation of jobs and tasks are often influenced by societal roles, stereotypes, stigma, and expectations (Quinn and Smith, 2018). The District Health division has driven the emergence of the "masculinized" and "feminized" activities and tasks, materializing in different working conditions and uneven distribution of work environment between men and women officers. Women are over-represented in General Secretariat (63.4%), Public Health and Community Empowerment (62.5%), and Healthcare Services (80%) based on matriarchal background, while men are over-represented in disease prevention and control (57.8%). In contrast to the patriarchal background, men dominate in two divisions: Disease Prevention and Control (57.8%) and Health Services (55.3%). Women are primarily employed in occupations that are characterized by collaborative work (compassionate, kind, sentimental, helpful, and generous), while men are employed characterized as agentic (authority, power, and physical strength and technical skills etc.) (Bloksgaard, 2011; Brescoll, 2016).

The gender segregation in the District Health Office occurs for several reasons. First of all, gender segregation in the District Health Office is a form of the social construction of gender stereotypes. Stereotypes define a social categorization characteristic of culture, and all men and women are expected to fit into these

categories and not break with the ideas of "appropriate" work for women and men. Most jobs and tasks can be characterized as either masculine or feminine by highlighting certain dimensions and labeling them in a certain way (Bloksgaard, 2011). Secondly, labeling and stereotyping results are formed from negative views or stigma about the roles of women and men in society (Link and Phelan, 2001). Gendered stereotypes and cultural stigma of women and men lead to gender exclusivity about who should enter the District Health division.

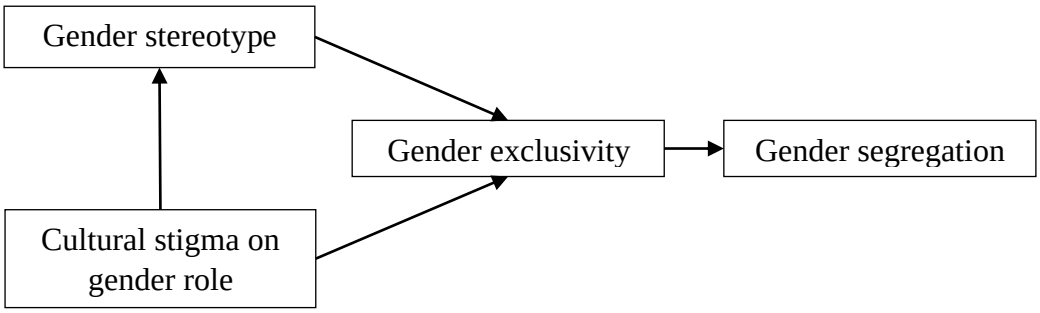


**Figure 1.** The concept of Gender Segregation

## CONCLUSION

The study proved the existence of gender segregation in the healthcare system. The different kinship systems tend to not bring any difference in the gender segregation. The pattern of segregation is likely related to the job description of the position. Female managers tend to be placed in domestic organization affairs while the male managers are generally responsible for interorganizational affairs, including jobs with high emergency responses.

The gender composition in occupation is important for their future attachment. Based on this, it is not beneficial when anyone gender dominates a profession. There is a need for gender diversity among divisions that can boost innovation and creativity sparked by diversity which is related to the diversity of thought, experience, and knowledge as much as it does to gender.

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Original Research

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# EVALUATION INDIVIDUAL LEVEL OUTCOME OF NUTRITION EDUCATION IN SURABAYA PREGNANT WOMEN CLASS PROGRAM

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**ABSTRACT**

**Introduction:** Pregnant women class is one of the nutrition education programs and its success can be assessed by its outcomes. **Aims:** to evaluate the outcome of nutrition education in pregnant women class at individual level in Surabaya on 2019. **Method:** This research was a descriptive qualitative study using purposive sampling technique to each informant in 4 public health services (Puskesmas) in Surabaya that is Kedungdoro, Wonokusumo, Siwalankerto and Asemworo. Informants in this study were 2 staff from Family Health and Community Nutrition Section at Health Department of Surabaya, 4 nutrition workers, 7 midwives, 4 pregnant women cadres and 9 pregnant women class participants in 2019. **Result:** show that outcome of nutrition education in pregnant women class program at individual level is mothers' behavior in consuming high iron foods increase during pregnancy, frequency and portions of mother's meals increase during pregnancy and breastfeeding, mother's practice of EIB and exclusive breastfeeding. **Conclusion:** Effect of the nutrition education in pregnant women class on compliance with consuming iron supplementation tablets and PMT biscuit for pregnant women is not yet known and needs to be studied further.

**Keywords:** mother behavior, nutrition education, pregnant women class

## INTRODUCTION

Pregnant women class is a Republic Indonesia Health Ministry program which has been implemented since 2009. This program targets pregnant women who want to learn about health together in a group form (Ministry of Health Republic Indonesia, 2014). Surabaya is the capital city of East Java Province, which has implemented pregnant women classes. Based on pregnant women class program implementation report using maternal and child health (Kesehatan Ibu Anak / KIA) books in Surabaya in 2018, it showed that every village in Surabaya already has a pregnant women class. Although Surabaya has implemented this program in every village, the results of the pregnant women class evaluated in Surabaya are only in the form of output (direct results of the program). Output of the pregnant women class program includes coverage of maternal and child health books, pregnancy examination stickers, pregnancy visits, cross-health assistance, early breastfeeding, and neonatal visits. One goal of pregnant women classes is to increase knowledge and change maternal behavior about preventing nutritional disorders (Ministry of Health Republic Indonesia, 2014). According to Frye and Hemmer, (2012), outcome is short term, medium term, or long term changes as a result of program activities which can be in the form of implementing new knowledge or skills in practice at individual, group, or organizational level. This shows that maternal behavior that supports prevention of nutritional disorders is the outcome of the pregnant women class at individual level that needs to be evaluated to determine the success of nutrition education in the pregnant women class.

Pregnant women class program implementation report using the KIA book shows there are 371 pregnant women classes in Surabaya on 2018, while the number of facilitators available was only

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240 people. These findings indicate that one facilitator can hold more than one pregnant women class. It is feared that there will be nutrition subjects that are not delivered by the facilitator in pregnant women classes, thus affecting the outcome of nutrition education. Because of that reason, we are interested in doing research aimed to evaluate the outcome of nutrition education in pregnant women classes at individual level in Surabaya in 2019.

## METHODS

This research was a descriptive qualitative study using purposive sampling technique to each informant in four public health services (Puskesmas) in Surabaya, namely Kedungdoro, Wonokusumo, Siwalankerto and Asemworo. Data collection was performed on May-July 2020 using in-depth interviews and document review techniques. In-depth interview technique was carried out by triangulating sources, which were program maker, program implementer, and program target. Informants in this study were two staff from Family Health and Community Nutrition Section at Health Department of Surabaya, four nutrition workers, seven midwives, four pregnant women cadres and nine pregnant women class participants in 2019. Document review was based on the report of pregnant woman class implementation in four Puskesmas using the KIA book from Health Department of Surabaya in 2019.

Variables studied in this study were nutrition education in pregnant women classes (number of nutrition educator, number of class meetings for pregnant women, delivered nutrition material, and nutrition education facilities), nutrition education obtained by mothers outside pregnant women class program and outcome of nutrition education in pregnant women class program at individual level (mother's diet during pregnancy and breastfeeding, consumption of iron supplementation, consumption of supplementary feeding for pregnant women, early initiation of breastfeeding and exclusive breastfeeding).

Data analysis was carried out by reducing or removing data not related to study, presenting all data related to study, cross-checking or verification between all informant statements with the related document and making a conclusion after obtaining saturated data results. Ethical approval was obtained from the Health Research Ethics Committee, Faculty of Nursing, Airlangga University No 1987-KEPK. Informed consent was given by all informants.

## RESULT

### Characteristics of Participants' in Pregnant Women Class Program

There were around 70 pregnant women class participants in 2019 in four puskesmas in Surabaya, but only nine mothers were willing to be interviewed. The characteristics of the nine informants participating in the pregnant women class in 2019 are presented in Table 2.

### Nutrition Education Outside Pregnant Women Class Program

Six out of nine mothers participating in the pregnant women class in 2019 had received nutrition education outside the pregnant women class. Nutrition education obtained by mothers outside the pregnant women class for six mothers is presented in Table 3.

### Nutrition Education in Pregnant Women Class Program

Based on the results of in-depth interview with all informants and review of related documents, the results of nutrition education in pregnant women class at four puskesmas in Surabaya on 2019 are presented in Table 1.

**Table 1.** Nutrition Education in Pregnant Women Class Program 2019

| Variable | Finding |
|---|---|
| Nutrition Educator | Facilitators (village midwives or implementing midwives) |
| Number of meeting | 3 meetings |
| Nutritional material presented in | |
| 1st meeting | Recommended foods for pregnant women, high iron content foods, recommendation to consume one extra portion during pregnancy, definition and impact of anemia, recommendation to consume iron supplements, and sign of chronic energy deficiency. |
| 2nd meeting | Definition of early initiation of breastfeeding (EIB), recommendation to provide exclusive breastfeeding, and recommended foods during breastfeeding or postpartum. |
| 3rd meeting | Signs of low birth weight babies, food myths for mothers and babies |
| Nutrition education facilities | Flipchart for pregnant women class and KIA books. |

**Table 2.** Characteristics of Participant in Pregnant Women Class Program in 2019

| Inf code | n children | Age (year) | Gestational age (trimester) | Mother's last education | Jobs | Pregnant women class meetings attended by | |
|---|---|---|---|---|---|---|---|
| | | | | | | Mother | Husband |
| M1 | 1 | 32 | III | Bachelor | - | Full meeting | - |
| M2 | 2 | 27 | III | Bachelor | call center officer | 2nd meeting | - |
| M3 | 3 | 27 | III | Bachelor | - | 1st meeting | - |
| M4 | 4 | 42 | III | Senior high school | - | Full meeting | - |
| M5 | 2 | 20 | III | Senior high school | online shop seller | 1st-2nd meeting | - |
| M6 | 3 | 37 | I/II | Senior high school | - | 1st-2nd meeting | 2nd meeting |
| M7 | 2 | 31 | II | Senior high school | - | Full meeting | - |
| M8 | 1 | 25 | I | Senior high school | - | 1st meeting | - |
| M9 | 1 | 27 | I | Senior high school | admin | 2nd meeting | - |

**Table 3.** Nutrition Education Obtained by Mothers outside the Pregnant Women Class

| Inf code | Sources of nutrition information | Nutrition information that mothers get | Comparison of nutrition information from inside and outside the pregnant women class |
|---|---|---|---|
| M1 | KIA book, internet, online group | Foods that are recommended or prohibited for pregnant women | Mother finds it easier to understand nutrition information from pregnant women classes. Reason: Facilitators in pregnant women class used simple language and mothers can have direct discussion with health workers. |
| M2 | Internet | Foods that are recommended for | Mother felt that both nutrition materials from the pregnant women class and from the outside |

| Inf code | Sources of nutrition information | Nutrition information that mothers get | Comparison of nutrition information from inside and outside the pregnant women class |
|---|---|---|---|
| | | pregnant women, EIB | were easy to understand.<br>Reason: Facilitators in pregnant women class used flipchart to explain. |
| M3 | Internet | Foods that are recommended for pregnant women, EIB | Mother finds it easier to understand nutrition information from internet.<br>Reason: Mother unable to concentrate when other participants were noisy. |
| M5 | Internet | Foods that are recommended for pregnant women | Mother finds it easier to understand nutrition information from pregnant women class.<br>Reason: Mother only read nutrition information from the internet briefly so it was difficult to remember |
| M6 | Counseling at Integrated Health Family Post Service (Posyandu) | Foods that are recommended for pregnant women and children under five years | Mother finds it easier to understand nutrition information from pregnant women classes.<br>Reason: Facilitators in pregnant women class used flipchart and KIA book to explain. |
| M9 | Counseling from obstetrician | Foods needed during pregnancy and after giving birth | Mother finds it easier to understand nutrition information from mother's obstetrician.<br>Reason: Mother only attends class for pregnant women once and the nutrition information that she get is about exclusive breastfeeding. |

**Outcome of Nutrition Education in Pregnant Women Class**

The results of interview from nine participants of the pregnant women class program in 2019 found outcome of nutrition education in pregnant women class at individual level as shown in Table 4 (mother's diet), Table 5 (behavior of consuming supplements and supplementary feeding biscuit during pregnancy) and Table 6 (breastfeeding practices).

**Mother's Diet during Pregnancy**

Table 4 shows that only two mothers (M6, M7) increased food portions during pregnancy because mothers wanted to meet the nutrient requirement of both mother and fetus. M6 attended first and second meetings of the pregnant women class and received information about diet for pregnant women during counseling at posyandu. M7 attended all class meetings for pregnant women and never received nutrition information outside pregnant women class. However, M6 found it easier to understand the nutrition material from pregnant women class. This indicates that the presence of mothers in the pregnant women class can affect the knowledge and awareness of mothers to consume more portions during pregnancy.

Table 6 also shows the portion and frequency of meals of seven other mothers (excluding M6 and M7) during pregnancy depending on their physiological conditions. Mothers who often feel hungry tend to have an increased frequency or portion of their meals while mothers who feel nausea and vomiting tend to have fewer meals and increased fruit portions and frequency. Mothers who didn't feel easily hungry, nausea or vomiting didn't

change their diet during pregnancy, such as M9.

There were only two mothers (M1, M6) who often consumed heme iron food sources during pregnancy. Table 2 and Table 3 show that M1 attended all meetings while M6 attended the first and second meetings of the pregnant women class. They had received information about nutrition for pregnant women nutrition information outside the pregnant women class and both found it easier to understand information from the pregnant women class. This indicates that the presence of mothers in the pregnant women class can affect the knowledge and awareness of mothers to consume iron source foods during pregnancy. Table 4 also shows that seven out of nine mothers (77.8%) have consumed additional food, which is one glass of milk every day during pregnancy.

**Table 4.** Mother's Diet during Pregnancy and after Giving Birth

| Inf code | Mother's Diet | |
|---|---|---|
| | **During Pregnancy** | **After Giving Birth** |
| M1 | 1. Portion and frequency of rice increase while portion and frequency of side dishes, vegetables and fruits also had increase.<br>2. Consume 1 glass of milk/day and 1 chicken liver 1-4 times/month. | 1. Portion and frequency of rice increase.<br>2. Frequency of side dishes and vegetables increase |
| M2 | 1. Portions of side dishes, vegetables and rice reduce while portion and frequency of fruits increase.<br>2. Consume 1 glass of milk/day. | Portion and frequency of meals increase. |
| M3 | 1. Portion and frequency of meals didn't change.<br>2. Consume 2 glasses of milk/day. | 1. Portion of meals increase.<br>2. Consuming 1 cup of turmeric herbs/day. |
| M4 | 1. Portion and frequency of meals didn't change.<br>2. Consume 0-1 glasses of milk / day. | Portion and frequency of meals didn't change. |
| M5 | 1. Frequency of rice, side dishes, vegetables increases and eating a variety of vegetables.<br>2. Consume 1-2 glasses of milk / day. | Frequency and portion of meals increases. |
| M6 | 1. Portions of meals increase.<br>2. Consume 1-2 glasses of milk/day and often eat green vegetables, fish, liver, eggs in the early trimester. | Frequency and portion of meals increase. |
| M7 | Portions of side dishes, vegetables and rice increase. | Portion of meals increase during 3 months of breastfeeding. |
| M8 | 1. Portion and frequency of meals didn't change.<br>2. Consume 1 glass of milk / day. | Portion and frequency of meals did not change. |
| M9 | Portion and frequency of meals didn't change. | Portions of side dishes and rice increase. |

**Mother's Diet During Breastfeeding.**

Table 4 shows only two (M5, M6) out of nine mothers whose frequency and portion of food increased during breastfeeding because mothers wanted to fulfill the intake of both mother and baby. Table 2 and Table 3 show that M5 attended first and second meeting of the pregnant women class and never received nutrition information about breastfeeding mother diet outside pregnant women class. M6

attended the first and second meetings of pregnant women class and she never received nutrition information about breastfeeding mothers' diet outside pregnant women class. This indicates that the presence of mothers in a pregnant women class can affect the knowledge and awareness of mothers to consume with greater frequency and more portions of foods during breastfeeding.

Table 4 also shows the portion and frequency of meals for six mothers (excluding M5, M6, M9) during pregnancy depending on physiological conditions experienced by mothers at that time. Breastfeeding mothers who often felt thirsty or hungry mostly have an increased frequency or portion of meals (rice, side dishes, and vegetables). Mothers who do not easily get hungry or thirsty mostly have an unchanging diet, as experienced by M4 when breastfeeding. This shows that the frequency and portion of mother's meal while breastfeeding is not only influenced by mother's knowledge of nutrition obtained from pregnant women class, but also influenced b physiological conditions experienced by mother.

Only one (M3) out of nine mothers consumed additional food in the form of one cup of turmeric herbs every day during breastfeeding because the mother believed that herbal medicine could help increase breastmilk production. M3 only attended the first pregnant women class meeting. Information about recommended food during breastfeeding is taught by the facilitator in the second pregnant women class meeting. This shows that the type of food consumed by mothers while breastfeeding is influenced by mother's knowledge of nutrition obtained from the pregnant women class as well as cultural factors or local beliefs.

**Mother's Behavior in Iron Supplementation Tablet (TTD)**

Table 5 shows that eight out of nine mothers received TTD. Five out of eight mothers who received TTD (62.5%) consumed all TTD, where four mothers (M2, M5, M6, M8) consumed all TTD that they received because they followed the recommendations of health workers, and one mother (M1) consumed all TTD because she wanted to maintain her health. Table 2 shows that from five mothers, only M1 attended all meetings of the pregnant women class. Table 1 shows that midwives explained the definitions and symptoms of anemia and recommended that pregnant women take iron tablets during pregnancy at the first meeting of the pregnant women class. During examination or Antenatal Care (ANC), midwives and nutritionists also advised mothers to consume a minimum 90 tablets of TTD during pregnancy. This shows that the effect of the presence of mothers in the pregnant women class on maternal compliance in consuming blood supplemented tablets still needs to be further reviewed.

Three (M3, M7, M9) out of eight mothers didn't eat all TTD that they received. M7 and M9 didn't eat all TTD because they did not like the taste of TTD and routinely took other supplements during pregnancy. This indicates that, in addition to maternal knowledge, maternal preferences also affect TTD consumption. On the other hand, M3 didn't eat all TTD because of nausea and only consumed TTD when reminded by her husband. This shows that family support, especially husbands, plays an important role in mother compliance in consuming TTD.

**Mother's behavior in consuming PMT biscuits**

In the first meeting of pregnant women class, the midwife explained the signs of CED and recommended pregnant women with CED to consume PMT biscuits. Table 5 shows that one mother (M5) who participated in the pregnant women class (11.1%) had CED. She and two other mothers (M4 and M6) also received PMT biscuits (33.3%). M4 ate all

PMT biscuits because she likes snacks. M5 because they both like snacks. Different from M6, she ate all PMT biscuits alone because she likes the taste of biscuits and wants to maintain the health of her fetus. During the examination or ANC, midwives and nutritionists also provided ate all PMT biscuits with her children and recommended that CED pregnant women eat all the PMT biscuits that were given. This shows that the effect of the presence of mothers in the pregnant women class in consuming PMT still needs to be further reviewed.

**Table 5.** Mother's Behavior in Consuming Iron Supplementation Tablet and Supplementary Feeding Biscuits During Pregnancy

| Inf code | Mother Behavior's in Consuming | |
|---|---|---|
| | **Iron Supplementation Tablet (TTD)** | **Supplementary Feeding Biscuit (PMT Biscuits)** |
| M1 | Mother consumed all TTD. Reason: Mother wants to take care of her health during pregnancy. | Mother didn't have CED and never got PMT biscuits. |
| M2 | Mother consumed all TTD. Reason: Mother wants to follow advice from health workers. | Mother didn't have CED and never got PMT biscuits. |
| M3 | Mother didn't consume all TTD and only consume TTD when her husband reminds her. Reason: Mother felt nauseous after consuming TTD. | Mother didn't have CED and never got PMT biscuits. |
| M4 | Mother never got and consumed TTD. Reason: Mother didn't feel need to consume TTD because do have anemia. | Mother didn't have CED and received 1 pack of PMT biscuits during pregnancy. She consumed all PMT that she got. |
| M5 | Mother consumed all TTD. Reason: Mother wants to follow advice from health workers and wants to get rid the symptoms of anemia. | Mother had CED and only received 1 box of PMT biscuits during pregnancy because she was late asking for PMT. She and her children ate 1 pack PMT biscuit/day. |
| M6 | Mother consumed all TTD. Reason: Mother wants to follow advice from health workers. | Mother didn't have CED, received 1 box of PMT biscuits / month during pregnancy. She ate 7 packs of PMT biscuits/ 10 days. |
| M7 | Mother didn't consume all TTD. Reason: Mother didn't like the taste of TTD. | Mother didn't have CED and never got PMT biscuits. |
| M8 | Mother consumed all TTD. Reason: Mother wants to follow advice from health workers. | Mother didn't have CED and never got PMT biscuits. |
| M9 | Mother didn't consume all TTD. Reason: Mother didn't like TTD. | Mother didn't have CED and never got PMT biscuits. |

**Table 6.** Mother Behavior Related to Breastfeeding Practices

| Inf code | Mother's Behavior in | |
|---|---|---|
| | **Early Initiation of Breastfeeding(EIB)** | **Provide Exclusive Breastfeeding** |
| M1 | Mother performs EIB. Reason: Birth attendants direct mother to perform EIB. Process: 5-10 minutes, skin of mother and baby attached, baby assisted in finding mother's nipple. | Mother gave exclusive breastfeeding to baby. Reason: mother thinks that nutrition of breast milk better than formula milk. |
| M2 | Mother performs EIB. Reason: Birth attendants direct mother to perform EIB. Process: Skin of mother and baby attached, baby assisted in finding mother's nipple. | Mother gave exclusive breastfeeding to baby. Reason: Mother thinks that nutrition of breast milk better than formula milk and gets time off from work after giving birth so she can breastfeed directly. |
| M3 | Mother performs EIB. Reason: Birth attendants direct mother to perform EIB. Process: 30 minutes, skin of mother and baby attached, baby assisted in finding mother's nipple. | Mother gave exclusive breastfeeding to baby. Reason: Mother thinks that nutrition of breast milk is better than formula milk. |
| M4 | Mother didn't perform EIB to baby. Reason: Mothers were separated from their baby by birth attendants after delivery process. | Mother's baby has received formula milk before 6 months of age. Reason: Husband never got education about breastfeeding and he agrees with birth attendant to give formula milk to baby. |
| M5 | Mother performs EIB. Reason: Birth attendants direct mother to perform EIB. Process: 15 minutes, skin of mother and baby attached, baby find mother's nipple without assistance. | Mother's baby has received formula milk before 6 months of age. Reason: Baby given formula milk by hospital staff when her 3-day-old baby was hospitalized. |
| M6 | Mother performs EIB. Reason: Birth attendants direct mother to perform EIB. EIB process: 10 minutes, skin of mother and baby attached, baby assisted in finding mother's nipple. | Mother gave exclusive breastfeeding to her baby. Reason: Mother felt that she always able to give breast milk because she didn't work, got support from her husband, and want to fulfill the recommendations of health workers. |
| M7 | Mother performs EIB. Reason: Mother wants to teach her baby to breastfeed. Process: 5-10 minutes, skin of mother and baby attached, baby assisted in finding mother's nipple. | Mother only gives breast milk to baby until 3 months. Reason: Mother cannot produce breast milk after 3 months of breastfeeding her baby. |
| M8 | Mother performs EIB. Reason: Mother wants to form bond with baby and birth attendants' direct mother to perform EIB. Process: Skin of mother and baby attached, baby assisted in finding mother's nipple | Mother gives formula milk to her baby. Reason: Mother cannot produce breast milk. |
| M9 | Mother performs EIB. Reason: Birth attendants direct mother to perform EIB. Process: 1 hour, skin of mother and baby attached, baby assisted in finding mother's nipple. | Mother gives breast milk and formula milk to her baby. Reason: Mother was unable produce breast milk after delivery and was unable to breastfeed baby while working. |

Table 5 also shows M5 received one box of PMT biscuits during pregnancy and ate one packet of PMT biscuits every day with her children. M6 received one box of PMT biscuits every month during pregnancy and ate one box of PMT biscuits in 10 days. According to the guidelines for distribution of PMT biscuits, one box of PMT packages contains seven packages of PMT biscuits or 21 pieces of biscuits. The provision of appropriate PMT biscuits is given to pregnant women with CED in the first trimester as much as two pieces/ day, while in second and third trimesters they are given three pieces of PMT biscuits / day (Minisrty of Health Republic Indonesia, 2012). This shows that number of PMT biscuits consumed by M5 every day is sufficient if she is in the first trimester of pregnancy. It also shows that PMT biscuits distribution in some places is still not on target because M5 had CED so she needed more PMT biscuits during pregnancy than M6.

**Mother's Behavior in Performing EIB**

Table 1 shows that the midwife had explained about Early Initiation of Breastfeeding (EIB) at the second meeting of the pregnant women class. Table 6 shows eight out of nine mothers (88.9%) had undergone EIB. One mother (M4) did not perform EIB because she was separated from her baby immediately after giving birth. Among eight mothers who did EIB, only one (M7) did EIB because she wanted her child to learn to breastfeed. Seven other mothers did EIB because it was directed by the childbirth officer. Table 2 and Table 3 show that M7 attended all meetings of the pregnant women class and never received information about EIB outside the pregnant women class. This indicates that M7 has received information about EIB from the pregnant women class so that the mother was motivated to perform EIB so her baby can learn to breastfeed. This shows that EIB can be influenced by the knowledge of mother because of her presence in the pregnant women class, but EIB is also influenced by other factors, which is advice or support from birth attendants. Although Table 6 shows that most of mothers have performed EIB with recommendation of birth attendants, all mothers still have not carried out EIB properly. But, based on results of this study, it was found that even though all mothers had direct contact between the skin of mother and baby, they still helped babies to find nipples or the duration of EIB implementation was still less than one hour.

**Mother's Behavior in Exclusive Breastfeeding**

Table 1 shows midwives explained about exclusive breastfeeding in the second meeting of the pregnant women class. Table 6 shows that four (M1, M2, M3, and M6) out of nine mothers gave exclusive breastfeeding to their babies, because they felt that nutritional content of breast milk was more complete than formula milk. M2 had another reason for giving exclusive breastfeeding to her baby, that she gets paid leave from work after giving birth. M6 gave exclusive breastfeeding to her baby because she did not work, received support from her husband and wanted to follow recommendation of health workers. Table 2 and Table 3 show M6 is the only mother who was accompanied by her husband at the pregnant women class and four mothers never received exclusive breastfeeding information outside the pregnant women class. This indicates that exclusive breastfeeding is influenced by the presence of mothers in the pregnant women class as well as other factors such as mother's job and husband's support.

Table 6 also shows that five other mothers (55.6%) didn’t provide exclusive breastfeeding or had given formula milk to their babies aged less than six months. The reason M7, M8 and M9 didn’t provide exclusive breastfeeding was because they could not produce breast milk. M9 did not provide exclusive breastfeeding because she worked after giving birth. On the other side, M4 and M5 did not provide exclusive

breastfeeding because their baby had received formula milk from hospital workers and their husbands lack knowledge of exclusive breastfeeding. Table 2 shows that five mothers were never accompanied by their husbands during the pregnancy class. This indicates that exclusive breastfeeding is influenced by the ability of mothers to produce breast milk, mother's job and knowledge of husband.

## DISCUSSION

### Nutrition Education in Pregnant Women Class Program

Nutrition education is important during pregnancy to maintain the health of the mother and the baby she is carrying. One of the existing facilities is the pregnant women class. Antenatal class not only increases information for mothers (and husband / family) regarding optimization during pregnancy, but also parenting preparations for the nutritional needs of infants and breastfeeding mothers (Barimani et al., 2018). Classes for pregnant women are still rarely carried out independently, mostly nutrition education is through antenatal care, but even this is only done at the beginning of the meeting and is ineffective (Nankumbi et al., 2018). Classes for pregnant women are usually led by a local midwife and this shows the important role of the midwife in providing information to pregnant women (Arrish et al., 2014).

Based on the study in four public health centers in Surabaya it shows that village midwives or implementing midwives had already delivered nutrition information at every meeting of pregnant women classes in 2019 using a flipchart for pregnant women class and KIA books. Nutrition information presented in pregnant woman classes in Surabaya is such as recommended foods during pregnancy and breastfeeding or postpartum, anemia, consume iron supplements, chronic energy deficiency, early initiation of breastfeeding (EIB), exclusive breastfeeding, low birth weight babies, and food myths for mothers and babies.

### Nutrition Education Outside Pregnant Women Class Program

Nutrition education can be obtained from anywhere, including pregnant women classes. However, pregnant women often have problems including time, resources, and lack of means of providing nutrition education (Lucas et al., 2014). The internet is a solution for pregnant women in getting information about their pregnancy (Sayakhot and Carolan-Olah, 2016). A study in Italy reported that most pregnant women obtained pregnancy information online even though they had received health education because it was easier and simpler (Bert et al., 2013). But this needs to be a concern for health workers to straighten out any information that may not be appropriate (Sayakhot and Carolan-Olah, 2016).

Based on study in four public health centers in Surabaya it shows that six mothers out of nine informants who participated in pregnant women classes in 2019 had already got nutrition information from outside the pregnant women class. Sources of nutrition information that informants get from outside pregnant women classes are KIA book, internet, online group, counselling at posyandu or counselling from obstetrician. Most informants (four of six mothers) got that nutrition information from internet. Nutrition information that almost every mother gets outside pregnant women classes is foods that are recommended for pregnant women. The result shows that three mothers found it easier to understand nutrition information from pregnant women classes than outside pregnant women classes, one mother felt both nutrition information from the pregnant women class and from the outside was easy to understand, while two mothers found it easier to understand nutrition information from outside pregnant women classes than pregnant women classes. One mother

found it easier to understand nutrition information from outside pregnant women classes because she was unable to concentrate when other participants were noisy. Another mother found it easier to understand nutrition information from outside the pregnant women classes because she just attended one meeting. Among the reasons for mothers who find it easier to understand the material from pregnant women classes is that the midwife uses simple language and uses the KIA book and flipchart in explaining the material and participants can have direct discussions with health workers. That indicates that the nutritional material described by the midwife in pregnant women classes in Surabaya was delivered quite well.

**Individual Outcome of Nutrition Education in Pregnant Women Class Program**

Energy and nutritional needs of women increase during pregnancy to be able to fulfill the nutritional needs of mother and fetus in order to grow and develop (Hardinsyah and Supariasa, 2016). In nutrition education in the pregnant women class, it is known that midwives have advised mothers to eat one portion more during pregnancy at the first meeting. Presence of mothers in the pregnant women class can affect the knowledge and awareness of mothers to consume bigger portions during pregnancy. In Western Kenya, the higher presence of antenatal clinics for pregnant women significantly associated with higher maternal health knowledge (Perumal et al., 2013). Research in the US reports that most subjects do not meet the needs of vitamins (A, B6, B9, B7, C, D, E, K) and minerals (Fe, K, Ca, Mg, Zn) and even consume excess sodium (Bailey et al., 2019). Deficiencies of certain nutrients can affect the health of the mother and the development of the baby who is being conceived, even postpartum. Pregnant women need additional iron intake to increase iron stores and compensation due to hemodilution, especially in second trimester pregnancy (Cunningham and Al, 2006). Iron can be found as heme iron form in animal foods because it can be absorbed up to 25% while non-heme only 5% (Almatsier, 2004). During the pregnant women class, data in this study show that midwifes from Puskesmas advised mothers to consume foods that are high in iron, such as liver, eggs, fish, meat and green leafy vegetables such as spinach at the first class meeting. But actually, it is not rare for pregnant women to not have good appetite. The results show that frequency and portion of eating during pregnancy is not only influenced by mother's knowledge of nutrition obtained from inside and outside pregnant women class, but also influenced by physiological conditions experienced by the mother (Omidvar et al., 2018).

Action of most mothers who drink one glass of milk per day is a good thing. It is known that one glass of milk contains about 150 kcal of energy and 7 g of protein (Pritasari et al., 2017). According to Recommended Dietary Allowance for Indonesia 2019, pregnant women need an additional of 180 kcal of energy and 1 g of protein in first trimester, 300 kcal of energy and 10 g of protein in second trimester, as well as 300 kcal of energy and 30 g of protein in third trimester (Ministry of Health Republic Indonesia 2019). Therefore, it is not enough for pregnant women to only consume one glass of milk / day. One cup of milk/day fulfills protein needs in the first trimester, but doesn't fulfill energy needs in first, second, and third trimesters and didn't fulfill protein needs in second and third trimesters. It shows that mothers need to consume two glasses of milk / day or needs to increase meal portions in a day to fulfill their nutritional needs during pregnancy.

Nutritional needs of women during breastfeeding are higher than pregnant women because mother needs more nutritional intake to produce breast milk (Kominiarek and Rajan, 2016). In the

second meeting of the pregnant women class, the midwife explained that, in order to successfully breastfeed, mothers need food with balanced nutrition. Presence of mothers in the pregnant women class can affect the knowledge and awareness of mothers to consume with more frequency and greater portion of foods during breastfeeding. Frequency and portion of mother's meal while breastfeeding is not only influenced by mother's knowledge of nutrition obtained from the pregnant women class, but also influenced by physiological conditions experienced by the mother. An experimental study proves that giving simple relaxation to breastfeeding mothers affects the level of stress and the amount of breast milk produced (Mohd Shukri et al., 2019). Type of food consumed by mothers while breastfeeding is influenced by mother's knowledge of nutrition obtained from the pregnant women class as well as cultural factors or local beliefs. McLeod et al. (2011) stated that knowledge of breastfeeding mothers is a mediator between socioeconomic conditions and diet quality.

Iron supplementation Tablet (TTD) is a supplement containing 60 mg of ferro sulfate and 400 µg of folic acid taken by pregnant women. Ninety tablets are given starting from the first trimester of pregnancy to prevent anemia. In this study, effect of presence of mothers in pregnant women classes on maternal compliance in consuming blood supplemented tablets still needs to be further reviewed. Research in Sukoharjo shows that nutrition education has an effect on increasing compliance with iron consumption through pregnant women classes (Sulastijah et al., 2015). Maternal preferences also affect TTD consumption in addition to maternal knowledge Research in 2016 in Indonesia showed that husband's support also contributed to the consistency of TTD in pregnant women (Setyobudihono et al., 2016). Husband is a family member who lives at home with the mother, so that he has a very important role in supervising drug taking. Husbands who have high knowledge and awareness about maternal health and nutrition can support mothers to consume TTD during pregnancy (Triharini et al., 2018). Therefore, husbands need also to attend classes for pregnant women at least once to increase their knowledge and awareness about health or nutrition. The presence of a husband during antenatal classes is proven to improve understanding of pregnant women and also prepare themselves for their husbands to become a father later (Aguiar and Jennings, 2015).

In 2012, the Indonesian Ministry of Health distributed PMT programs in an effort to improve nutritional status of mothers during pregnancy in dealing with Chronic Energy Deficiency(CED) problems (Ministry of Health Republic Indonesia, 2012). But, this study results show that effect of the presence of mothers in pregnant women classes in consuming PMT still needs to be further reviewed. The presence of mothers during the class for pregnant women is certainly expected to increase the understanding of mothers about the importance of PMT consumption for mothers who are at risk of CED.

Early Initiation of Breastfeeding (EIB) is the process of placing a newborn to the breast within the first hour of life. EIB is essential for the survival of newborn and for successful long-term or exclusive breastfeeding (United Nations International Children's Emergency Fund, 2018). Not only the presence in pregnant women classes, but also support from birth attendants can influence EIB. If birth attendants advise and direct mothers to carry out EIB immediately after the baby is born, then most mothers would perform EIB. EIB treatment must still be in accordance with the prescribed recommendations to maximize bonding between mother and child. In this study, all pregnant women are not in accordance with Government Regulation of Republic of Indonesia Number 33 year 2012, second part of Article 9 of Early Initiation for Breastfeeding, which basically states that

health service providers are required to carry out EIB for newborn to their mothers for at least one hour (Republic Indonesia, 2012).

Until the age of six months, babies only need to consume breast milk because the nutritional content of breast milk is sufficient for all baby's nutritional needs, known as exclusive breastfeeding (Maryunani, 2010). Just like TTD consumption, husband's support also affects exclusive breastfeeding in pregnant women. Husbands who participate in pregnant women classes having more health and nutrition knowledge, so they can support mothers in giving exclusive breastfeeding to their baby. A cross-sectional study explains that husbands' support is associated with high levels of exclusive breastfeeding for both working and unemployed mothers (Taddele, 2014). Exclusive breastfeeding is also influenced by the ability of mothers to produce breast milk. According to Kent et al. (2012), breastmilk production can be maintained or increased by taking into account the frequency, timing, and amount of breastmilk given.

## CONCLUSION

Outcome of nutrition education in the pregnant women class program at individual level in Surabaya 2019 is mothers in consuming high iron foods during pregnancy, frequency and portions of mother's meals increase during pregnancy and breastfeeding, mother's practice of EIB and exclusive breastfeeding. Apart from being influenced by the presence of mothers in pregnant women classes, this behavior is also influenced by other factors. Frequency and portion of mother's meals during pregnancy and breastfeeding are also influenced by physiological conditions experienced by the mother. Practice of EIB is also influenced by advice or support of birth attendants. Exclusive breastfeeding is also influenced by mother's job, ability to produce breast milk, also support and knowledge from husband. Effect of the presence of mothers in pregnant women classes on compliance with consuming iron supplementation tablets and PMT biscuit for pregnant women is not yet known and needs to be studied further.

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# DETERMINANTS OF STIGMA ON PEOPLE LIVING WITH HIV AND AIDS IN INDONESIA (EVIDENCE FROM 2017 IDHS DATA)

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**ABSTRACT**

**Introduction:** People living with human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) face bio-psycho-socio-spiritual problems. The stigma against PLWHA exists in more than 65 countries. Indonesia occupied the highest position in the Pacific with a case rate of 62.8%. Stigma has contributed to the failure of HIV and AIDS epidemic-control programs. **Aims:** To determine the stigma against PLWHA in Indonesia. **Method**: This study used the 2017 IDHS dataset with a cross-sectional design. The study sample comprised 47.233 people. The variables studied included age, sex, marital status, educational level, economic status, employment status, mass media exposure, type of residence, knowledge about HIV and AIDS, and stigma against PLWHA. The data analysis technique was the chi-square test and logistic regression with α 0.05 (5%). **Result**: Factors that determined the stigma of PLWHA include age 15-19 (OR 1.611), age 20-24 (OR 1.438), age 25-29 (OR 1.131), age 30-34 (OR 0.993), male gender (OR 0.834), married status (OR 1.416), educational level less (1.247), very poor economic status (OR 1.503), poor (OR, 1.134), medium (OR 1.080), rich (OR 0.972), not working ( OR 1.065), and lack of knowledge (OR 2.588). **Conclusio**n: person aged 15-24 years, female, single, have low education, poorest/poor, do ot have a job, and have a low level of knowledge about HIV and AIDS are very likely to be stigmatized towards PLWHA. Education related to HIV and AIDS, especially how HIV and AIDS are transmitted, still needs to be improved so that it can reach all levels in society.

**Keyword:** HIV and AIDS, stigma, socio demography, PLHIV

## INTRODUCTION

In the social sciences, stigma is often referred to as the harsh criticism of someone because of what is perceived as a negative characteristic that sets them apart from others (Solanke, 2017). Stigma is a major social determinant of health that drives morbidity, mortality, and health disparities and has been described as a hidden burden of disease by *World Health Organization* (WHO, 2001). Stigma towards people with HIV/AIDS (PLWHA) is considered dangerous because it hinders the HIV/AIDS prevention process. The number of HIV cases reported in Indonesia, from April to June 2019 was 11,519, and 1,463 people (12.7%) had AIDS. The number of cases found and reported was Only 60.7% of the estimated cases (Ministry of Health, 2019).

The discrepancy between cases that are found, reported, and expected indicates a problem with finding and reporting (Ministry of Health, 2019). One of the causes of the difficulty in identifying PLWHA is the low level of public interest in screening *Voluntary Counseling and Testing (VCT*). There are 72.9% of pregnant women in the Karanganyar Health Center area of Tasikmalaya City do not take advantage of VCT services (Dudi, Mulyanti & Nuraeni, 2019). Only 56.8% of men who have sex with men (MSM) in Jakarta use VCT (Widsono, A.F. & Nurfadhilah, 2020).

Society's stigma towards PLWHA affects a person's interest in VCT (Kelly, Weiser and Tsai, 2016; Aminuddin, A. and Kurniawati, 2017). The stigma against PLWA also contributes to the failure of opportunities for prevention, education, and treatment, thus undermining efforts to

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manage and prevent HIV transmission (Vorasane *et al.*, 2017). The impact of stigma on PLHIV also affects individuals, families, communities, and the healthcare system. For HIV-infected patients, the stigma of HIV makes it difficult for them to maintain their physical, mental, and emotional health (Lokko & Stone, 2016).

Many factors influence the occurrence of stigma against PLWHA, such as individual sociodemographic characteristics, including age, gender, marital status, education level, employment status, and economic status (Sari and Yovsyah, 2014; Li et al., 2017; Maharani, 2017; Vorasane et al., 2017; Mateveke et al., 2016; Mawarni, Ismarwati and Indriani, 2017). Mass media exposure and type of residence also contribute to the stigmatization of PLWHA (Sari and Yovsyah, 2014). In other studies, religion, level of knowledge, and perceptions about HIV and AIDS were also causes of a person's attitude of being stigmatized towards PLWHA (Damalita, 2014; Stringer et al., 2016; Maharani, 2017; Hati, Shaluhiyah and Suryoputro). Research to find out the response of the people of Heilongjiang, China to PLWHA found that 49.6% of people living in rural areas and 37% of people living in urban areas had a stigmatizing attitude towards PLWHA (Li *et al.*, 2017). The proportion of Indonesian youth who have a stigma toward PLWHA is 71.63% (Situmeang, Syarif & Mahkota, 2017). Research on stigma towards PLWHA among nurses in Jakarta found that 75.7% of nurses had an unfavorable attitude towards PLWHA (Urifah, 2017). Research on stigma towards PLWHA among housewives in Yogyakarta found that 65.6% of respondents had moderate stigma and 12.5% had severe stigma. (Aminuddin, A. & Kurniawati, 2017). Forty-four percent of people in Kupang City, East Nusa Tenggara Province, have a high stigma towards PLWHA, and there is a stigma of 26.1% in the family, 19.1% in the workplace, 55.8% in health services, 23.3% in the community, and 29.3% in the school environment (Hati, Shaluhiyah & Suryoputro, 2017).

Therefore, there is a need for research related to the determinants of stigma against PLHIV to be used as a basis for making programs that are more targeted. This study aimed to analyze the determinants of stigma towards PLWHA in Indonesia.

## METHODS

This study uses data from the 2017 IDHS. We conducted an observational analytical study with a cross-sectional approach. The sample consisted of men and women in Indonesia, with 59,636 respondents to the 2017 IDHS. The inclusion criteria had heard about HIV/AIDS, and the data were missing, so the number of samples that met the inclusion criteria was 47,233.

The independent variables of this study were age, gender, marital status, education, level of welfare, employment, exposure to mass media (print, electronic, and internet), place of residence, and knowledge using the IDMR71SV male dataset and the IDIR71SV female dataset. The stigma against PLWHA is the dependent variable, sourced from the IDHS questionnaire section 7 HIV/AIDS (married male respondents used question numbers 720, 720A, 720B, 721, 726 – married female respondents used question nos 1035, 1035A, 1035B, 1036, and 1041 ). Education level was divided into two categories: low and sufficient education. The level of education is lower if the respondent's last education is ≤junior high school, while it is sufficient if the last education attained is >junior high school (Grieb *et al.*, 2017). The level of knowledge about HIV and AIDS was divided into two groups: poor and moderate. Poor knowledge was indicated if the respondent's correct answer score was <8 of 12 questions, while the level of knowledge was moderate if the respondent's correct answer was ≥8 of 12 questions (Situmeang, Syarif and Mahkota, 2017).

Stigma against PLHIV is divided into two groups: yes and no stigma. The stigma category is if the respondent gets a score <4 from the answers to questions about the willingness to care for an HIV-positive family, the willingness to keep buying fresh vegetables from shop owners or sellers even though they know that the seller is suffering from HIV-AIDS, consent for children suffering from HIV-AIDS must be allowed to go to school with children who do not suffer from HIV, the fear of getting HIV-AIDS if they come into contact with the saliva of someone who has HIVAIDS, and the desire to keep family members who suffer from HIVAIDS. The category is not stigmatized if the respondent receives a score≥4 on the answers to the questions above (Situmeang, Syarif & Mahkota, 2017).

The data obtained from the DHS measure were analyzed in stages from univariable analysis to analysis of the frequency distribution of each variable, bivariable analysis with the chi-square test, and multivariate analysis with the logistic regression test using α=0,05.

## RESULT

### Characteristic of respondent

the results of the descriptive analysis are presented in Table 1. This shows that the distribution of respondents who had heard of HIV and AIDS was highest in in those age range 35-39 years (15.7%) and 30-34 years (15,2%). The majority of respondents were women (83.1%), married (72%), and had poor education (78.1%). Based on economic status, most of the respondents belonged to the richest economic group (23,8%), and the fewest belonged to the poorest economy (15,6%).

Most of the respondents had occupations (61.1%) and have moderate knowledge about HIV and AIDS (66.54%). The majority of respondents exposed to mass media (94.19), lived in urban areas (58.77 %), and had a stigma towards PLWHA (85.20%).

### Analysis of Bivariable

The results of the chi-squared analysis and odds ratios are presented in Table 2. Based on the information in table 2, the p-value of all variable characteristics respondents was ≤ 0.05, so it can be interpreted that age, gender, marital status, education, wealth index, occupational status, exposure to mass media, residence, and knowledge had a significant difference in the proportion of stigma against PLHIV based on age, gender, marital status, education, wealth index, occupational status, exposure to mass media, residence, and knowledge.

Level of knowledge had the highest OR (2.85). The OR value means that someone who has less knowledge about HIV and AIDS is 2.85 times more at risk of being stigmatized by PLWHA than someone who is sufficiently knowledgeable. Two variables become protective factors: gender and place of residence. Male respondents and those living in urban areas had a smaller tendency to stigmatize PLHIV.

### Analysis of Multivariable

The multivariable analysis results with the enter logistic regression method in Table 3 show that the variables with a p-value ≤ 0.05 are age, gender, marital status, education, economic status, occupation, and knowledge. Thus, all the independent variables in this study were included in the multivariate analysis.

**Table 1.** Characteristics of the respondents

| Variable | N | % |
|---|---|---|
| **Age** | | |
| 15-19 | 6.754 | 14,3 |
| 20-24 | 6.206 | 13,1 |
| 25-29 | 6.572 | 13,9 |
| 30-34 | 7.179 | 15,2 |
| 35-39 | 7.439 | 15,7 |
| 40-44 | 6.569 | 13,9 |
| 45-49 | 5.500 | 11,6 |
| 50-54 | 1.014 | 2,1 |
| **Sex** | | |
| Male | 7.994 | 16,9 |
| Female | 39.239 | 83,1 |
| **Marital Status** | | |
| Separated/No Longer Living Together | 125 | 0,3 |
| Divorced | 1.037 | 2,2 |
| Widowed | 585 | 1,2 |
| Cohabitation | 304 | ,6 |
| Married | 34.026 | 72,0 |
| Never Married | 11.156 | 23,6 |
| **Education Level** | | |
| Poor | 36.910 | 78,1 |
| Moderate | 10.323 | 21,9 |
| **Wealth Index** | | |
| Poorest | 7.376 | 15,6 |
| Poor | 8.676 | 18,4 |
| Middle | 9.517 | 20,1 |
| Rich | 10.436 | 22,1 |
| Richest | 11.228 | 23,8 |
| **Occupational Status** | | |
| No | 18.389 | 38,9 |
| Yes | 28.844 | 61,1 |
| **Mass Media Exposure** | | |
| No | 2.742 | 5,81 |
| Yes | 44.491 | 94,19 |
| **Residence** | | |
| Urban | 27.757 | 58,77 |
| Rural | 19.476 | 41,23 |
| **Knowledge Level** | | |
| Poor | 15.805 | 33,46 |
| Moderate | 31.428 | 66,54 |
| **Stigma** | | |
| No | 6.992 | 14,8 |
| Yes | 40.241 | 85,2 |
| **Total** | **47.233** | **100** |

**Tabel 2.** Relationship between socio-demographic characteristics, media exposure, and knowledge about HIV and AIDS with stigma against PLWHA in Indonesia

| Variable | Stigma of PLWHA | | | | *p-value* | OR (*Confidence Interval* 95%) |
|---|---|---|---|---|---|---|
| | No | | Yes | | | |
| | n | % | n | % | | |
| **Age** | | | | | 0,000* | |
| 15-19 | 744 | 1,58 | 6.010 | 12,72 | | 1,54 (1,28-1,85) |
| 20-24 | 804 | 1,70 | 5.402 | 11,44 | | 1,28 (1,06-1,54) |
| 25-29 | 935 | 1,98 | 5.637 | 11,93 | | 1,15 (0,96-1,38) |
| 30-34 | 1.088 | 2,30 | 6.091 | 12,90 | | 1,06 (0,89-1,27) |
| 35-39 | 1.274 | 2,70 | 6.165 | 13,05 | | 0,92 (0,77-1,10) |
| 40-44 | 1.105 | 2,34 | 5.464 | 11,57 | | 0,94 (0,79-1,13) |
| 45-49 | 880 | 1,86 | 4.620 | 9,78 | | 1,00 (0,83-1,20) |
| 50-54 | 162 | 0,34 | 852 | 1,80 | | 1 |
| **Sex** | | | | | 0,000* | |
| Male | 1.354 | 2,87 | 6.640 | 14,06 | | 0,82 (0,77-0,88) |
| Female | 5.638 | 11,94 | 33.601 | 71,14 | | 1 |
| **Marital Status** | | | | | 0,015* | |
| Separated | 18 | 0,04 | 107 | 0,23 | | 0,97 (0,59-1,61) |
| Divorced | 150 | 0,32 | 887 | 1,88 | | 0,97 (0,81-1,16) |
| Widowed | 95 | 0,20 | 490 | 1,04 | | 0,84 (0,67-1,06) |
| Cohabitation | 30 | 0,06 | 274 | 0,58 | | 1,49 (1,02-2,18) |
| Married | 5.132 | 10,87 | 28.894 | 61,17 | | 0,92 (0,87-0,98) |
| Never Married | 1.567 | 3,32 | 9.589 | 20,30 | | 1 |
| **Education Level** | | | | | 0,000* | |
| Poor | 4.948 | 10,48 | 31.962 | 67,67 | | 1,60 (1,51-1,69) |
| Moderate | 2.044 | 4,33 | 8.279 | 17,53 | | 1 |
| **Wealth Index** | | | | | 0,000* | |
| Poorest | 688 | 1,46 | 6.688 | 14,16 | | 2,18 (1,99-2,39) |
| Poor | 1.127 | 2,39 | 7.549 | 15,98 | | 1,51 (1,39-1,63) |
| Middle | 1.362 | 2,88 | 8.155 | 17,27 | | 1,35 (1,25-1,45) |
| Rich | 1.756 | 3,72 | 8.680 | 18,38 | | 1,11 (1,04-1,19) |
| Richest | 2.059 | 4,36 | 9.169 | 19,41 | | 1 |
| **Occupational Status** | | | | | 0,000* | |
| No | 2.371 | 5,02 | 4.621 | 9,78 | | 1,29 (1,22-1,36) |
| Yes | 16.018 | 33,91 | 24.223 | 51,28 | | 1 |
| **Mass Media Exposure** | | | | | 0,000* | |
| No | 303 | 0,64 | 2.439 | 5,16 | | 1,42 (1,26-1,61) |
| Yes | 6.689 | 14,16 | 37.802 | 80,03 | | 1 |
| **Residence** | | | | | 0,000* | |
| Urban | 4.433 | 9,39 | 23.324 | 49,38 | | 0,80 (0,76-0,84) |
| Rural | 2.559 | 5,42 | 16.917 | 35,82 | | 1 |
| **Knowledge Level** | | | | | 0,000* | |
| Poor | 1.167 | 2,47 | 14.638 | 30,99 | | 2,85 (2,67-3,05) |
| Moderate | 5.825 | 12,33 | 25.603 | 54,21 | | 1 |

**Table 3**. Results of the determinant of socio demographic characteristics, media exposure and knowledge about HIV and AIDS with stigma against PLWHA in Indonesia

| Variable | B | Wald | Sig. | OR | 95% CI | |
|---|---|---|---|---|---|---|
| | | | | | *Lower* | *Upper* |
| **Age** | | 124,128 | 0,000* | | | |
| 15-19 | 0,48 | 17,845 | 0,000* | 1,611 | 1,291 | 2,010 |
| 20-24 | 0,36 | 11,849 | 0,001* | 1,438 | 1,169 | 1,768 |
| 25-29 | 0,12 | 1,529 | 0,216 | 1,131 | 0,930 | 1,376 |
| 30-34 | - 0,01 | 0,005 | 0,944 | 0,993 | 0,820 | 1,203 |
| 35-39 | - 0,17 | 2,906 | 0,088 | 0,848 | 0,701 | 1,025 |
| 40-44 | - 0,14 | 2,147 | 0,143 | 0,867 | 0,716 | 1,049 |
| 45-49 | - 0,08 | 0,683 | 0,408 | 0,922 | 0,760 | 1,118 |
| 50-54 | | | | 1 | | |
| **Gender** | | | | | | |
| Male | - 0,18 | 21,773 | 0,000* | 0,834 | 0,773 | 0,900 |
| Female | | | | 1 | | |
| **Marital Status** | | 48,629 | 0,000* | | | |
| Separated | -0,029 | 0,013 | 0,910 | 0,971 | 0,588 | 1,605 |
| Divorced | -0,034 | 0,137 | 0,711 | 0,966 | 0,806 | 1,158 |
| Widowed | -0,171 | 2,195 | 0,138 | 0,843 | 0,672 | 1,057 |
| Cohabitation | 0,400 | 4,251 | 0,039* | 1,493 | 1,020 | 2,184 |
| Married | -0,083 | 7,142 | 0,008* | 0,920 | 0,866 | 0,978 |
| Never Married | | | | 1 | | |
| **Education Level** | | | | | | |
| Poor | 0,22 | 44,357 | 0,000* | 1,247 | 1,169 | 1,331 |
| Moderate | | | | 1 | | |
| **Wealth Index** | | 73,619 | 0,000* | | | |
| Poorest | 0,41 | 56,231 | 0,000* | 1,503 | 1,351 | 1,672 |
| Poor | 0,13 | 7,974 | 0,005* | 1,134 | 1,039 | 1,237 |
| Middle | 0,08 | 3,499 | 0,061 | 1,080 | 0,996 | 1,170 |
| Rich | - 0,03 | 0,575 | 0,448 | 0,972 | 0,904 | 1,046 |
| Richest | | | | 1 | | |
| **Occupational Status** | | | | | | |
| No | 0,06 | 4,113 | 0,043* | 1,065 | 1,002 | 1,133 |
| Yes | | | | 1 | | |
| **Mass Media Exposure** | | | | | | |
| No | 0,04 | 0,447 | 0,504 | 1,045 | 0,918 | 1,190 |
| Yes | | | | 1 | | |
| **Residence** | | | | | | |
| Urban | 0,04 | 1,947 | 0,163 | 1,043 | 0,983 | 1,106 |
| Rural | | | | 1 | | |
| **Education Level** | | | | | | |
| Poor | 0,95 | 748,543 | 0,000* | 2,588 | 2,417 | 2,770 |
| Moderate | | | | 1 | | |
| **Constant** | 0,91 | 68,593 | 0,000* | 2,480 | | |

*****Significance at $\alpha<0,05$

Table 3. also presents the odds ratio (OR), which indicates the risk of an event occurring. Age 15-19 and 20-24, female sex, single, less educated, very poor and

poor economic status, unemployed, and lack of knowledge are risk factors for stigma against PLHIV because it has a p-value ≤ 0.05, and OR > 1.

The value of E(Y/X) in the logistic regression is always between zero and one. Based on The equation model with a constant value of 0.908, it shows if a woman is 15-24 years old, single, has a low level of education, has a very poor or poor economic status, does not have a job, and lacks knowledge about HIV and AIDS, then the chance of having a stigmatizing attitude towards PLWHA is 97.4%. This can be observed based on the following calculations:

$p = \frac{1}{1+exp^{(-y)}}$

$y = \text{constant} + a_1x_1 + a_2x_2 + a_3x_3 + \ldots + a_nx_n + \varepsilon$

$y = 0{,}908 + 0{,}477T1(1) + 0{,}363T1(2) - 0{,}181T2(1) + 0{,}400T3(4) - 0{,}083T3(5) + 0{,}221T4(1) + 0{,}407T5(1) + 0{,}125T5(2) + 0{,}063T6(1) + 0{,}951T9(1) = 3{,}651$

$p = \frac{1}{1+exp^{(-4{,}713)}}$

$p = 0{,}974$

## DISCUSSION

Adolescent girls who are young, have less education than junior high school, have no occupation, come from poor or poorest families, and have poor knowledge about HIV and AIDS tend to have a stigmatizing attitude towards PLWHA. In other words, the results of the study show that there is a relationship between age and stigma towards PLWHA. The Odds Ratio (OR) value for each age group decreased as the respondent's age increased, which means that the older a person, the lower the risk of stigmatizing behavior toward PLWHA.

The results of this study align with those of Sari and Yovsyah (2014), which state that younger people are more at risk of being stigmatized by PLWHA than those who are older. Research on predictors of stigma and discrimination against PLWHA in Jember District states that younger age (15-19 years) has a two times greater risk of being stigmatized towards PLWHA than older age (20-24 years) (Baroya, 2017). Research by Li *et al.* (2018) in China also stated that younger respondents were associated with greater stigma towards PLHIV.

Age is often associated with an individual's life experience and mental maturity, which leads to the level of acceptance of the differences and uniqueness of others (Hartini *et al.*, 2018). The level of acceptance which is still low compared to other age ranges causes respondents in the age range 15-19 years to have the highest percentage of stigma compared to other age ranges.

This study shows the relationship between the gender of the respondent and stigma towards PLWHA. Male sex had an OR value of 0.82 (95% CI: 0.77-0.88OR <1), which means that male sex is a protective factor for someone to be stigmatized against PLWHA. Therefore, it can be concluded that women are more at risk of being stigmatized by PLWHA than are men. The results of this study are supported by research by Lokko et al. (2016), where women have a greater potential than men to be stigmatized. Research by Baroya (2017) and Maharani (2017) also mention something similar: women are twice as likely to be stigmatized and discriminated against PLWHA than men. Women are more likely to be stigmatized than men because women have higher moral standards than men, and HIV and AIDS are often associated with immoral behavior (Vorasane *et al.*, 2017). Marital status in this study had a significant relationship and was a determinant of stigma towards PLWHA. This is in line with previous research that stated that someone married is less likely to be stigmatized by PLWHA than someone who is single or has never been married. (Mateveke *et al.*, 2016). A married person

is more tolerant toward others than a single or divorced person (Hartini *et al.*, 2018).

The results of this study indicate that there is a relationship between educational level and stigma toward PLHIV. Education level is also a determinant of stigma towards PLHIV. The results of this study support previous research stating that the lower a person's education level, the greater the likelihood of being stigmatized and discriminated against PLWHA (Baroya, 2017). Individuals with more than five years of education have a significantly lower risk of stigmatization than those with less than five years of education (Mateveke *et al.*, 2016). Educational level is generally associated with knowledge. The higher a person's education, the wider the information they receive and the more knowledge they have (Dharmawati & Wirata, 2016). This is why more respondents had a stigmatizing attitude towards PLHIV in the group with less knowledge than in the group with sufficient knowledge.

Economic status is related to stigma against PLWHA. The poorest family had an OR of 2.18 (95% CI 1.99-2.39), which indicates that very poor economic status is a risk factor for stigma against PLWHA. The OR value of economic status decreases as a person's economic status increases, meaning that the richer a person is, the less likely they are to be stigmatized against PLHIV. The results of this study are supported by the research of Mateveke *et al.* (2016), who stated that stigma was positively related to middle (OR = 1.73) and low (OR = 1.97) economic status. Maharani (2017) also mentions a similar matter, where people with low family economic status are 2 times more at risk to be stigmatized than people with high family economic status. HIV stigma continues to exist as social capital diminishes. Poor people tend to have limited access to health services (Lokko & Stone, 2016). This causes poor communities to be less exposed to correct health information, so the potential for having a stigmatized attitude is even greater.

This research shows that employment status has a significant relationship with stigma toward PLWHA. The unemployed category had an OR value of 1.29 (OR > 1). An OR value > 1 indicates that not working is a risk factor for stigma against PLWHA, with a risk of 1.3 times greater than those with working status. Unemployed individuals have a two times greater risk of being stigmatized and discriminated against than someone working (Baroya, 2017). A reduced usable income after job loss creates financial constraints, so maintaining a minimum standard of living while still participating in social and cultural activities can be even more challenging. Unemployment is also a major factor in social exclusion; it can be a potential source of stress and can cause emotional, physical, and alienation. Sociologists and psychologists emphasize that termination can result in feelings of insecurity, shame, and stigmatization (Pohlan, 2019).

Exposure to mass media has a significant relationship with stigma against PLHIV. Someone who is not exposed to mass media is at risk of 1.4 times more being stigmatized compared than someone exposed to the media mass. This result is in line with Sari and Yovsyah's research (2014:14), where it is stated that people who do not utilize mass media have the potential 1.3 times higher to be stigmatized against PLHIV than people who use mass media more. This study also showed that there is a significant relationship between place of residence and stigma against PLHIV. This is in line with the findings of Situmeang et al. (2017:38), which state that residence has a significant relationship with stigma against PLHIV. The OR value of the place of residence in urban areas in this study was 0.80 ( < 1 ), which means that living in an urban area is a protective factor against stigma of PLHIV Residential urban areas can also be a protective factor, meaning that someone who lives in a rural area is more at

risk of being stigmatized against PLWHA. This is in line with Sari and Yovsyah's research (2014:11), which states that people living in rural areas tend to be stigmatized more than those living in urban regions.

Lack of knowledge is a risk factor for the stigma against PLHIV. A person with a low level of knowledge about HIV and AIDS has a 2.9 times greater risk of being stigmatized than someone with sufficient knowledge. This is in line with Maharani (2017), who stated that respondents with low knowledge were three times more at risk of being highly stigmatized by PLWHA than respondents with good knowledge. Situmeang et al. (2017) also stated that respondents with less knowledge were 1.2 times more likely to have a stigmatizing attitude towards PLHIV. The stigma in the process is related to free and bound knowledge. This is because stigma can poison cognitive interactions and contaminate social relationships (Solanke, 2017). Ignorance and misinformation about HIV transmission, disease prognosis, and treatment options contribute to the stigma (Lokko & Stone, 2016).

## CONCLUSION

The following conclusions can be drawn based on the results of this study: The characteristics that contribute to stigma are age, gender, and marital status. Young age (15-29 years), female, living with a partner without marriage ties. Socioeconomic status was significantly associated with stigma. Those with low education, unemployed, poor, and low knowledge about HIV/AIDS are more likely to have a stigmatizing attitude towards PLHIV than those with higher education, wealthier economic status, employed, and good knowledge about HIV/AIDS. Meanwhile, exposure to the mass media and place of residence was not significant.

Based on the results of this study, there is a need to increase education for middle school-age children and women regarding the methods of transmission and ways of identifying PLHIV/PLWHA through learning at school, extracurricular activities such as PMR, and optimizing the functions of the UKS Triassic, especially health education. It is also necessary to optimize the use of mainstream mass media, such as television advertisements, billboards, newspapers, and online media to increase public understanding of how HIV/AIDS is transmitted and how to identify people with HIV/AIDS. Thus, they can be easily accessed and can reach all levels of society.

This study had several limitations. First, researchers could not control data quality directly because the data used in this study were secondary data from the 2017 IDHS results. In addition, the variables analyzed in this study were limited to the data available in the 2017 IDHS dataset per the research objectives. During the implementation of the 2017 IDHS, the data collection method was based on a questionnaire. Bias by the interviewer was still possible even though, before conducting the interview, the interviewer was given training. Although there are some limitations related to the IDHS, the instruments used in the 2017 IDHS had good validity and reliability.

The results of this study need to be followed up with a policy on integrating HIV and AIDS materials into the basic education curriculum or integrated into extracurricular activities, such as the Youth Red Cross (MR), as well as optimizing the functions of the *Usaha Kesehatan Sekolah* (UKS), especially regarding the triad of adolescent reproductive health.

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Original Research

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# EFFECT OF ANXIETY AND WORK FATIGUE ON JOB BURNOUT, DISTRESS, HEALTH EATING INDEX AND BLOOD PRESSURE THROUGH COPING MECHANISM IN OIL AND GAS COMPANY

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**ABSTRACT**

**Introduction:** Workers in oil and gas companies are one of several groups of workers who have a heavy workload, both physically and psychologically, owing to the heavy work responsibilities related to the duration of work, which is not in accordance with the standard working time specified in Indonesia. Based on research conducted in similar industries, 69% of workers in critical jobs experience both acute and chronic fatigue. If not managed properly, it will result in occupational burnout. **Aims:** of this research was to determine whether there is a relationship between coping style, eating habits, work stress, fatigue and occupational burnout **Method:** Design study of cross-sectional manner with the research respondents being permanent workers in oil and gas companies in Bojonegoro, East Java. The total sample comprised of 102 respondents. The data obtained will then be statistically processed using IBM SPSS software with multiple regression tests. **Result:** The level of work fatigue experienced by oil and gas company employees had a significant indirect effect on the healthy eating index through the copying mechanism variable, and the anxiety experienced by oil and gas company employees had a significant indirect effect on the healthy eating index and blood pressure, both systolic and systole, and diastole via the copying mechanism variable. **Conclusion:** Anxiety experienced by workers influences the healthy eating index and systolic blood pressure with coping mechanisms as an intervening variable. Work fatigue experienced by workers influences the healthy eating index, with coping mechanisms as an intervening variable.

**Keywords**: anxiety, coping mechanism, job burnout, health eating index, work fatigue

## INTRODUCTION

Anxiety disorders are a group of conditions that provide an important description of excessive anxiety accompanied by behavioral, emotional, and physiological responses (American *et al.*, 2009;American et Association, 2012; Silverman and van Schalkwyk, 2019). Someone who experiences anxiety shows unusual attitudes and behaviors, for example, panic for no apparent reason, excessive fear of the object or life condition that is being faced, and repetitive actions that are difficult to control by oneself (Bandelow, Michaelis and Wedekind, 2017). Work fatigue is a health problem that often occurs among workers. Work fatigue is a feeling of fatigue experienced by workers (Lee and Giuliani, 2019). Work fatigue can have various impacts, one of which is a decrease in work efficiency, which then has an impact on decreasing work productivity (Arini, Martiana and Ardyanto, 2019). Burnout is a feeling of continuous hopelessness associated with an excessive workload, but with no significant change through the efforts that have been made or any difficulties that occur during work

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effectively due to lack of support (Soares and Grossi, 2007). Some researchers have revealed that burnout also represents a negative mood. Burnout is also defined as fatigue or frustration because of the unachieved expectation or the hard effort to achieve the goal, but has difficulties in achieving the goal or far from reality (Soares and Grossi, 2007; Wu et al., 2019). In addition, burnout can also refer to a negative internal state, including psychological experiences that indicate fatigue or exhaustion, and decreased work motivation.

Workers in oil and gas companies are one of several groups of workers who have heavy workloads, both physically and psychologically, owing to their heavy work responsibilities. This is also related to the duration of work, which is not in accordance with the standard working hours specified in Indonesia. Based on workload, workers are at risk of experiencing work stress and fatigue both physically and mentally, which, if not managed properly, will result in occupational burnout. In addition, the differences in each individual coping mechanism when workers have many burdens, habits, or eating patterns will also affect their body's reactions when they begin to show symptoms of burnout. Therefore, researchers want to analyze the relationship between coping style, eating habits, work stress, and fatigue with occupational burnout in order to be able to propose appropriate control for workers in the oil and gas sector, which is one of the vital sectors owned by Indonesia as one of the countries that has a large amount of oil and gas production in the world. The data obtained will then be processed statistically to determine whether there is a relationship between coping style, eating habits, work stress, fatigue, and occupational burnout.

## METHODS

This cross-sectional study included research respondents who were permanent workers in oil and gas companies in Bojonegoro, East Java. This study was conducted from March to December 2022. The population in this study was permanent workers in the oil and gas company where the research was conducted. The sample was part of the research population that will later be studied or observed, involving inclusion and exclusion criteria as a condition for determining the sample. The inclusion criteria in this study were over 18 years of age, had worked for at least 3 months, had no reading limitations, and were willing to become respondents by signing an informed consent form. The exclusion criteria were workers who did not come to work and did not fill out the questionnaire. Respondents were chosen using simple random sampling. The number of samples required in this study was calculated using the two-proportion population hypothesis test formula developed by Lameshow et al. Putra (2018), and the minimum sample size required was 100 subjects.

The study variables included independent, dependent, and intermediate variables. The independent variables were anxiety and work fatigue. The dependent variables in this study were job burnout, distress, eating health index, and blood pressure. In addition, the intermediate variable in this study was coping mechanism.

Measurements for each variable were performed using a questionnaire or measuring instrument with a ratio data scale. The anxiety variable is a feeling of unease, such as worry or fear, that can be mild or severe, as measured using the GAD 7 Anxiety questionnaire, which is a feeling felt by workers where work feels tired, which is characterized by a decrease in efficiency at work that was measured using the Industrial Fatigue Research Committee (IFRC) questionnaire.

The dependent variable was measured using the Maslach Burnout Inventory (MBI) questionnaire to measure job burnout. Job burnout is a feeling of

displeasure at work, feeling tired from work or workload, and starting to appear as symptoms that attack physically and mentally. Distress is an imprecise term that typically refers to unpleasant subjective stress responses, such as anxiety and depression, as measured using The Kessler Psychological Distress Scale questionnaire. The Healthy Eating Index is a measure of diet quality used to assess how well a set of foods is measured using The Healthy Eating Assessment questionnaire. Blood pressure is a condition of systolic and diastolic blood pressure compared to normal values that were measured with the sphygmomanometer to determine blood pressure. The coping mechanism variable is the way workers respond to job stress due to the demands of work, measured using the Cope Inventory Carve questionnaire.

Data analysis was performed using the IBM SPSS Statistics 21 software. Several types of data analyses used in this study are descriptive analysis to see the distribution of research data descriptively, classical assumption test, which includes normality test, multicollinearity, and heteroscedasticity data as the requirement for multiple linear regression tests. The multiple linear regression test is used to determine the relationship or influence of the independent variable on the dependent variable. This study also involved an intermediate variable (intervening) in the effect testing of the independent variable on the dependent variable; therefore, the multiple linear regression test was performed twice, where the first multiple linear regression test was used to see the effect of the independent variable on the intermediate variable (intervening), and the second multiple linear regression test was conducted to determine the effect of the intervening variable on the dependent variable. The results of the two regression tests are then compared with the respective values to determine whether the independent variable influences the dependent variable through the intervening variable. This research was approved by the Health Research Ethics Committee of the Faculty of Public Health Airlangga University (number 56/EA/KEPK/2022).

## RESULT

### Distribution of Respondent Characteristics

**Table 1.** Characteristics Distribution

| Characteristics | n | % |
|---|---|---|
| **Age** (Mean ± SD) 29.37 ± 6.964 | | |
| **Educational Background** | | |
| Senior High School | 99 | 97.6 |
| University | 3 | 2.4 |
| **Marriage Status** | | |
| Unmarried | 32 | 2.8 |
| Divorce | 2 | 2.4 |
| Married | 68 | 67.9 |
| **Nutritional Status** | | |
| Normal | 45 | 53.6 |
| Obesity | 35 | 41.7 |
| Underweight | 4 | 4.8 |
| **Exercise Habit** | | |

| Characteristics | n | % |
|---|---|---|
| Rarely (Less than once in 3 months) | 1 | 1.2 |
| Minimum 1x per week | 81 | 96.4 |
| Minimum 1x per month | 2 | 2.4 |
| **Smoking Habit** | | |
| Yes | 60 | 71.4 |
| No | 24 | 28.6 |
| **Staying Up Late Habit** | | |
| Rarely (Minimum 1x per week) | 36 | 42.9 |
| Always | 1 | 1.2 |
| Frequently (3-5x per week) | 27 | 32.1 |
| Never | 20 | 23.8 |
| **Having Disease History** | | |
| Yes | 1 | 1.2 |
| No | 83 | 98.8 |
| **Leukocyte** | | |
| Negative | 101 | 99.0 |
| Positive | 1 | 1.0 |
| **Urobilinogen** | | |
| Normal | 102 | 100 |
| **Urine Protein** | | |
| (+) 0,3 | 5 | 5.0 |
| (+) Trace | 1 | 1.0 |
| Negative | 96 | 94.0 |
| **Nitrite** | | |
| Negative | 97 | 95.0 |
| Positive | 5 | 5.0 |

The characteristics of respondents were used to provide an overview of what we wanted to know about the condition of the respondents in the study. In this study, the characteristics of the respondents were age, recent education history, marital status, nutritional status, exercise habits, smoking habits, staying up late, disease history, and urine profile, which included examination of leukocyte content, urobilinogen, protein, and nitrite in the urine. Based on the results of the study, it was found that the average respondent was 29 years and 3 months old, 97.6% had a recent history of high school education, and 67.9% were married. In terms of nutritional status, 53.6% had normal nutritional status, 96.4% of respondents were accustomed to exercising at least 1 time per week, 71.4% were active smokers, and 42.9% of respondents had a low habit of staying up late (at least 1 time per week). Meanwhile, from the health status, 98.8% of respondents had no history of disease, with a negative percentage of leukosyte values (99% of all respondents), 100% of respondents had normal urobilinogen values, 94% of respondents have no protein in their urine, and 95% respondents have negative nitrite values.

**Analysis of the Correlation between Independent and Dependent Variables**

**Table 2.** Distribution of Respondents

| Hypothesis | Independent Variable | Dependent Variable | P Value | Note |
|---|---|---|---|---|
| H1 | Anxiety | Job Burnout | 0.212 | Not Significant |
| H2 | Fatigue | Job Burnout | 0.306 | Not Significant |
| H3 | Anxiety | Distress | 0.003 | Significant |
| H4 | Fatigue | Distress | <0.000 | Significant |
| H5 | Anxiety | Healthy Eating Index | 0.581 | Not Significant |
| H6 | Fatigue | Healthy Eating Index | <0.000 | Significant |
| H7 | Anxiety | Sistole Blood Pressure | 0.022 | Significant |
| H8 | Fatigue | Sistole Blood Pressure | 0.247 | Not Significant |
| H9 | Anxiety | Diastole Blood Pressure | 0.023 | Significant |
| H10 | Fatigue | Diastole Blood Pressure | 0.458 | Not Significant |

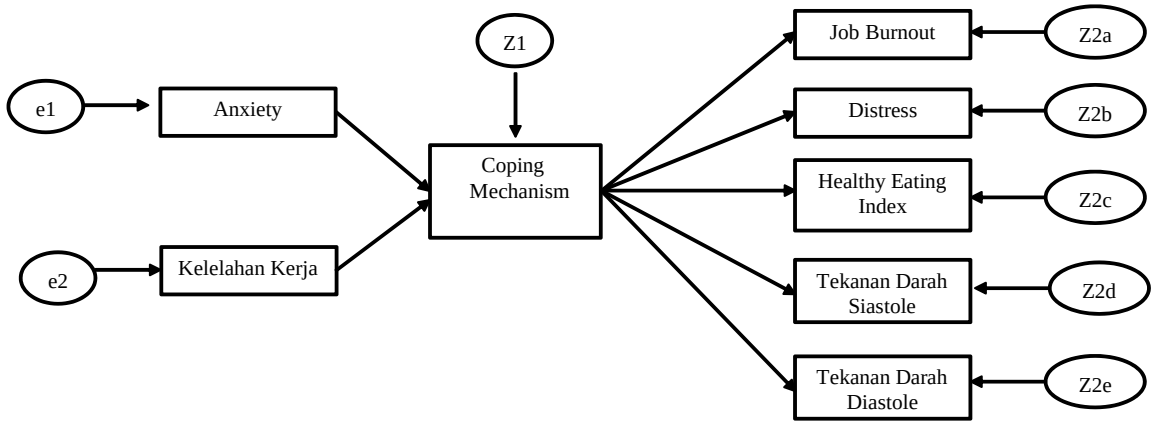


**Figure 1.** Pathway Analysis.

In this study, the correlation of the independent variable with the dependent variable was analyzed in two ways: direct and indirect. The indirect relationship involves the intervening variable, whereas in this study, the independent variable shows the direct influence of the independent variables on the dependent variable. If the value of sig. indicates the number <0.05, it can be said that the variable can affect other variables. The variables that had an influence included

anxiety on distress, fatigue on distress, fatigue on healthy eating index, and anxiety on systolic blood pressure.

**Table 3.** Independent Variable Regression Test Results (Anxiety, Fatigue) on Dependent Variables Job Burnout, Distress, Healthy Eating Index, and Blood Pressure) through Intervening Variables (Coping Mechanism)

| Dependent Variable | Variabel Independent | | | |
|---|---|---|---|---|
| | Anxiety | | Fatigue | |
| | β Direct Effect | β Indirect Effect | β Direct Effect | β Indirect Effect |
| Job Burnout | 0.150 | 0.037 | 0.124 | 0.035 |
| | No Effect | | No Effect | |
| Distres | 0.402 | 0.098 | 0.046 | 0.013 |
| | No Effect | | No Effect | |
| HEA | -0.062 | -0.015 | -0.434 | -0.122 |
| | Have Effect | | Have Effect | |
| Sistole BP | -0.288 | -0.070 | 0.145 | 0.041 |
| | Have Effect | | No Effect | |
| Diastole BP | -0.153 | -0.037 | 0.095 | 0.027 |
| | Have Effect | | No Effect | |

Based on Table 3, it can be concluded that anxiety about job burnout and distress through coping mechanisms has no effect, and fatigue on job burnout, distress, and blood pressure both systole and diastole through coping mechanisms have no effect. Meanwhile, anxiety about healthy eating index and blood pressure, both systolic and diastolic, through coping mechanisms, has a significant influence, as well as fatigue on healthy eating index through coping mechanism.

## DISCUSSION

### Anxiety and Job Burnout

Anxiety is a condition in which a person is worried that something bad will occur (American *et al.*, 2009; American et Association, 2012; Silverman and van Schalkwyk, 2019; Gibson-Smith *et al.*, 2020). Job burnout is a condition in which individuals experience a decrease in conditions that lead to physical and psychological fatigue triggered by various factors, such as high workload, which can cause a decrease in employee performance (Demerouti *et al.*, 2001; Chen *et al.*, 2020; Afonso *et al.*, 2021).

Job burnout is influenced by three main factors: demographic, personal, and organizational (Chen *et al.*, 2020; Soelton *et al.*, 2020). Demographic factors include gender, age, education, length of work, and marital status; personal factors include work stress, workload, and personality type; and organizational factors include working conditions and social support (Mazloomy *et al.*, 2018). However, this study does not show that anxiety levels have an influence on job burnout, so it is not in line with previous research where anxiety levels that are not handled properly can interfere with employee performance due to the emergence of a complex sense of fatigue dominated by mental fatigue or burnout (Bandelow, Michaelis, & Wedekind, 2017; Mikolajczak *et al.*, 2020; Suzabar *et al.*, 2020). This study shows that there is no direct influence of anxiety on job burnout, with a p-value >0.05, as presented in Table 2. Meanwhile, Table 3 shows that anxiety about job burnout through the coping mechanism does not have a significant effect, where the β value of the direct effect is larger than the indirect effect.

## Fatigue and Job Burnout

Work fatigue is a health problem that often occurs among workers. Work fatigue is the feeling of fatigue experienced by workers. Work fatigue can have various impacts, one of which is a decrease in work efficiency, which then has an impact on decreasing work productivity (Lee and Giuliani, 2019; Powell, 2020; Zhu *et al.*, 2020). As shown in Table 2, there was no direct effect of fatigue on job burnout (p-value >0.05). Meanwhile, Table 3 shows that fatigue on job burnout through the coping mechanism did not have a significant effect, where the β value of the direct effect was greater than the indirect effect. This study is not in line with previous research that states that job burnout is caused by work fatigue experienced by workers (Ozel and Hacioglu, 2021; Sikaras *et al.*, 2022). Research further explains that, to understand fatigue, one must be aware of its symptoms. Obvious and subjective signs of fatigue include dizziness, boredom, loss of concentration, lack of alertness, and decreased physical and mental abilities (Ahman, Santoso and Bagaskara, 2022). Job burnout is a work phenomenon that can have a major impact on physical and mental health, and work performance (Titan Permana, Ginanjar and Fatima, 2020). This is in line with Septio's study, which shows that work fatigue has a positive and significant effect on worker health, such that employees who have high work fatigue will have an impact on employee job burnout, which is also high (Septio *et al.*, 2020).

## Anxiety and Distress

Someone with an anxiety disorder tends to think negatively about things that do not necessarily happen; negative thoughts cause anxiety, which develops into worry and leads to stress (Bandelow et al., 2017; Zezelj *et al.*, 2019; Arcand *et al.*, 2020). Distress is the body's emotional and physiological response to an event that is considered stressful and threatening, and has a negative impact on individuals characterized by symptoms of depression and anxiety (Gibson-Smith *et al.*, 2020; Keck *et al.*, 2020; Aucoin *et al.*, 2021).

Psychological distress is caused by high expectations of life, for example, in terms of education, career, and personal relationships, which trigger feelings of depression, anxiety, and anger in emerging adults (Wang and Heppner, 2002). The psychological distress that occurs in an individual can be influenced by two factors, namely intrapersonal and situational factors (Davidson *et al.*, 1999). Intrapersonal factors are related to personality traits and self-esteem in each individual, especially in individuals with personality traits of extraversion and neuroticism who are ambitious, easily nervous, easily anxious, short-sighted, and others (Mirowsky and Ross, 2002). Situational factors can be divided into physiological, cognitive, and social factors.

Other factors that can cause distress include psychological, cognitive and social factors. Physiological factors are related to biological processes and brain mechanisms that influence individual responses to certain events that can cause and increase distress. Cognitive factors are an individual's expectations of external situation events, which often cause stress. Social factors reflect disturbances or mistakes in interpersonal relationships. Establishing positive relationships with those closest to them can reduce psychological distress in emerging adulthood (Dewayani, Sukarlan and Turnip, 2011).

As shown in Table 2, there was a direct influence of anxiety on distress, with a p-value <0.05. Meanwhile, Table 3 shows that anxiety about distress through coping mechanisms did not have a significant effect, where the β value of the direct effect was larger than the indirect effect. Therefore, it can be concluded that this study proves that the level of anxiety that is not handled well will lead to

distress, where anxiety and anxiety will develop into a complex sense of depression to face an event that has a negative impact on individuals that are characterized by symptoms of depression and anxiety (Gibson-Smith *et al.*, 2020; Keck *et al.*, 2020; Aucoin *et al.*, 2021).

**Fatigue and Distress**

As shown in Table 2, there is a direct effect of fatigue on distress, with a p-value <0.05. Meanwhile, Table 3 shows that fatigue on distress through coping mechanisms did not have a significant effect, where the β value of the direct effect was greater than the indirect effect. Feelings of fatigue, both physically and mentally, encourage a person to take an action or activity as a form of adaptation to overcome these feelings so that it does not lead to stress, which is a form of coping mechanism (Desmond, Shevlin, & Maclachlan, 2006; Lee & Giuliani, 2019).

Everyone has their own way of dealing with these feelings; therefore, the form of the coping mechanism is also different. In this study, the level of work fatigue felt by workers of oil and gas companies influenced their feelings of stress. Work fatigue includes both physical and mental fatigue; this mental fatigue experienced by workers then develops into a sense of stress (Lee and Giuliani, 2019). Mental fatigue that is not treated immediately develops into a prolonged sense of stress, which is in line with previous research, where psychological conditions or mental perceptions and psychological stress have the greatest influence on prolonged fatigue (Tang *et al.*, 2020). A survey conducted on the adult population in Hong Kong found that respondents who experienced chronic fatigue had poor mental health (Wong and Fielding, 2010). Other research shows a relationship between the level of work fatigue and work stress (Aprilia & Novitasari, 2021). This means that the more severe the fatigue experienced by workers at work, the higher the level of work stress. Work fatigue can cause several conditions such as decreased work performance due to stress (Ekaputri and Faslina, 2022). Work fatigue has been proven to contribute to more than 60% of accidents at work, but this can be anticipated by improving self-coping mechanisms to manage perceived work stress.

**Anxiety and Healthy Eating Index**

In this study, it was proven that the level of anxiety that is not balanced with a good coping mechanism can adversely affect the healthy eating index. As shown in Table 2, anxiety had no direct influence on the health eating index (p >0.05). Meanwhile, Table 3 shows that anxiety about healthy eating through the coping mechanism has a significant effect, where the β value of the direct effect is higher than the indirect effect. Lower levels of anxiety are found in people with healthy lifestyles who have high levels of vegetable and fruit consumption and the number of calories consumed in one day as needed. Individuals with a high level of fat consumption, low protein, and high sugar intake tended to have a high level of anxiety. When someone is anxious, they tend to eat foods that are high in sugar and fat (Gibson-Smith *et al.*, 2020; Nitturi *et al.*, 2021). Fear and anxiety about something that will happen are problems that are often experienced by many people. Anxiety can increase sympathetic activity, which can then continue to become a somatic reaction. If it affects the circulatory system, it can increase heart rate and blood pressure (Byrd and Brook, 2014).

**Fatigue and Eating Healthy Index**

In this study, it was proven that the level of work fatigue that is not balanced with a good coping mechanism can have an adverse effect on the healthy eating index. As shown in Table 2, fatigue had a direct effect on job burnout with a value of p <0.05. Meanwhile, Table 3 shows that

fatigue has a significant effect on job burnout through the coping mechanism, where the β value of the direct effect is greater than the indirect effect. Someone who experiences work fatigue will tend to choose food that the preparation does not take long or, in other words, fast food (Keck *et al.*, 2020; Endo and Sudo, 2021).

Lower levels of work fatigue are commonly found in people with healthy lifestyles who have high levels of vegetable and fruit consumption and calories consumed in one day as needed. Individuals with a high level of fat consumption, low protein, and high sugar intake tend to have a high level of fatigue. When a person is in a tired body condition, both physically and mentally exhausted, they will have a tendency to choose foods that do not take a lot of time to serve, which are high in sugar and fat (Food Fatigue, 2019). The choice of food is one of the forms of coping mechanisms that they use to suppress fatigue so that it does not develop into a sense of stress. The results of the research by Khoiroh *et al.* (2022) showed a significant relationship between the level of energy sufficiency and the level of work fatigue ($p<0.001$). The level of energy adequacy is the percentage of fulfilling energy intake compared to energy needs according to the 2019 RDA, which considers a person's weight, height, and age; the fulfillment of this energy intake can also be influenced by the eating level index (Khoiroh *et al.*, 2022).

A person with a low level of energy sufficiency can experience a decrease in glucose levels. Decreasing glucose levels cause glycogenolysis and gluconeogenesis in the body. These two processes cause energy reserves in the muscles to decrease, resulting in a decrease in muscle contractions, which can increase work fatigue (Hidayah, 2018).

### Anxiety and Blood Pressure

As shown in Table 2, anxiety had a direct effect on systolic blood pressure and diastolic blood pressure ($p <0.05$). Meanwhile, Table 3 shows that anxiety on systolic and diastolic blood pressure through the coping mechanism had a significant effect, where the β value of the direct effect was greater than the indirect effect. In this study, it was proven that the level of anxiety or anxiety that is not balanced by a good coping mechanism can increase blood pressure. Fear and anxiety about something that will happen are problems that are often experienced by many people. Anxiety can increase sympathetic activity, which continues to become a somatic reaction. If it affects the circulatory system, it can increase heart rate and blood pressure (Byrd and Brook, 2014).

### Fatigue and Blood Pressure

As shown in Table 2, there was no direct effect of fatigue on systolic and diastolic blood pressure ($p >0.05$). Meanwhile, Table 3 shows that fatigue on systolic and diastolic blood pressure through the coping mechanism does not have a significant effect, where the β value of the direct effect is higher than the indirect effect. This study is in line with previous research in which blood pressure values were not closely related to the occurrence of work fatigue (Nelesen *et al.*, 2008). This study has limitations in that blood pressure is only measured after the workers finish working, and it is better to measure blood pressure not only at the end but also at the beginning before the workers do the work to see the real blood pressure change.

## CONCLUSIONS

Anxiety experienced by workers influences the healthy eating index and systolic blood pressure with coping mechanisms as an intervening variable. Work fatigue experienced by workers influences the healthy eating index, with coping mechanisms as an intervening variable. Based on the results of the study,

it is recommended that workers who have anxiety disorders and are also feeling tired both mentally and physically are expected to be able to do good coping mechanisms so that they do not continue to worry about things such as distress, eating disorders or healthy eating index, and blood pressure. occurrence of work fatigue

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Original Research

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# A DESCRIPTIVE COMPARISON OF RESPONSE OF ORAL HYPOGLYCEMIC AGENTS AMONG T2DM IN A BACKDROP OF INSULIN RESISTANCE

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**ABSTRACT**

**Introduction:**Different homeostatic models for the assessment of beta cell function in patients with insulin resistance in type 2 diabetes mellitus suggest that Dipeptidyl Peptidase (DPP-4) inhibitors cause less beta cell stress. **Aims:** The present study aimed to compare and contrast insulin resistance in two groups of patients taking oral hypoglycemic agents, DPP-4 plus metformin and glimepiride plus metformin, on the basis of fasting and postprandial c-peptide and insulin resistance estimated by homeostatic model assessment of insulin resistance (HOMA-IR). **Methods:** This preliminary descriptive observational study was conducted from 2018 to 2019 in the service Laboratory of the Department of Biochemistry, in collaboration with the Endocrinology Department, Nil Ratan Sircar Medical College and Hospital, Kolkata. Serum C-peptide, serum insulin, and plasma glucose levels were measured in both fasting and post-prandial states along with glycated hemoglobin. **Result:** In the fasting and fed state, the secretagogue effect of glimepiride-metformin combination was significantly higher ($p = 0.017$) than that of the linagliptin-metformin combination. **Conclusion:** Patients treated with glimepiride showed high post prandial insulin levels and high post prandial glucose excursion. This finding can be explained by the probable increase in insulin resistance, which is reflected in their post-prandial C peptide level. However, in the case of linagliptin, one mechanism of decreased post-prandial glucose is believed to be the inhibition of α-cell glucagon release, thereby relieving β-cell stress.

**Keywords**: DPP-4, GLP-1, HOMA-IR, OHA, T2DM

## INTRODUCTION

The impact of diabetes mellitus (DM) and its complications on public health is increasing globally. India is no exception to this, with 77 million diabetic people projected to rise to more than 134 million in 2045(Pradeepa& Mohan, 2021). Thus, so far, the prevalence of DM is concerning; India is second in the world in accordance with the International Diabetes Federation.

Metabolic markers of type 2 DM (T2DM) include insulin resistance, impaired secretion of ofinsulin, and excessive glucose production in hepatocytes alongwith dyslipidaemia(Galicia-Garcia et al., 2020).Thehyperinsulinemic state in T2DM occurs as the disease progresses, and this state of insulin resistance is followed by compensatory hyperinsulinemia, which ultimately leads to pancreatic β cell failure, and glucose intolerance is marked by an increase in postprandial blood glucose(PPBG). A rise in hepatic glucose production, along with declining insulin secretion, leads to overt diabetes mellitus, causing beta cell failure. (Galicia-Garcia et al., 2020)

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Pancreatic β cells synthesize and secrete insulin as a preproinsulin. In the beta cellsC peptide and mature insulin are stored and secreted simultaneously after proteolytic cleavage of preproinsulin(Fu et al., 2013).Glucose regulates insulin secretion from thebeta cell of endocrinepancreas.

Glucose enters betacells by a facilitative glucose transporter (GLUT2), which stimulates insulin secretion. The rate-limiting step that controls glucose-mediated insulin secretion is the phosphorylation of glucose by glucokinase, and ATP is generated by glycolysis; this ATP-sensitive K+ channel is inhibited by ATP generated during glycolysis. These K+ channels consist of two different proteins: one binds to sulfonyl-ureas, a meglitinidin group of oral hypoglycemics, and the second protein (Kir6.2) is a transmembrane K+ channel protein. Depolarization of the beta cell membrane caused by K+ channel inhibitionopens voltage-gated$Ca^{2+}$channels, resulting in calcium influx. This event triggers the secretion of insulin(Walczewska-Szewc& Nowak, 2021).

Incretins are secreted from gastrointestinal (GI) tract neuroendocrine cells following food intake. This event causes the glucose-mediated upregulation of insulin secretion and downregulation of glucagon secretion. Glucagon-like peptide 1 (GLP-1),which is secreted by small intestinal enteroendocrine cells,is a 30-31 amino acid peptide. This most potent incretin, GLP-1, stimulates the secretion of insulin, which is glucose-dependent, and occurs when fasting blood glucose is high(Nauck et al., 2021).Glucose-dependent insulinotropic peptide (GIP) alongwith GLP-1 decrease blood glucose by glucosedependent manner by stimulating insulinsecretion(Holst, 2019). Unlike GIP, it is preserved in T2DM patients. This is why common pharmacotherapy includes the use of incretin analogs to stimulate endogenous insulin secretion. In circulation, the C peptide circulates longer because of its slow clearance. Therefore, estimation of serum C-peptide can be used as a marker of endogenous insulin secretion. (Hardy et al., 2000)

Insulin secretion and sensitivity are interrelated events. They play a major role in T2DM pathophysiology(Park et al., 2021). In initial phase of T2DM there is hyperinsulinemia,followed by insulin resistance toregulate glucose homeostasis. At the initialstage of T2DM, the defect of insulin secretionis mild. This specifically involves glucose-mediated insulin secretion. The cause forthis decrease in insulin secretion in T2DMstill remains unanswered. This is assumed that insulin resistance complicated by a second genetic defect may lead tobeta cells failure(Kaufman, 2002). Insulin resistance is defined as the inability to deal with increased glucose uptake and utilization after the addition of insulin in an individual compared with the euglycemic population(Lebovitz, 2001).

Recent advances in the pharmacotherapeutics and management of T2DM have formulated oral hypoglycemic medication that modifies different disease pathogenesis in T2DM. Based on their pharmacodynamics and kinetics, oral hypoglycemic medications are subdivided into different groups; one that increase insulin secretionand sensitivity along with reduce glucose production and enhance Glucagon like peptide -1 (GLP-1) action. Metformin, member of Biguanides, lowers hepatic glucose production and slightly improves peripheral glucose utilization(Foretz et al., 2019). The insulin secretagogue glimepiride helps insulin secretion through its interaction with the ATP-sensitive Potassium channel on the beta cell. “Incretins" modify and increases glucose-sensored insulin secretion. GLP-1 agonists or drugs that enhance endogenous GLP-1 activity are used to manage T2DM. Dipeptidyl peptidase-4 (DPP-4) inhibitors act by inhibiting the degradation of native GLP-1 and enhancing the incretin effect(Deacon,

2020). DPP-4 inhibitors are believed to reduce postprandial glucagon release from alpha cells, along with their main actions on β-cell(Phillips &Prins, 2011).

C-peptide, a marker for beta-cell function, is widely used to assess the risk of complications, drug response, and glycemic control in T2DM. In contrast to insulin, C-peptide had a substantially longer t1/2 than insulin (35 minutes vs. 3-5 min). Furthermore, in individuals receiving subcutaneous insulin replacement, insulin immunoassay fails to distinguish between endo-and exogenous insulin, but the differential kinetics of plasma C-peptide accurately estimates endogenous insulin secretion. The long half-life (t1/2) of C-peptide is believed to be its unique ability to evade hepatic degradation and ultimately renal clearance(Galgani et al., 2010).

The aim of our study was to recognize beta cell stress by estimating serum C-peptide in fasting and post prandial states and HOMA–IR in the linagliptin- and metformin-treated groups compared to the glimepiride and metformin combination group.

The objective of our study was to compare fasting and Postprandial C-peptide, HOMA- IR%, and β cell activity among three groups: T2DM patients taking different combinations of oral hypoglycemic drugs and another age- and sex-matched control group.

## METHOD

This preliminary descriptive observational study was conducted between 2018 and 2019. First, the Institutional Ethics Committee reviewed the study protocol (No/NMC/7500 dated 13/11/2017). Permission was obtained prior to the commencement of the study. Both the participant and control gave willful consent to take part in this project.The study was performed in the service Laboratory of the Department of Biochemistry in collaboration with Endocrinology Dept., Nil RatanSircar Medical College and Hospital, Kolkata. Individuals of both sexes with T2DM were incorporated into this project in accordance with the American Diabetes Association guidelines, 2020.

Total 207 individuals which includes both case and control groups participated in this project Total 207 individuals participated in this project. These individuals wereT2DM patients taking oral hypoglycemic agents. Patients who were taking insulin (n-30) were excluded. Another 37 patients with increased urinary albumin-to-creatinine ratio were also excluded. Those taking antihypertensive drugs (n = 16) were excluded. Another 24 individuals declined to participate in the study. A total of 100 participants, including 60 T2DM patients who were on an oral hypoglycemic drug combination (30 subjects were on metformin and glimepiride and rest were on metformin and linagliptin) were included, and 40 healthy non-diabetic subjects were chosen for comparison.

Under all aseptic and antiseptic conditions, 5 ml whole blood and spot urine samples were drawn from the subjects and divided separately into EDTA vials, Fluoride& Oxalate vials, and clotted vials in fasting and post-fed conditions.

Post prandial plasma glucose was drawn 2 hours after 75 gm oral glucose load. Fasting and PPBG were measured using the GOD-POD (glucose oxidase and peroxidase) method(Trinder, 1969), which oxidizes glucose to gluconic acid and peroxidase cleaves hydrogen peroxide, which further reacts with phenol and 4-aminoantipyrine to form a red-colored quinonemine dye complex. The amount of glucose present in sampleis directly proportional to intensity of the colour formed which is measured at 505 nm HbA1c level was estimated using HPLC, and(Sacks, 2012). blood HbA1c≥ 6.5% was considered to indicate diabetes. Glycated hemoglobin, referred to as Hemoglobin A1C (IFCC mmol/mol and NGSP %), was estimated in the blood by high performance

liquid chromatography(HPLC) with a cation-exchange column in the Hb-Vario kit on the Hb-VarioTMAnalyser.

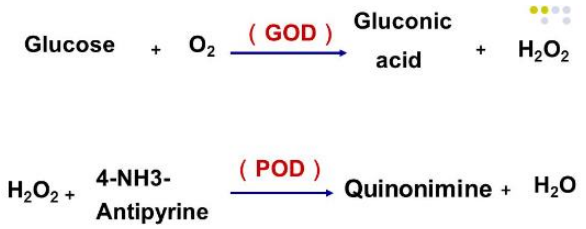


**Figure 1.** Showing basic principle of plasma glucose estimation by GOD-POD method

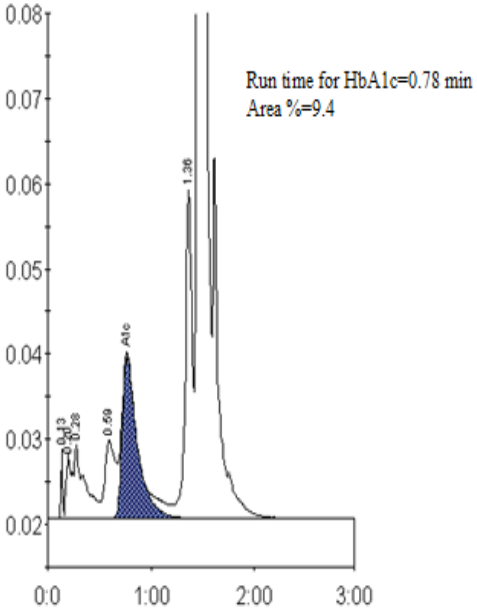


**Figure 2.** Showing standard chromatogram of HbA1C of a particular sample tested in our laboratory

Fasting plasma insulin was measured by chemiluminescence immunoassay using siemens immulite 1000 automated analyser(Tanaka & Matsunaga, 2000).It is a solid-phase, two-site chemiluminescent immunometricassay(Clark, 1999). The HOMA2 model was used to estimate insulin resistance, insulin sensitivity, and β-cell function from fasting plasma glucose and fasting plasma insulin concentrations using the HOMA 2 Calculator ( www.OCDEM.ox.ac.uk)(Wallace,2004). Insulin resistance was defined as a HOMA2-IR more than 1.8(Praveen et al., 2012). Fasting and post-prandial C-peptide levels were assayed by chemiluminescence using a Siemens Immulite 1000 automated analyzer. This is a solid-phase competitive chemiluminescent enzyme immunoassay(Hardy et al., 2000). Urinary albumin: creatinine ratio(ACR) was measuredusingimmunoturbidometric method to rule out nephropathic changes(Bargnoux et al., 2014).

Suitable statistical methods and techniques were applied with the help of a software-based computer program (SPSS version17) to analyze the results, and the significance of differences among different groups was calculated using analysis of variance (ANOVA), with a p-value <0.05.

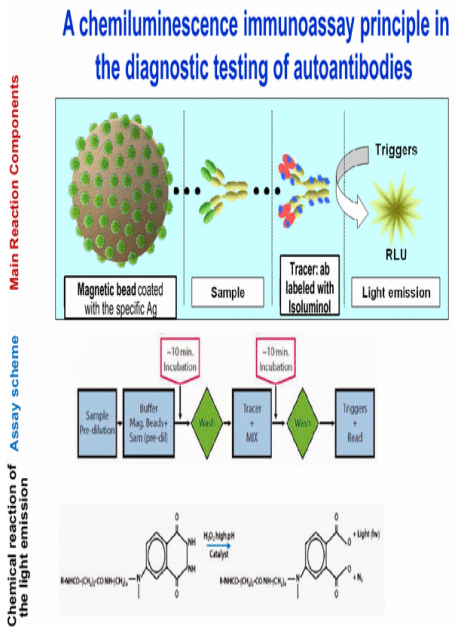


**Figure 3.** Showing basic principle of chemiluminescence of C-peptide in serum as mentioned Siemens Immulite1000 kit insert

## RESULTS

Most of the study population belongs to 30-60 years old (average 43.7 years ) group. A total of 100 patients were enrolled in this study from 2018 to 2019 and were randomized into three groups. Among them, 40, 30, and 30 patients were included in the control, metformin + glimepiride group(group1) and metformin + linagliptin(group2)add-on groups, respectively. In our study, FPG (mg/dl) was significantly increased in both case groups (group 1-167.9±53.1, group2-171.6±21.6) compared to the control group (92±7.2). $HbA_{1C}$values were raised in the case group than in the controls (Table1). T2DM cases were confirmed by estimating fasting blood glucose (FPG) and HBA1C levels. Fasting and post-prandial C-peptide levels were higher in the case group than in the control group.

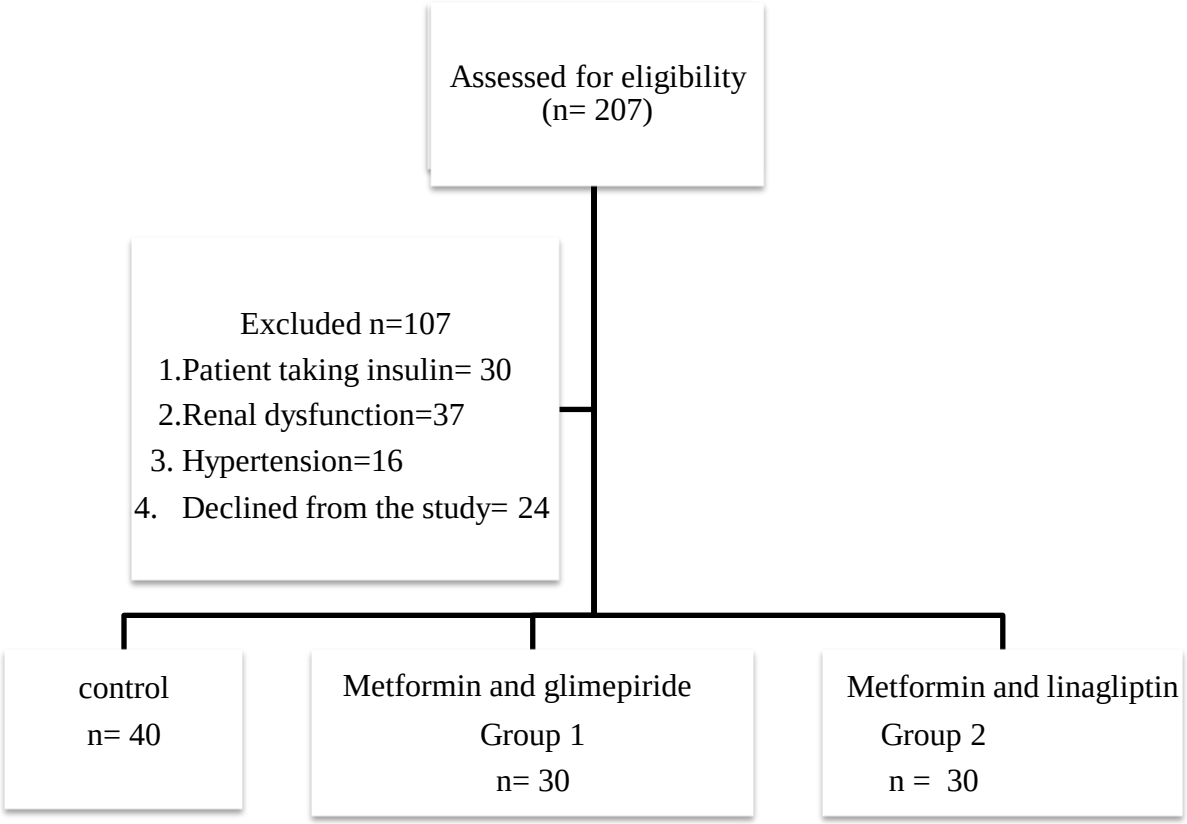


**Diagram 1.** STROBE Flow Chart

**Table 1**. Showing all the measured and calculated parameters in this study along with mean±S.D.

| **Biochemical parameters** | **Group1(Mean±S.D.)** Metformin+ Glimiperide N=30 | **Group2(Mean±S.D.)** Metformin +Linagliptin N=30 | **Control** (Mean±S.D.) N=40 |
|---|---|---|---|
| FPG[mg/dl] | 167.9±53.1 | 171.6±21.6 | 92.0±7.2 |
| PPPG[mg/dl] | 252.7±75.1 | 246.3±57.2 | 121.0±29.7 |

| **Biochemical parameters** | **Group1(Mean±S.D.)** Metformin+ Glimiperide N=30 | **Group2(Mean±S.D.)** Metformin +Linagliptin N=30 | **Control** (Mean±S.D.) N=40 |
|---|---|---|---|
| HbA1C% | 8.0±1.7 | 8.4±2.2 | 5.4±0.5 |
| Peptide (fasting) [ng/ml] | 3.1±1.5 | 2.4±0.6 | 1.7±0.7 |
| CPeptide(p.p.)[ng/ml] | 8.9±4.5 | 5.2±2.7 | 4.1±1.4 |
| Insulin [mU/L] | 24.2±19.3 | 9.9±6.1 | 6.4±2.8 |
| HOMA IR | 2.7±1.1 | 2.1±0.5 | 1.1±0.2 |
| % Betacell activity | 82.8±68.6 | 44.4±14.2 | 117.9±37.8 |
| % Sensitivity | 42.9±17.6 | 51.0±17.7 | 73.0±21.4 |
| Urinary ACR(mg/gm) | 19±3.05 | 18±4.02 | 12±2.1 |

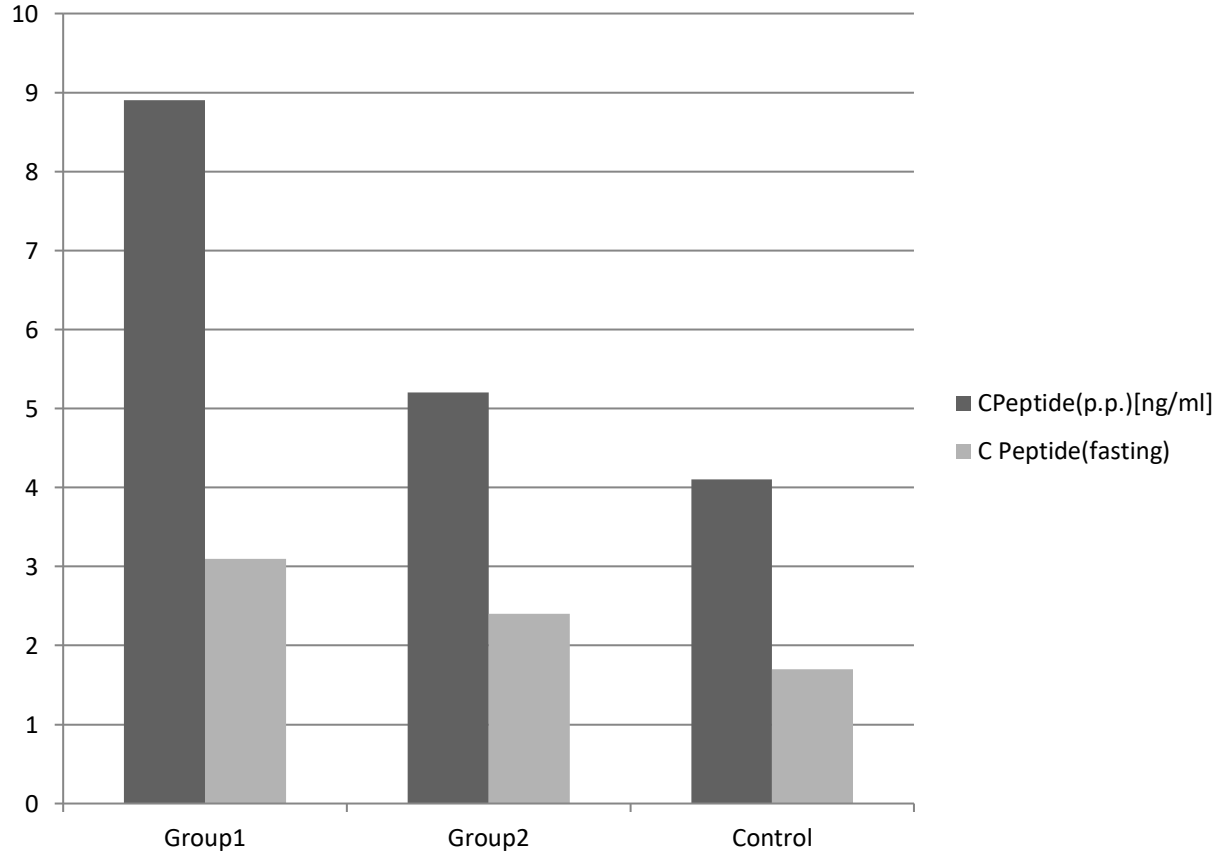


**Figure 4**. shows a comparison of the mean C-peptide levels in the fasting and Post prandial states among the three different groups.

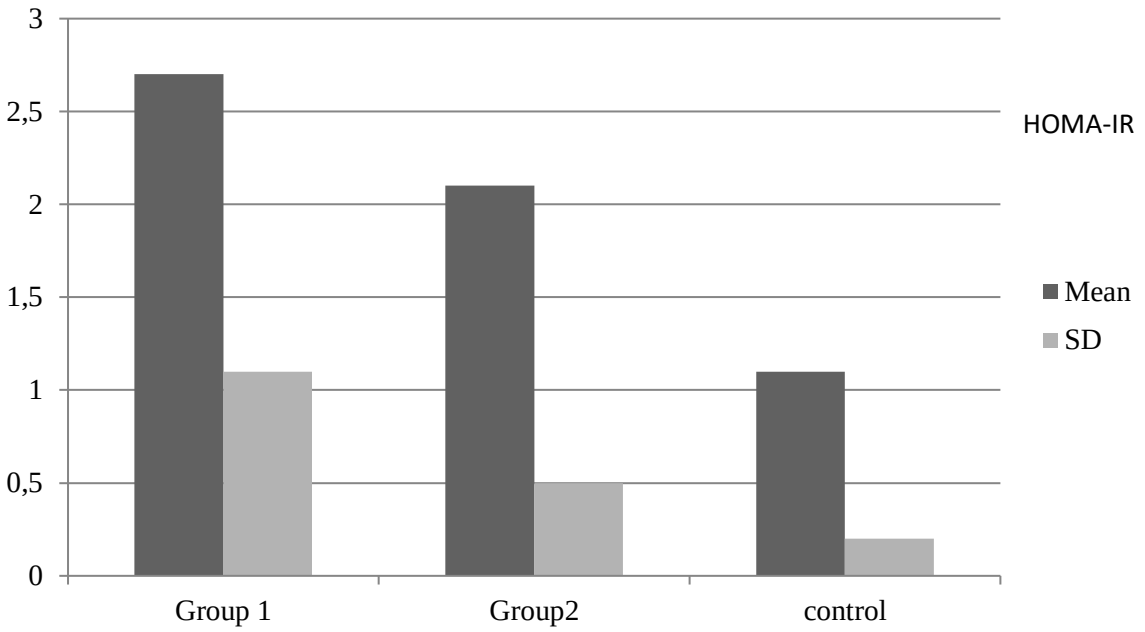


**Figure 5.** shows a comparison of the mean and SD of HOMA-IR among the three different groups.

This is a descriptive study. ANOVA is used to compare the significance of the parameters among 3 different study groups. Statistical significance was set at $P < 0.05$. There was no significant difference in FPG values among the case groups ($p = 0.908$), but FPG values among both case groups were significantly higher than those of the control group ($p < 0.001$). Similarly, HbA1C also increased significantly among both case groups compared to the control ($p < 0.001$) (table 1), but no significant difference was found between the two case groups(p-value - 0.719). In both fasting and fed states, the C-peptide value was significantly higher in group 1 than in group 2(p-value-0.017), and in both case groups, C peptide in the fasting state was significantly raised in comparison to the control ($p < 0.05$). HOMA-IR was significantly higher in both groups than in the control group ($p < 0.05$). As shown in table 1all urinary ACR values were below30 mg/g.

## DISCUSSION

Hyperinsulinemia is a characteristic marker of insulin resistance and contributes to the pathology of T2DM. In this study, fasting insulin concentration was 24.2±19.3 in group 1 and 9.9±6.1 in group 2, whereas HOMA-IR in both groups was found to have more insulin resistance (group 1- 2.7±1.1; group 2- 2.1±0.5) in comparison to the control population, that is, euglycemic healthy individuals (1.1±0.2). This variation in insulin concentration was in accordance with the observations obtained by Praveen et al. HOMA IR > 1.8 was considered insulin resistance according to Bruno Gelonze et al(Geloneze et al., 2009).

The pathogenesis of T2DM is critical and obscure, and in most cases manifests defects in both β-cell dysfunction and insulin sensitivity. Postprandial pathogenesis in T2DM is characterized by insulin resistance and subsequent changes in GLP-1, insulin, and glucagon secretion(Jalleh et al., 2022).

Mechanism of action of DPP-4 inhibitors are believed to lower plasma glucose levels by increasing the physiological level of GLP-1. GLP-1 modifies and improves glucose-dependent insulin secretion from β-cells; the process is energy dependent, where ATP is converted to cAMP. In

contrast, the sulfonylurea group of the drug showed a beta cell-exhausting effect(Solis-Herrera et al., 2013). In this study, the post-prandial C peptide value was (8.9±4.5 in group 1 and 5.2±2.7 in group 2 ) which was significantly higher in group 1 than in group 2(p-value-0.017). In 2014, Thomas Forst et al. showed that treatment with glimepiride and linagliptin significantly improved HbA1c levels and PPBG control. In patients treated with glimepiride, a sharp increase in postprandial(PP) insulin levels was accompanied by an improvement in PPBG control, whereas it was not observed in the group treated with agliptin(Forst et al., 2014). This finding corroborates the results of the present study.

Patients treated with glimepiride showed high post prandial insulin levels and high post prandial glucose excursion. This finding can be explained by probable increased insulin resistance level which is reflected in their post prandial c peptide level.But in case of linagliptin, one mechanism of decreased post-prandial glucose is believed to be inhibition of the plasma glucagon release from the alpha cell of pancreas, and resulting in relief of beta cell (Forst et al., 2014) Carolina Solis-Herrera in 2013 showed that DPP-4 inhibitor alone or along with metformin combined produce decrease plasma glucagon(Solis-Herrera et al., 2013). In 2011, Del Prato showed that single-drug therapy with linagliptin achieved a clinically significant and observable improvement in glycemic control, accompanied by enhanced parameters of β-cell function(del Prato et al., 2011).

However, another meta-analysis of the homeostatic model cited by Wu et al. on the comparison of incretin-based therapy with sulfonylurias and placebo showed no significant β cell-preserving effect between the two groups(Wu et al., 2019). Therefore, the homeostatic model of insulin resistance (HOMA-IR) and β-cell function should be interpreted with caution. From this study, it can be concluded that more uses of DPP-4 analogs will elicit lesser beta cell stress in comparison to sulfonuria in this study, with little difference in glycemic control. This observation can be further reinforced by increasing the sample size and properly designing therapeutic trials for longer durations.

## CONCLUSION

It can be concluded that both regimes of oral hypoglycemic drugs improve fasting and post prandial blood glucose levels along with HbA1C levels in T2DM patients included in this study. However, serum C-peptide in fasting and post-prandial state and HOMA –IR, β cell defect suggest lower β cell stress in the linagliptin- and metformin-treated groups than in the glimepiride and metformin combination group.

## LIMITATIONS

This study has a few limitations, including the small sample size and discrepancy in the dose and duration of oral hypoglycemic agents and other confounding variables that were not considered, such as renal clearance. The insulin-insulin ratio could not be estimated. The findings of this study can be better evaluated by properly designed therapeutic trials of longer durations.

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Original Research

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# STRENGTHENING IMPLEMENTATION 5S WORK CULTURE TO FINANCIAL PERFORMANCE AND PRODUCTIVITY AT PT PETROKIMIA GRESIK

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**ABSTRACT**

**Introduction:** The preliminary, applying Japanese housekeeping, namely the 5S such as Seiri, Seiton, Seiso, Seiketsu, and Shitsuke, is one way to achieve these five qualities. 5S is a procedure that controls and standardizes the workplace by ensuring the efficiency of business processes to provide a safe and high-quality workplace. **Aims:** This research was a case study that aimed to observe how the 5S was implemented as a work culture and how it influenced organizational performance. **Method** The research was qualitative research using an ethnography approach through the description of the data collected through field observation. The data analysis included data reduction, data presentation, and drawing conclusions. It was found by observing indicators that activities that needed development were found, such as: Sort Out = 4, Set in Order = 1, Sweep = 1, Standardize = 2 and Sustain = 1. **Results** Findings show that the previously unfavorable working conditions of employees have now improved and can be further improved by implementing 5Ss. The results show that if the subsidiary has an increase in financial performance, it can be seen from the overall average value of Assets = 0.00103 and the GPM value = 0.547 is higher than before. **Conclusion** Increased work efficiency and effectiveness are well-coordinated and work quality and safety are well-maintained. Then the financial performance changed greatly, which initially declined due to the weakness of the 5S work culture, has now drastically improved thanks to the 5S work culture that was successfully strengthened.

**Keywords**: Implementation, 5S, observation

## INTRODUCTION

Business actors must adapt to increased market competition, they must pay attention to supporting elements that contribute to productivity, such as work culture (Luturmas, 2017) To make work more accessible and enjoyable, it is vital to establish a work culture. A well-organized work environment might result in a positive line output for the business (Saidi et al., 2019). The work environment must be conducive to all activities during the workday. Additionally, the work process must highlight other factors, such as efficiency and effectiveness, productivity, and safety, to meet acceptable requirements.

To better understand the impact of the work culture toward the effectiveness of the work performed (Soni, 2019) in a business operation could be seen from how a well-established company conducts their activities in a systematic and well-organized manner. Many big and well-established companies adopt the already suited work culture to ensure their productiveness (Cherian, Gaikar, Paul, & Pech, 2021). Many types of research have been conducted toward the organizational culture in many diverse aspects within the company to establish the importance of it from the perspective of the company management (Tulcanaza-Prieto, Aguilar-Rodríguez, & Artieda, 2021). The organizational culture and work values are receiving increasing research attention in the global firm context nowadays (Hong, Joseph, & Kureethara, 2018). Companies in Indonesia have also been putting importance on the work culture to ensure their work performance as well as

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establish the company's competitiveness in the global markets (Muriithi, 2021).

Indonesia as an agricultural country makes the fertilizer industry one of the competitive business fields (Wahyuningdyah, Sucherly, Soemaryani, & Komaladewi, 2021). This makes many companies vying to become quality fertilizer producers. Due to a large demand for fertilizers, the fertilizer industry is trying to provide good quality products to ensure customer satisfaction. In addition to improving product quality, fertilizer producers in Indonesia also strive to improve environmental management system aspects as an effort to implement ISO 14001:2015. One of the largest fertilizer producers in Indonesia meeting that standard is PT Petrokimia Gresik (Fardiansyah & Sidjabat, 2021). PT Petrokimia Gresik is a state-owned enterprise that operates by international and corporate quality standards. PT. Petrokimia Gresik has not integrated the four supporting sectors into its operation, particularly the portfolio sector. This unit's workflow involves document processing activities such as converting financial reporting data from Excel to time series, conducting monthly performance assessments, doing business reviews of subsidiary companies, and sending letters. Operationally, it is still not well-organized. The main problems with business portfolio units are: Each table has not been tidied, and some items are rarely used on the table; The secretariat of the unit is not in order, the documents are not neat, and the things in the closet are still messy, making it difficult to find items; The trash can in the room is tiny. If the trash can is full, then the trash can't be put in it; Rooms are not tidy, and sometimes documents are messy; Have not implemented and recognized the 4R culture: a simple, neat, caring, and clean work environment. The most basic units in the management and documentation process are the environment and workspace. The workspace is where strategies and documents are managed to produce assessments and results to summarize the documents required by the company and the conditions. Within the business portfolio unit, there are document processing processes such as importing financial reporting data from Excel to time series, conducting monthly performance reviews, conducting business reviews of subsidiaries and writing letters. Based on these assumptions, it is necessary to have a project to change and implement a work culture that will positively impact the work business unit. This study aims to learn how PT Petrokimia Gresik's 5S implementation focuses on increasing productivity, efficiency, effectiveness, and work safety. Therefore, implementing 5S is the scope of the work. This financial report data were taken in August when financial performance was not optimal and the implementation of the 5S work culture had not yet been implemented. The samples taken are Assets, Profit, GPM and NPM in five of the 16 subsidiaries in PT. Petrokimia Gresik. Financial performance data can be seen in the following table:

**Table 1.** Financial Performance Report

| Subsidiary | PKY | PST | PSG | PGM | PJA |
|---|---|---|---|---|---|
| **Asset** | 720,844,116,818 | 154,555,010,013 | 1,072,393,043,902 | 208,048,000,000 | 216,830,000,000 |
| **Profit** | 4,469,630,078 | 82,370,422 | 502,129,313 | 1,017,000,000 | (354,000,000) |
| **GPM** | 30% | 10% | 15% | 1% | -1% |
| **NPM** | 8% | -1% | 1% | 4% | 4% |

*Source : PT Petrokimia Gresik*

Within the business portfolio work unit, there is a decline in financial performance due to the weak implementation of the 5S applied by the company. To maintain a competitive edge, manufacturing firms have devised a range of management systems that are intrinsically linked to the two factors of efficiency and effectiveness (Kabiesz & Bartnicka, 2019). One approach to accomplish these four goals is implementing a domestic service from Japan, specifically the 5S, or Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. 5S is a procedure that controls and standardizes the workplace by assuring the efficiency of corporate processes and by fostering a healthy, safe, and productive work environment (Sultana, 2019). Many researches have been conducted toward the implementation of 5S in various sectors of industry, including manufacturing (Houa, Haslinda, Muliati, Miri, & Rahim, 2018) in regard to workplace management (Gupta, 2021) as well as infrastructures (Akinwole & Tunji, 2019).

In Indonesia, the concept of 5S is being adopted, which stands for sort out, set in order, shine/sweep, standardize, and sustain (*Ringkas, Rapi, Resik, Rawat dan Rajin*). One way to create a comfortable working atmosphere is for the company to apply the 5S work attitude where 5S is the stage to regulate workplace conditions that have an impact on work effectiveness, efficiency, productivity and work safety (Purwanto, 2018). According to a preliminary study at PT Petrokimia Gresik, researchers see that the 5S in business portfolio units have not been executed or coordinated. While it appears to be relatively simple to adopt, it is extremely tough, and knowledge of the value of 5S has not been thoroughly appreciated. It is still not adequately organized operationally (Sugiarti & Aliyah , 2015).

Several earlier studies on implementing the 5S culture to achieve efficiency have been conducted. Liliana (2018) found in her study "Implementation of 5S Culture in Government Institutions K Jakarta" that the 5S program at KPPN Jakarta I is governed by the Inspector General Regulation Number PER-05/IJ/2014 issued by the Ministry of Finance. All employees must become acquainted with the 5S culture by adhering to office regulations that have been tailored to the values of the Republic of Indonesia's Ministry of Finance. According to the findings of Gunawan (2020) in "Analysis of 5S Applications at PT Sukun Transport Logistik," the benefits of this implementation include assisting organizations in improving workers' mindsets toward 5S habituation in the workplace. The findings of Nelfiyanti's (2018) research, titled "Implementation of 5S at Sasa Homestay Teluk Jambe Karawang," conclude that implementing the 5S concept at Rukost Sasa Homestay will result in a clean, orderly, and pleasant atmosphere that is pleasing to the sight and delivers a new sense. Rahma (2020) conducted research titled "Assisting the Implementation of the 5S Program in the Unida Cafe Business Unit (U3)," and concluded that counselling about the importance of 5S in the Unida Kafe Business Unit was well carried out, where cooking, food serving, and storage areas became neatly arranged, there are table names on the shelves and cooking ingredients, and there is a divider between the trash can and the place for serving food. According to Apriliani's (2020) findings in "Implementation of 5S Culture as an effort to improve facility maintenance and train personal discipline in Bekasi City LKS," the 5S culture is a good housekeeping practice as an entry point to integrated facility maintenance management. The 5Ss are technical procedures that strive to build attitudes and behaviors that, in turn, form a disciplined culture in all aspects of life.

According to various research findings, the adoption of 5S has a favorable impact on employee performance. As a result, in this study, an

analysis of 5S implementation will be conducted to determine its effect on employee performance in the business portfolio department at PT Petrokimia Gresik.

## METHODS

The research adopted the qualitative research as multi-method focus that involves an interpretive, naturalistic approach to the subject. This means that qualitative researchers study things in their natural setting, trying to understand, or interpret, phenomena in terms of the meanings that people bring to them. Qualitative research involves the study of the use and collection of various empirical materials – case studies, personal experiences, introspection, life stories, interviews, observational, historical, interactional, and visual texts – that describe routine and problematic moments and meanings in an individual's life (Aspers & Corte, 2019).

This research used an ethnography approach to conduct the study toward the work culture. The ethnography approach was assumed to be suitable for studying work culture as questions and observations of this approach are generally related to social and cultural processes and shared meanings within a given group of people. The data collection method used an observation through a case study (Pathiranage, Jayatilake, & Abeysekera, 2020 ) toward the state of the determined research object (Barrett & Twycross, 2018), in this case the business portfolio department of PT Petrokimia Gresik, during before and after implementation of the 5S work culture.

The case study was carried out from January-February 2022 at PT Petrokimia Gresik's business portfolio division with a total of seven employees, Jl. General Ahmed Yani – Gresik 61119, Gresik Regency, East Java. This study aims to learn how PT Petrokimia Gresik's 5S implementation focuses on increasing productivity, efficiency, effectiveness, and work safety. Data analysis techniques carried out in descriptive research include data reduction, data presentation, and drawing conclusions (Febriati & Akhyar, 2019). In this research, the researcher conducted data reduction, namely going into the field to find out the initial conditions for the implementation of 5S at PT Petrokimia in which it was later found that the portfolio business unit was still lacking in the implementation of 5S. Then, from the initial findings, data are presented from the 5S implementation project to the 5S implementation achievement, and conclusions are drawn.

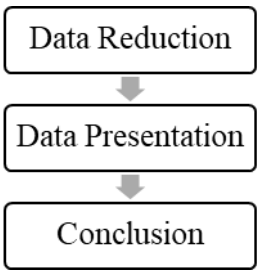


**Figure 1.** Data analysis

Researchers monitored individuals and examined event-based problem-solving strategies (Upadhyay & KC, 2014). The researcher observes the participants at the event and creates a problem-solving framework: the employee work environment and the business portfolio department. The implementation of the 5Ss is investigated through observational steps, which are: Understand how to apply 5S activities and 5S work unit competency. Investigating business processes, issues, and places for improvement in units that have not implemented 5S to the greatest extent possible. Evaluate findings and consult with management. This study has obtained ethical approval as issued by the Health Research Ethics Commission of the Faculty of Dentistry, University of Islam Sultan Agung (No. 357/B.1-KEPK/SA-FKG/III/2022).

## RESULT

### Profile of PT Petrokimia Gresik

PT Petrokimia Gresik is a state-owned company that has complied with international and corporate quality standards located on Jl. Jendral Ahmad Yani – Gresik 61119. PT Petrokimia Gresik (PG) is a highly competitive producer of fertilizers and other chemical products and the products most demanded by consumers with superior and sustainable performance, through the implementation of the Mut Management System, Environmental Management System, Health and Safety Management System Work (SMK3) in an integrated manner. PT Petrokimia Gresik has several leaders from the board of commissioners and the board of directors. The board of commissioners consists of the President Commissioner, independent commissioner and commissioner and on the board consists of the main director who oversees the director and general affairs as well as the director of operations and production. Each director has responsibilities to supervisors and departments under them. The following is the organizational structure of the PT Petrokimia Gresik company which consists of: President Director: The president director is the highest position in the company. The President Director is responsible for the company's business and the maintenance of employees of PT Petrokimia Gresik. The President Director oversees two boards: the director of finance and general affairs, and the director of operations and production; Director of Finance and General Affairs: The Director of Finance and General Affairs has the responsibility and authority to manage costs and empower employees at PT Petrokimia Gresik. Sections under the general and finance director are administration, business planning and control, general, human resources, and engineering. In running, the Director of Finance and General Affairs is responsible to the President Director; Director of Operations and Production: has the responsibility and authority in planning, managing, and regulating as well as developing the operation and production processes at PT Petrokimia Gresik. Sections under the Director of Operations and Production are factory I, factory II, factory III, business partners, planning and control, factory services, technology, and development. In running these, the Director of Operations and Production is responsible to the main director; SVP or General Manager: In general, SVP at PT Petrokimia Gresik has the task of assisting the board in running it by supervising, directing, and coordinating several departments led by a VP or manager; VP or Manager. VP at PT Petrokimia Gresik has the task of supervising, directing, and coordinating the employees in the department in order to achieve company goals. In running this, the VP is responsible for the SVP; AVP or Head of Section: AVP at PT Petrokimia Gresik has the task of supervising, directing, and coordinating the employees within the department. In running this, the AVP is responsible for VP.The Business Portfolio Department consists of seven employees who have different duties and responsibilities

### The Nature of Implementation

Implementation is a process that must be carried out to attain the benefits or goals that have been created and planned. The purpose of implementation is to put the strategy into action. Implementing a system is as crucial as, if not more important than, the strategy itself. Implementation is an activity that involves the use of facilities (tools) as a means of completing work to accomplish the desired goals and outcomes. The company's use of the 5S work culture will result in a work culture that is efficient, effective, pleasant, relaxed, efficient and promotes high work safety (Wiyanto & Salafudin, 2019). The implementation of 5S based on Liliana (2018) will benefit organizations in a

number of ways, including: increased productivity due to more efficient workplace arrangements; increased comfort due to the workplace being always clean and spacious/airy; decreased workplace hazards due to the good/good quality of the workplace; and increased savings due to the elimination of various workplace wastes. Then, according to Patel and Thakker (2014) and Kareem and Talib (2015), there are many benefits that can be obtained from implementing a 5S work culture such as: reducing unnecessary activities, reducing human errors and work accidents, reducing time in finding the right tools or equipment and reducing training and coaching time for employees. Based on those explanations, the goals of the implementation of 5S based on Liliana (2018) are:

**Table 2.** The Goal of 5S

| Term | Meaning | Objective |
|---|---|---|
| Seiri | Sort | To decrease waste and loss |
| Seiton | Set in order | To increase efficiency (A place for everything and everything in place) |
| Seiso | Shine/ Sweep | To observe, inspect and correct (Prepare the rules to follow) |
| Seiketsu | Standardize | To standardize the way of maintaining (Prepare the rules to follow) |
| Shitsuke | Sustain | To maintain and train (Daily activity) |

### 5S as Work Culture

5S culture is one of the elements of work culture that must be used in the industrial sector. This concept is quite simple to comprehend and disseminate throughout the corporate sector, but it is quite tough to apply. 5S stands for simplicity, neatness, cleanliness, care, and diligence; 5S, which stands for Seire, Seiton, Seiso, Seiketsu, and Shitsuke, is well-known in Japan and has demonstrated its ability to manage industry; it is now widely utilized in Indonesia (Sakti & Kusmindari, 2021).

The 5S methodology enables firms to sort and segregate undesired commodities, tools, and materials, eliminating excess (Qowim, Mahbubah, & Fathoni, 2020). Adopting 5S increases workflow productivity improves the work atmosphere, reduces traffic flow, and creates more order after removing undesirable objects. The conclusions of this study offer valuable enterprise information (Adam & Sati, 2019). A sixth step, "safety," is occasionally regarded in a Japanese setting. However, effectively applying the 5S system ensures a safe working environment. However, when safety is compromised in order to preserve cleanliness, a hazard increases. Caution should be exercised to avoid persuading any 5S system that is defective. Essentially, Kaizen does not advocate for large-scale changes but rather for incremental improvements that have a far-reaching effect (Sultana, 2019).


**Figure 2.** 5S by Kaizen

Everyone, from top management to workers/operators, must be involved in the manufacturing process. The senior

management is accountable for establishing the organization's goals, implementing the 5S system inside the organization, and familiarizing employees with the 5S system. They specify the procedures to be followed to accomplish organizational goals using the 5S approach. Supervisors are accountable and need to educate and train employees on the 5S methodology. Employees are exclusively accountable for execution of the 5S technique, as they constitute a vital component of an organization's operation. Essentially, the manager keeps an eye on the employees' part in executing the 5S technique (Sultana, 2019).

The 5S approach, which Kaizen pioneered, is an efficient office administration solution widely used in various businesses. Prepare only what the workplace truly needs with a superficial culture. Being neat entails arranging items to make them easily accessible when needed. Cleanliness is defined as maintaining everything in the office free of odors, dust, and grime. Prudence is a culture that successfully achieves simplicity, tidiness, and neatness, the 3Rs that existed before standardization or standardization, and which, of course, operate best when all employees support them. Additionally, the concept of persistence is attained through the development of positive employee habits and their improvement, namely doing what needs to be done (Liliana, 2018). While the concept of a 5S plan is straightforward to follow, in practice, it remains challenging to implement within a business. A business without a 5S strategy will be unable to operate in an ordered and uniform manner, as 5S is the basis upon which the industry is formed in Japan (Suprayitno, Rahadi, & Rusdianto, 2021): afacility or workplace that is small, neat, clean, caring, and hardworking. The 5S plan's implementation lays a firm foundation for developing corporate entities necessary to usher in the industrial era.

## 5S Program at PT Petrokimia Gresik

A 5S plan is a culture that governs how an organization or individual treats a workspace or location responsibly and properly. A well-organized, nice, and clean workstation will make it easier for individuals to perform their job functions. There are four primary industrial objectives: efficiency, productivity, quality, and workplace, AKHLAK itself is an abbreviation of the daily performance of BUMN employees. It stands for Trustworthy, Competent, Harmonious, Loyal, Adaptive, and Collaborative; the idea is critical in state-owned enterprises. The five primary objective areas are as follows: trust, competence, alignment, loyalty, adaptation, and collaboration, all of which are essential industrial criteria for the development of the globalization period. At PT Petrokimia Gresik, the implementation of AKHLAK has been going well but has not been matched by the implementation of the 5S work culture.

## 5S The Procedure of Project Implementation

The 5S project is implemented by tracing and monitoring the scope of work of the business portfolio work unit, by observing some of the significant challenges the unit faces, then redeveloping it to find the best answer. For proposed solutions to the challenges of PT Petrokimia Gresik. It is proven in the financial performance report that it can increase significantly because of the conducive place and atmosphere for every employee in the room. And for work safety, there are no more greedy cables, now they have a special place

## Initial Circumstances

The execution of PT Petrokimia Gresik's 5S, particularly in business portfolio management, has not been adequately coordinated. At the same time, the implementation is relatively simple. It is rather complex and understanding the

relevance of 5S is still insufficient. It is still not adequately organized operationally.

The following is a suggested system for researchers to complete: Non-essential or infrequently used items are stored in the closet, ensuring that each table remains nicely organized and does not obstruct work activities; Reorganize the closet layout to appear friendly and spacious when searching for stuff; Purchase a giant garbage can to accommodate more rubbish while maintaining a clean appearance in the space; Provide cable clamps and cable boxes to organize cable channels and minimize workplace safety issues properly; Become accustomed to the 5S culture in the workplace, establish a designated snack area, and maintain a neat appearance.

**5S Project Outcomes**

The 5S strategy is one method for coordinating the climate and conditions that affect efficiency, effectiveness, productivity, and workplace safety. The best method to create a friendly and comfortable work environment is to adopt the 5S work mentality (Jahja, 2009). With the application of 5S at PT Petrokimia Gresik, particularly in the business portfolio, previously unpleasant working circumstances for employees can be addressed. The 5S program can be implemented in businesses with a practical and modern workspace theme or background consisting of a clean, comfortable, relaxed, and modern layout that facilitates the alignment of work quality standards for business portfolio units with a company and international standards. Observation data are arranged into several compliance assessment indicators that can be used as a reference to see the condition of 5S use indicator as a measuring tool of a variable is very necessary; it is related to provide an easy means of understanding the meaning. So that it is scientifically acceptable and accounted for the truth as an appropriate indicator to measure the variable (Sudiyanto & Puspitasari, 2010).

This indicator contains activities of Sort Out, Set in Order, Sweep, Standardize and Sustain, in each of these aspects it is observed how the conditions were before the implementation of the 5S work culture and what aspects require improvement and development, The criteria that will be used are derived from survey data in other work units that become a reference for the implementation of strengthening the 5S work culture carried out by the person in charge of the business portfolio work unit.. The results are shown in the following table:

**Table 3.** 5S Compliance Assessment Indicators in Portfolio Business Department

| No | Activity | Total of criteria | Total activities that have met the criteria | % | Total activities that need improvement | % |
|---|---|---|---|---|---|---|
| 1 | Sort Out | 4 | 0 | 0.0 | 4 | 100.0 |
| 2 | Set in Order | 3 | 2 | 66.7 | 1 | 33.3 |
| 3 | Sweep | 4 | 3 | 75.0 | 1 | 25.0 |
| 4 | Standardize | 3 | 1 | 33.3 | 2 | 66.7 |
| 5 | Sustain | 2 | 1 | 50.0 | 1 | 50.0 |
| | **Total** | **16** | **7** | **45.0** | **9** | **55.0** |

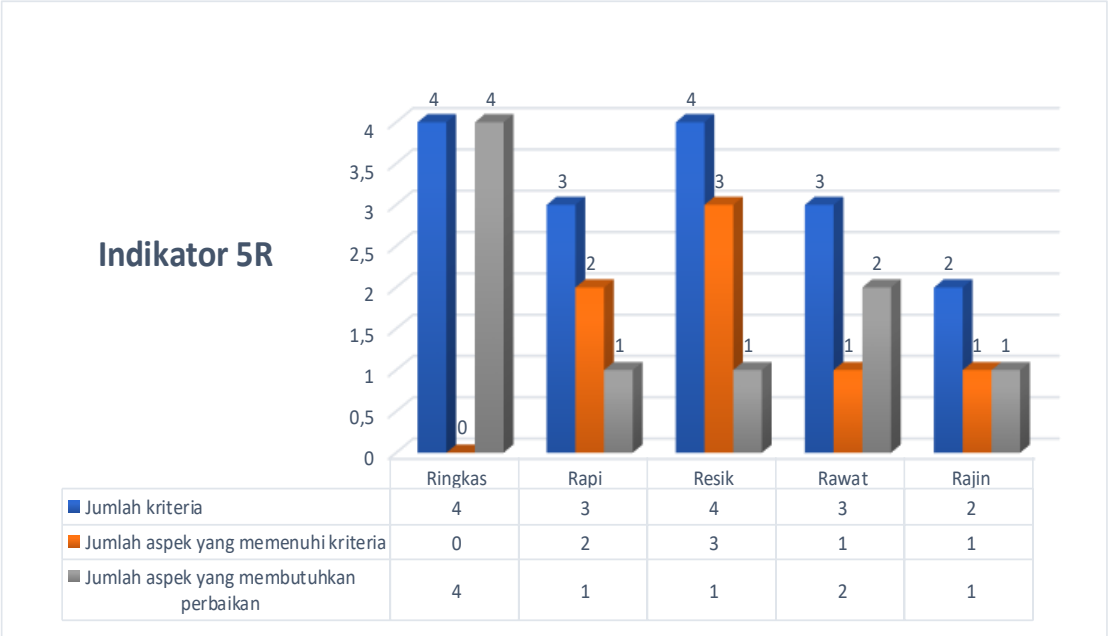


**Figure 3**. Chart Indicator 5S

**Table 4.** Before and After the Implementation of 5S

| | | PKY | PST | PSG | PGM | PJA |
|---|---|---|---|---|---|---|
| **Asset** | Before | 720,844,116.818 | 154,555,010.013 | 1,072,393,043,902 | 208,048,000.000 | 216,830,000.000 |
| | After | 876,465,000.000 | 131,856,000.000 | 984,600,000,000 | 159,581,000.000 | 205,570,000.000 |
| **Profit** | Before | 4,469,630,078 | 82,370,422 | 502,129,313 | 1,017,000,000 | (354,000,000) |
| | After | 8,431,000,000 | 30,000,000,000 | 14,070,000,000 | 1,173,000,000 | 1,693,000,000 |
| **GPM** | Before | 30% | 10% | 15% | 1% | -1% |
| | After | 35% | 13% | 13% | 12% | 13% |
| **NPM** | Before | 8% | -1% | 1% | 4% | 4% |
| | After | 7% | 1% | 2% | 4% | 10% |

*Source : PT Petrokimia Gresik*

In the financial performance data report before the implementation of the 5S work culture which resulted in low monthly financial performance, the sample data included assets, profits, GPM and NPM. Sample data were taken from five of the 16 subsidiaries, namely: PT. Petrokimia Kayaku, PT. Puspetindo, PT.

Petrosida Gresik, PT Graha Medika and PT Jordan Abadi. From the performance of PT Petrokimia Gresik it experienced a very drastic decline due to a work environment that was less conducive, effective and efficient.

Therefore, there is a need for research and observation on business portfolio work units to help support strengthening financial performance through the implementation of a 5S work culture so as to create an efficient work environment. And the work environment itself can increase productivity and reduce work accidents In the financial report data, there are several financial performances that are not affected by strengthening the implementation of 5S work culture because the results of the study show that in the aspect of assets owned by a company which can be tangible or intangible objects (Soemitro & Suprayitno, 2018) in the subsidiary PT Petrokimia Gresik, on average, they have more intangible assets so they are not affected by the implementation of the 5S work culture

**The effect of 5S implementation on the financial performance of a subsidiary**

Fitriani (2013) concluded that environmental performance has a positive effect on financial performance; the better it is responded positively by investors through fluctuations in the company's stock price can improve the company's financial performance. In addition, consumers or the public will be more interested in buying goods or services offered as a form of appreciation for companies that have carried out CSR. This will affect the company's income and profit which is an indicator of financial performance. The results of this study support the results of research by Djuitaningsih and Ristiawati (2011), which states that environmental performance has a positive and significant effect on financial performance because companies with good environmental performance will also receive good responses from stakeholders and have an impact on increasing company revenues in the long term. BUMN companies are companies that have good environmental performance; this is indicated by the environmental performance of BUMN by 66% above the average market environmental performance of 64%. This research is also reinforced by research by Darnall (2005), which states that companies with high growth rates, environmental performance has a positive effect on financial performance because companies with high growth rates have a more organic management style and can take additional benefits by going beyond compliance with laws such as investing through environmental performance, which has an impact on future financial performance.

**PT. Petrokimia Kayaku**

PT Petrokimia Kayaku experienced an increase in financial performance after implementing the 5S work culture, namely in assets worth Rp. 876,465,000,000 which were initially only worth Rp. 720,844,116,818. Then the GPM also increased by 35% which was initially 30%

**Table 5.** Financial Performance PT. Petrokimia Kayaku

| Financial Performance | Asset | GPM |
|---|---|---|
| **Before** | 720,844,116,818 | 30% |
| **After** | 876,465,000,000 | 35% |

**PT. Puspetindo**

PT Puspetindo experienced a significant increase in financial performance after implementing the 5S work culture, namely the Profit of Rp. 30,000,000,000 which was initially only worth Rp. 82,370,422. Then the GPM increased by 13% which was initially 10%. And the NPM also experienced an increase which was initially -1% and now to 1%

**Table 6.** Financial Performance PT. Puspetindo

| Financial Performance | Asset | GPM | NPM |
|---|---|---|---|
| **Before** | 82,370,422 | 10% | -1% |
| **After** | 30,000,000,000 | 13% | 1% |

**PT Petrosida Gresik**

PT Petrosida Gresik showed a significant increase in financial performance after implementing the 5S work culture, namely the Profit of Rp. 14,070,000,000 which was initially only worth Rp. 502,129,313. And the NPM also increased from 1% to 2% at first.

**Table 7.** Financial Performance PT. Petrosida Gresik

| Financial Performance | Asset | NPM |
|---|---|---|
| **Before** | 502,129,313 | 1% |
| **After** | 14,070,000,000 | 2% |

**PT. Graha Medika Gresik**

PT Graha Medika experienced a significant increase in financial performance after implementing the 5S work culture, namely the GPM or Gross Profit Margin of 12% which was initially only 1%.

**Table 8.** Financial Performance PT. Graha Medika Gresik

| Financial Performance | GPM |
|---|---|
| **Before** | 1% |
| **After** | 12% |

**PT. Jordan Abadi**

**Table 9.** Financial Performance PT. Jordan Abadi

| Financial Performance | Asset | GPM | NPM |
|---|---|---|---|
| **Before** | (354,000,000) | -1% | 4% |
| **After** | 1,693,000,000 | 13% | 10% |

PT Graha Medika, there was a significant increase in financial performance after implementing the 5S work culture, namely in profits which initially suffered a loss of Rp. 354,000,000 now get a profit of Rp. 1,693,000,000. Then the GPM or Gross Profit Margin increased by 13% which was initially only -1%. And the NPM also experienced an increase which was initially 4% and is now 10%. From the sample data on financial performance reports, the average values for the whole of the aspects most affected by the implementation of the 5S work culture are:

**Before total asset:**

$$Asset = \frac{720{,}844{,}116{,}818 + 82{,}370{,}422 + 502{,}129{,}313 - 354{,}000{,}000}{4}$$

$$= 237{,}836{,}138.25$$

**After total asset:**

$$Asset = \frac{876{,}465{,}000{,}000 + 30{,}000{,}000{,}000 + 14{,}070{,}000{,}000 + 1{,}693{,}000{,}000}{4}$$

$$= 230{,}557{,}000{,}000$$

So that the results from the comparison of assets are: 0.00103; it can be concluded that implementing a 5S work culture affects an increase in assets as much as 0.00103 higher than before.

**Before and After Total GPM:**

$$GPM = \frac{30 + 10 + 1 - 1}{4} = 10$$

$$GPM = \frac{35 + 13 + 12 + 13}{4} = 18{,}25$$

The results from the comparison of GPM are: 0.547, so it can be concluded that implementing a 5S work culture affects an increase in GPM as much as 0.547 higher than before. It can be seen from the overall average value of Assets = 0.00103 and the GPM value = 0.547 is higher than before.

## DISCUSSION

The 5S approach is being implemented successfully within the business portfolio unit. The following sections detail the outcomes and discussion of each of the 5Ss implemented in the portfolio work unit:

### Sort Out

While the business portfolio work unit's 5S side, Concise, is progressing well, each workstation initially has a problem; it is still unorganized. Then, there are rarely used objects now crammed onto the table. Existing goods are neither necessary nor superfluous. This change was part of a kaizen effort to reduce additional labor and sort out, which involves looking at the workplace from a new perspective and removing unneeded stuff (Sultana, 2019). By making everything sorted out and organized, it helps to finish job more efficiently and easier to inspect (Subburaman, 2019).

### Set in Order

There are also issues in the business combination work unit's secretariat, as seen by the storage drawers that are still not adequately organized. However, by carefully rearranging the closet, the suggested method has been implemented to make it appear friendly and easy to find items. This improvement allows for the elimination of errors as well as greater speed in selecting the correct tool. The fact that it is now positioned vertically/diagonally makes the job safer and allows for more ergonomic and less tiring (Costa, Ferreira, & Silva, 2018). It also makes the appearance more pleasing and gives an orderly vibe that makes workers more enthusiastic in doing their jobs efficiently (& Reena Pant, 2019).

### Shine/Sweep

The 5S element of the business portfolio work unit is that cleaning is going well; initially, the trash can in the work area is relatively small, to the point where it cannot be filled; nevertheless, the proposed remedy, for now, is to purchase a giant trash can. Large enough to store additional rubbish, so that the area constantly appears clean. Task is established to the maintenance of a clean environment as an ongoing, continuous program. Some time should be set for cleaning each day or each shift (Morey, 2020).

### Standardize

The 5S part of the work unit's business portfolio, namely the maintenance work, proceeded successfully; however, some erroneous wiring configurations in the early stages elevated production safety hazards; however, the system is now well-maintained. Supply cable channels with cable clamps and cable boxes and a well-organized organization, thereby lower the risk of a work-related injury. Standardizing also includes a constant place for things, constant rules of organization, storage and keeping cleanness. It ensures control and consistency and basic cleanliness standards that will be applied throughout the facility. Make sure that everyone knows their responsibilities as well as taking care of them is part of the regular job (Surya & Sundaram, 2021).

### Sustain

The 5S characteristics include being diligent, performing well, not performing under adverse conditions, and being habituated to simplicity, neatness, care, and cleanliness. However, the solutions proposed can be applied by establishing a 5S culture in the workplace. What is visible in the work area is functional and is always kept clean and in good condition. This is also evident in the refreshments on the table, which had previously been deemed unnecessary. Now, create a designated snack area to keep the place looking nice. One of the

benefits from implementing the 5S is that everyone who uses the workshop can voice out, suggest and co-operate with fellow employees. The essence of implementing this in the workplace has shown greater results in a sense that everyone is involved and participated (Khumalo & Gupta, 2019).

## CONCLUSION

The conclusion drawn from the results and discussion is that by offering the appropriate solution based on observed concerns, all components of the 5S that are designed and planned may operate effectively, and all existing problems can be addressed appropriately. The business portfolio units have been standardized around four key industry targets: efficiency, productivity, quality, and safety.

Work efficiency increases due to the existing work environment, work efficiency and effectiveness are well-coordinated and work quality and safety are well-maintained. Then the financial performance which initially decreased due to the weakness of the 5S work culture has now increased drastically due to the 5S work culture which has been successfully strengthened. When adopting the 5S plan, it is envisaged that staff members in the business portfolio units will continue to operate and implement, allowing the 5S plan to positively affect the overall work environment, enhancing productivity, assuming that space is maintained. Maintain a clean and tidy work environment.

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Systematic Review

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# LEADERSHIP STYLE INFLUENCE ON NURSES' BURNOUT: A SYSTEMATIC REVIEW

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**ABSTRACT**

**Introduction:** We intend to evaluate the current literature, published from 2019 to 2022 and study the types of leadership styles and how they affected nurse burnout. **Aims:** the research was to systematically review the influence of leadership style on nurse burnout. **Methods** A systematic literature search was conducted through an electronic search in three databases and was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) with some inclusion criteria compiled by the research objective. **Results** A total of 15 selected articles show that leadership styles affected nurse burnout both directly and indirectly. This systematic review shows that some leadership styles had an influence on increasing nurse burnout, as well as affecting their job satisfaction, psychological distress and their intention to leave. Some other leadership styles also influenced reducing nurse burnout and increasing their work engagement. **Conclusions** Due to the variety of leadership styles studied in the articles, it's hard to draw specific conclusions. However, this systematic review shows most of the articles stated that some specific leadership styles took part in increasing nurse burnout, and some other leadership styles were able to reduce nurse burnout in particular.

**Keywords**: Burnout, Leadership style, Nurse

## INTRODUCTION

A nurse is a person having the closest interaction with people who need healthcare services. Under the Constitution of the Republic of Indonesia on Nursing, a nurse is someone who has graduated from higher education with a major in nursing, both at home and abroad which has been ratified by the Government following the clauses of the Legislation. The profession of nursing places a lot of pressure, both mentally and physically, on a job that requires various expertise and manners. Nursing work environments lead a notable role in promoting work engagement among nurses. Some characteristics of healthy work environments are (a) a high level of trust between employees and management, (b) a communication and collaboration-oriented culture, and (c) a work climate that guarantees employees' physical and emotional safety, and also well-being. Nurses' leadership is seen as an essential part of staff retention, productivity and effectiveness of healthcare organizations (Law of The Republic of Indonesia, 2014).

The leadership style is interpreted as a way of leaders giving influence to their members, so the member will do every command that the leaders ask to achieve the organization's goals. Leadership style is considered a combination of various characteristics, traits, and behaviors used by leaders to interact with their subordinates. Khajeh (2018) also described leadership style as a scheme related to managerial behavior, which is organized to integrate organizational or personal interests and effects to achieve certain goals (Khajeh, 2018).

An increasing number of studies considered leadership as the protective agent to reduce employee burnout in

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behavioral health organizations, also identifying different leadership styles as the cause of decreasing or increasing the likelihood of developing burnout. Prior studies which examined the correlation between employee burnout and leadership style have found that leadership styles are characterized by the leader's ability to actively listen, engaging in clear communication, empathizing with coworkers and employees, adopting compassionate and ethical approaches in problem-solving activity, and showing the desire to accept suggestions are all connected with lower symptoms of burnout (Kelly and Hearld, 2020).

An earlier study conducted at a hospital in Medan showed that leadership styles influenced psychological stress in nurses (Tinambunan and Tampubolon, 2018). The leadership style which creates the lowest psychological stress on nurses was democratic leadership, while the leadership style which brought the highest psychological stress was autocratic leadership (Laschinger and Fida, 2014). That study proves that the leadership style of the head nurse in every unit has a significant influence on the psychological stress among nurses. Moreover, an application of mismatched leadership styles is one of the reasons burnout syndromes developed (Laschinger and Fida, 2014; Amin, Ahmed and Soomro, 2019; Dall'Ora et al., 2020).

The World Health Organization (WHO) defines burnout as a conceptualized syndrome as a result of prolonged workplace-related stress that has not been resolved. Three dimensions of burnout characterizations are emotional exhaustion, depersonalization and personal accomplishment. Burnout refers to a phenomenon in occupational terms only and does not apply to portraying experiences in other aspects of life (World Health Organization, 2019).

A previous study by Ramdan and Fadly (2017) proved that Indonesian nurses at a hospital experienced burnout as many as 56% and a positive correlation between leadership and burnout incidence was found (Ramdan and Fadly, 2017). In addition, research by Andarini et al. (2018) at a hospital in East Java showed that organizational and work environment factors were strongly related to burnout syndrome and nurse performance (Andarini, Supriyanto and Kusumaningrum, 2018).

Based on an in-depth interview by the head of the emergency room in one of the hospitals in East Java, Indonesian nurses have general work shifts divided into three shifts. The first and the second shift is seven hours of work and the third shift is 10 hours of work. From the head of the emergency room's perspective, the signs of a nurse who has experienced physical and emotional fatigue would show unfriendly behavior, sensitivity, struggle to concentrate and missed communication.

There have been some earlier studies demonstrating the association between leadership style and burnout, but it is not been classified which kind of style is supposed to be applied in the healthcare services setting. The purpose of this study is to identify research that has examined theorized relationships between leadership and burnout, to determine which style increases and lessens burnout among nurses. In the future, this research can assist in the implementation of leadership manner in a hospital setting.

## METHODS

The method and protocol of this research was a systematic literature review directed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Database searches were carried out through several sources including Science Direct, Clinical Key Nursing and Wiley Online Library. Keywords searched were ("Burnout" AND "Nurse" AND "Leadership Style"). The inclusion criteria in this study were: 1) an article that has scope about stress, burnout, leadership style

and organizational environment; 2) an article was published in years range 2019 – 2022; 3) a full-text article; 4) an English written article; and 5) the respondent of the article was a nurse. This research was ethically approved by The Committee of Health Research Ethics from The Faculty of Public Health Universitas Airlangga No. 13/EA/KEPK/2021.

### Search strategy

A structured search strategy was developed in January-February 2022 using keywords related to leadership styles, burnout, and nurse. The final keywords used in the electronic searches were "Burnout" AND "Nurse" AND "Leadership Style." The initial literature search was conducted in March 2022, with a supplementary search in April 2022. Data sources were: Science Direct, Clinical Key Nursing, and Wiley Online Library.

### Selection of the Study

The results from the previous step were collected and put into a database to facilitate the author in screening the titles and abstracts to identify qualified articles. Qualified articles were then screened again to remove found duplicates, followed by reviewing the remaining qualified articles to ensure that those articles reached the inclusion criteria. Some of the research's titles and abstracts have been excluded since the aim of the study is convergence with examining the correlation between leadership style and burnout among nurses.

### Data extraction

The next step was to collect some data from the qualified articles to be presented in the study results, which include: authors and publication year, research objectives, data collection instrument, research method and results. Extracted data were shown descriptively with no analyses presented. Data were extracted from 15 articles that met the inclusion criteria.

## RESULT

### Study selection

Based on data searched and reviewed using keywords and the inclusion criteria, as many as *N* = 300 potential articles were obtained from three databases: Science Direct (*N* = 90), Clinical Key Nursing (*N* = 115), and Wiley Online Library (*N* = 95). After removing duplicates of 32 articles (*N* = 268), eliminating 238 articles of screening titles and abstracts (*N* = 30) and excluding 15 articles after applying inclusion criteria, a total of 15 articles met the inclusion criteria and remained in the researcher dataset. The PRISMA graphic can be seen below.

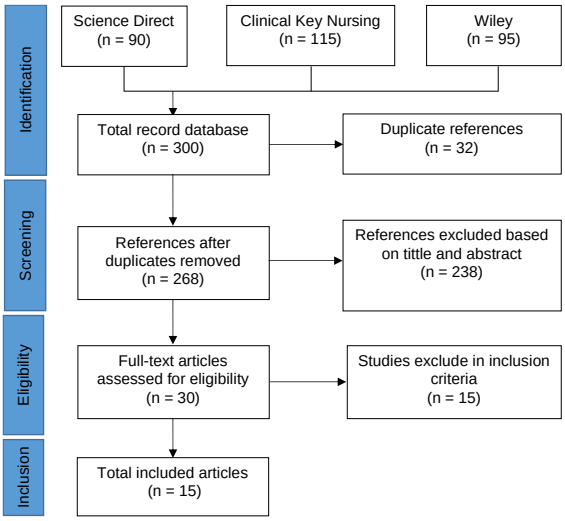


**Figure 1.** Flow diagram of systematic literature review

### Results and characteristics of the studies

Results of the leadership styles on nurse burnout in the obtained articles were diverse. Some leadership styles mentioned in the selected articles were: Authentic Leadership, Transformational Leadership. Abusive Leadership, Laissez-Faire Leadership, Ethical Leadership, Servant Leadership, Exploitative Leadership, Executive Leadership, and Despotic Leadership. Those leadership styles were reported to have an impact on nurses' burnout. Among the selected studies, 10 of the articles used the cross-sectional survey as their method to obtain data. In addition,

two articles were a systematic literature review, and the rest were a quality improvement project, a quantitative and casual study and a convergent mixed-method study. The instruments used to obtain data in the selected articles were also varied. The most used instruments in the selected articles were the Multi-Factor Leadership Questionnaire and Maslach Burnout Inventory Scales. As many as three articles used Multi-Factor Leadership Questionnaire to obtain data related to leadership style, also as many as six articles used Maslach Burnout Inventory Scales for measuring burnout. The summary of the article's results on leadership style on nurse burnout can be seen in Table 1.

**Table 1.** Summary of article's result of leadership style on nurses' burnout

| References | Aims | Instruments | Methods | Results |
|---|---|---|---|---|
| (Wei *et al.*, 2020) | Evaluate the impact of nurse leadership styles on nurse burnout based on current literature | CINAHL, PubMed, PsycINFO, and Google Scholar. | PRISMA | The major leadership styles that have an important role in reducing nurse burnout including authentic and transformational leadership. |
| (Gemeda and Lee, 2020) | Examine the relationship of leadership styles, work engagement and outcomes | Multi-Factor Leadership Questionnaire (MLQ- 5X) and the Utrecht Work Engagement Scale-9 | Cross-sectional research through online survey | Work engagement which has contrast to three dimensions of burnout mediated that leadership styles and indicators of outcomes. |
| (Lyu et al., 2019) | Specify psychological empowerment as a mediating effect between abusive supervision and turnover intention | Psychological empowerment scale, abusive supervision scale, and turnover intention scale | Cross-sectional study | Abusive leadership style has limited psychological empowerment that increases nurses' occupational burnout. |
| (Ángeles López-Cabarcos, López-Carballeira and Ferro-Soto, 2021) | Analyze the mediating role of emotional exhaustion between job attitudes and leadership | Maslach Burnout Inventory and Multi-Factor Leadership Questionnaire | Cross-sectional paper questionnaire | Emotional exhaustion as the mediator of the relationships between intrinsic satisfaction and laissez- faire leadership. |
| (Niinihuhta and Häggman-Laitila, 2022) | Summarize the current research about relationship of nurse leadership style and well-being | CINAHL, Scopus, PubMed and Medic databases | PRISMA | Leadership styles mediated by trust in leaders, emotional exhaustion, affectivity, job satisfaction and motivation. |
| (Wu et al., 2020) | Examine the impact of leadership on perceived emotional exhaustion and intention to leave | Multifactor Leadership Questionnaire (MLQ) and Maslach Burnout Inventory | Cross-sectional questionnaire study | Perceived positive spirituality reinforces transformational leadership to reduce emotional exhaustion. |

| References | Aims | Instruments | Methods | Results |
|---|---|---|---|---|
| (McKenna and Jeske, 2021) | Investigate the emotional exhaustion, work engagement and turnover intention by exploring effect of leadership | Ethical Leadership Scale, the LQWLQ-N scale, the Utrecht Work Engagement Scale-9, Maslach Burnout Inventory and Turnover Intention scale | Cross-sectional study | There were indirect but significant effects of ethical leadership on emotional exhaustion as well as work engagement and turnover intention. |
| (King, Gontarz and Wei, 2020) | Describes the implementation of leadership strategies to reduce absenteeism | The Plan, Do, Study, Act (PDSA) cycle | Quality Improvement Project | The QI project illustrates strategies for nurse leaders to attempt implementing to increase employee engagement and reduce burnout. Authentic leadership style is the most effective for engaging staff according to Maslow's Hierarchy. |
| (Ma et al., 2021) | Examine the role of leadership in nurses' burnout during Covid-19 pandemic | Maslach Burnout Inventory and the Global Servant Leadership | Cross-sectional quantitative research | The servant leadership style has a direct effect on nurses' burnout and is consistent with a number of empirical studies on employee well-being. |
| (Zappalà and Toscano, 2020) | Assess the leadership to job satisfaction, work engagement, cynicism and organizational climate | Ethical Leadership Scale, Service Climate Scale (ISCS), Job Satisfaction Scale, Leader-Member Exchange (LMX), Maslach Burnout Inventory | Cross-sectional study | The ethical leadership scale loads on a single factor, negatively related to cynicism as part dimension of burnout. |
| (Majeed and Fatima, 2020) | Evaluation the impact of leadership on nurses' stress and moderate role of leadership to negative affectivity | Exploitative Leadership, Negative Affectivity, Psychological Distress and Psychological Detachment from Work | Quantitative and casual | The result showed that exploitative leadership is related in significant number to negative affectivity and psychological distress. |

| References | Aims | Instruments | Methods | Results |
|---|---|---|---|---|
| (Peter *et al.*, 2020) | Determine the stress at work among health professionals | STRAIN questionnaire, Copenhagen Psychosocial Questionnaire (COPSOQ), Sixth European Working Conditions Survey—EWCS, the Work Ability Index | Cross-sectional | Nurses who work without management responsibilities being reported to have reduced score of job satisfaction, increased the intention to leave and increased burnout symptoms. |
| (Ness et al., 2021) | Understand the stressor of nurse during Covid-19 pandemic | The Professional Quality of Life (ProQOL), Measure of Moral Distress for Healthcare Professionals (MMD-HP) and an interview | Convergent mixed-methods | Executive leadership leads a proactive role in understanding the nurse's QOL and moral distress as a beginning of burnout symptoms. |
| (Lee, Chiang and Kuo, 2019) | Explore the effect of burnout between leadership and intention to leave on nurse | The Authentic Leadership Questionnaire (ALQ), The Practice Environment Scale of the Nursing Work Index (PES-NWI), and Maslach Burnout Inventory | Cross-sectional | Emotional exhaustion acted as a mediator on the intent to leave for nurses and authentic leadership's correlation. |
| (Dahri et al., 2018) | Evaluate the effect of leadership and occupational stress on job satisfaction through burnout among nurse | Multi-Culture Leader Behavior Questionnaire, Perceived Stress Scale (PSS), Burnout Measure Short (BMS) and Generic Job Satisfaction Scale | Cross-sectional | The statistical result showed there was a direct relationship with significant number between despotic leadership and burnout. |

There were varied leadership styles that were discussed in the selected articles seen in Table 1. Of all the leadership styles that have been identified based on research findings, we can classify the articles into three categories based on the impact of the leadership styles mentioned in the article on nurse burnout. The categories include leadership style that "reduces burnout," the leadership style that "increases burnout," and unclassified articles. The classification can be seen in Figure 2. Based on Figure 2, we can conclude that most of the articles were discussing a leadership style that reduced burnout as many as seven articles. Six other articles mentioned a leadership style that increased burnout in nurses and the other two articles were unclassified since they were discussing an unspecific leadership style or leadership style in general. Thus, we categorized it as "unclassified,"

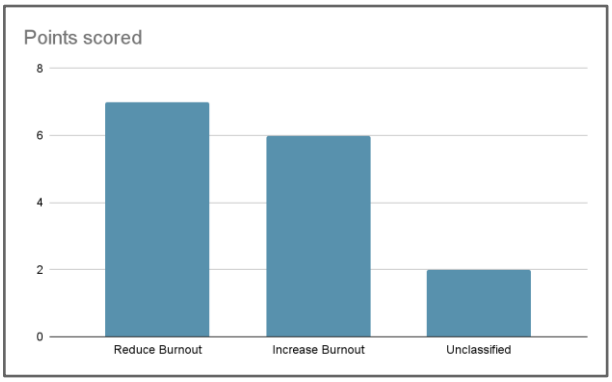


**Figure 2.** Classification of Leadership Styles' impact on Nurse Burnout

## DISCUSSION

### Burnout

Maslach and Leiter (2016) described burnout as a work-related heavy stress response. Characterization of burnout according to Maslach is the sense of being mentally drained and a lack of emotional resources — Emotional Exhaustion; negative and secluded response to surroundings and loss of idealism — Depersonalization; and a feeling of incompetence and underperforming at work — reduced personal accomplishment. Maslach was also the one who constructed a scale, the Maslach Burnout Inventory (MBI), which is a burnout measurement instrument that is mostly used by researchers globally (Dall'Ora et al., 2020).

Maslach theorized that burnout is a condition which appears as a result of a chronic unmet need between an employee and the six dimensions of work which are: 1) Workload: extreme number of demands and workload so that recovery is unachievable; 2) Control: employees' absence of control over the resources needed to accomplish their job; 3) Reward: lack of substantial reward for the job done. Rewards can be social, financial, and intrinsic; 4) Community: employees do not receive a feeling of healthy connections among their fellow workers and leaders, this leads to dropping scores of social support and increasing frustration; 5) Fairness: a person perceiving unfair treatment at the workplace, such as inequity in workload and salary; 6) Values: the feeling of oppressed and obliged to serve against their values or when they are facing a contravention amongst the organization's values (Maslach and Leiter, 2016). The three dimensions of burnout according to Maslach and Leiter (2016) were extreme exhaustion, cynicism and job unattachment, feelings of lacking accomplishment and ineffective working routines. The importance of this three-dimensional model is that it places the experience of individual stress within a social context involving the person's conception of both self and others. (Kelly and Hearld, 2020). This research also stated that an increasing number of researchers have reported leadership as a protective role on employee burnout in behavioral health organizations, also identifying different leadership styles as the cause of decreasing or increasing the likelihood of burnout development.

### Leadership Style on Nurse Burnout

The purpose of this study was to systematically review the existing literature and to present an overview of the leadership styles that affect burnout in nurses. Based on data searches using keywords and criteria in the databases above, 15 relevant journal articles were obtained and reviewed. The review process found that reports on nurse burnout are discovered and also being studied globally, and leadership style is one of the causes that play an important role in reducing or even increasing the experience of burnout in nurses.

Almost half of the studies reported that some leadership styles took part in increasing psychological distress, intention to leave and symptoms of burnout in nurses, as well as reducing their job satisfaction. The type of leadership styles namely Abusive Leadership, Laissez-Faire Leadership, Exploitative Leadership,

Executive Leadership, and Despotic Leadership. The hospital environment controlled bad leadership behaviors by encouraging nurses' interpersonal skills under that type of leadership, which adopted zero-tolerance standards for poor leadership behavior (Lyu et al., 2019; Majeed and Fatima, 2020).

Apart from increasing burnout in nurses, more than half of the studies reported that some leadership styles also influenced reducing nurse burnout. Namely Transformational Leadership, Authentic Leadership, Servant Leadership, and Ethical Leadership. Further, we decided to focus on these four leadership styles that influenced reducing nurse burnout, since they could be more useful and practicable in the scope of healthcare workers, especially nurses and other further management studies specifically on leadership. To support nurses' professional development and physical and mental health, nurse leaders must practice the style of leadership that cultivates and maintains a healthy work environment. When creating a healthy workplace, nurse leaders give nurses access to resources, opportunities, organizational support, and a respectful, cooperative work environment (Laschinger and Read, 2016; Lewis and Cunningham, 2016; Boamah, Read and Laschinger, 2017).

## Transformational Leadership

Transformational leadership is interpreted as a method where leaders appreciate their followers' values, praise innovative ideas, and inspire and encourage them, which results in the development and transformation of the followers. (Khan et al., 2020). Thus, transformational leadership requires a competent and innovative leader as it's the most significant agent to shape employees' interests and trust. Transformational leaders influence their subordinates to go exceed expectations by adjusting employee values with the organization's values and motivating them to go beyond self-interest (Bosak et al., 2021). Despite the strong emphasis on this constructive leadership style in the literature (Bosak et al., 2021). Transformational leadership has been steadily related to various work outcomes in the clinical setting of healthcare workers, especially nurses, such as innovative work behavior, increased nurse satisfaction, reduced burnout, increased psychological engagement, organizational commitment, employee well-being and compliance to be committed to the organization (Boamah, 2022).

## Authentic Leadership

Authentic leadership has consistently been equated with patient-care values and humanitarianism which are at the core of nursing in general (Nelson et al., 2014). Related to that, authentic leadership can be used as a tool against the "cold" bureaucracies, restructuration and organizational pressures by implanting a positive climate that could make everyone feels trusted, respected, and appreciated for their contribution (Nelson et al., 2014). Authentic leadership is an emerging model of leadership originating as a substantial part of Positive Organizational Psychology that has been showing promising results, especially in fostering employee health and well-being by creating positive work environments (Laschinger and Fida, 2014). Laschinger and Fida's (2014) study resulted in a model suggesting that personal and organizational resources may represent protecting newly graduated nurses from developing symptoms of burnout. The findings also proposed that both work-directed interventions may help prevent early burnout in nurses' careers.

## Servant Leadership

Greenleaf described servant leadership as a unique style that opened a new portal in the wave of research, specifically on managerial leadership humanities. The centre of the topic which once was leader-oriented then shifted to focus on the subordinates, which then

headed to a leadership scheme where the leader is serving their subordinates while at the same time building consensus, listening to the subs, and supplying future outlook (Saleem et al., 2020). Servant leadership was described as an arising leadership style where leaders' focus is shifted on subordinates' development and individual growth, by attempting an ethical way to serve them. The author emphasized that the servant leader is "primus inter pares" or "first among equals", which means that the leader's highest priority in the group is to serve others to fulfil others' needs, rather than fulfilling the leader's personal needs (Canavesi and Minelli, 2021). Servant leadership was also described as, "Enabling and encouraging people who are under the influence of the leader instead of using power and position to get served" (Amin, Ahmed and Soomro, 2019). One of the hallmarks of servant leadership was that servant leaders would always search for higher fields of operation, and the eagerness to cater for their followers instead of being served by them is their primary encouragement in leadership. The two dimensions ("serve" and "lead") in servant leadership are important for organizational prosperity (Saleem et al., 2020).

### Ethical Leadership

Ethical leadership is defined as the demonstration of appropriate behavior, with prevailing norms, through concrete actions and relationships between leaders and followers. Leaders with ethical leadership tend to promote ethical behavior in their followers through a two-way communication (Rantika and Yustina, 2017). Ethical leadership is proved to positively affect organizational citizenship behaviors, organizational commitment, employee job satisfaction, and business performance. When ethical leadership directly affects the positive organizational attitude and behavior in question, it also affects negative attitudes such as job stress, dissatisfaction at work, and burnout (Genç, 2020). Similar to authentic leadership, the leader holds the biggest key to determining the success of ethical leadership application on their followers. Therefore, it takes a leader who can embrace and empower. Ethical leaders must be oriented toward subordinates such as: giving enough individual attention, listening to them, encouraging them to express opinions, proposals, and new ideas and welcoming employee initiatives, openly sharing information with them and having high moral values. with trust, reliability, consistency, honesty, responsibility, justice, motivation, and integrity. Consequently, this leads to positive evaluations of ethical leaders. Thus, the more the ethical leader's leadership style is disclosed, the better the employee evaluates his or her superiors. As a result, the possibility of burnout is reduced (Morkeviciute and Endriulaitiene, 2016).

## CONCLUSIONS

Systematic reviews are commonly used to evaluate and summarize existing individual studies of relevant evidence-based knowledge in the field of interest. In this study, we found that there are a variety of leadership styles applied in healthcare management, and the entirety of those leadership styles had an influence on the outcome of nurse burnout. Those influences can differ as negative influences and positive influences, which will increase nurse burnout, and vice versa. We decided to highlight the leadership styles that positively influence nurse burnout since we believe those will be very useful in future studies. A systematic approach to collecting evidence on leadership styles' influence on nurse burnout would greatly improve our knowledge in this area of study.

The limitation of this present review was the variety of the leadership styles identified, so the author can only elaborate on some of the leadership styles considered relevant. In addition, another shortcoming was in the process of reviewing titles and abstracts which were carried out personally by the author, so there was the possibility of

creating a subjective bias both in the formulation of inclusion criteria and in the selection of articles.

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Systematic Review

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# THE EFFECT OF LOW-FIBER DIETS ON COLORECTAL CANCER INCIDENCE IN SOUTHEAST AND EAST ASIA: SYSTEMATIC REVIEW AND META-ANALYSIS

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**ABSTRACT**

**Introduction :** Colorectal cancer is a malignant tumor that grows in the colon tissue. In the Asian region, in 2018, cases and deaths from colorectal cancer are highest in East Asia (there were 736,573 cases and 325,128 of them died) and Southeast Asia (there were 95,223 cases and 52,475 of them died). **Aims:** Several studies have been conducted regarding the effect of a low-fiber diet and an increased risk of colorectal cancer, but it still shows mixed results. **Methods:** This study is an unobstrutive study with a systematic review and meta-analysis method. Data sources came from 14 primary studies with a case-control study design that met the inclusion criteria. Data analysis was performed using CMA software trial version 3.0 with a confidence level of $\alpha = 5\%$. Research with low-fiber diet variables shows heterogeneous variations in results so that the chosen model is random effect model. **Result:** The analysis states that there was a significant relationship between a low-fiber diet (CI: 0.421–0.867) and an increased risk of colorectal cancer due to the role of soluble and insoluble fiber. Lack of intake of soluble fiber can decrease insulin action and blood sugar control or the production of short-chain fatty acids, whereas insufficient intake of insoluble fiber can increase the potential for interactions between mutagens and colonic mucosa. **Conclusion:** The results of the study are expected to be an input for a proper diet so that there is no increase in cases of colorectal cancer.

**Keywords**: colorectal cancer, low-fiber diet, meta-analysis, systematic review

## INTRODUCTION

Globally, cancer is the second leading cause of death after cardiovascular disease (Ministry of Health Republic of Indonesia, 2015). In recent years, cancer has become a chronic disease that has a high incidence. In 2012, new cases of cancer reached 18.1 million and 8.2 million of them died. Then in 2018, cancer deaths increased to 9.6 million (World Health Organization, 2018). Basic Health Research (Riskesdas) in 2018, shows that the prevalence of cancer / tumors is 1.8 per 1000 population. This prevalence increased from the 2013 Riskesdas data, which amounted to 1.4 per 1000 population, or around 347,792 people (Ministry of Health Republic of Indonesia, 2018). By 2030, the incidence of cancer is estimated to reach 21.7 million people and 13 million of them will die. Cancer will increase in incidence in poor and developing countries (American Cancer Society, 2014).

The World Health Organization (2020) states that in 2018 there were 348,809 cancer cases in Indonesia, with 207,210 of them dying. There are three types of cancer with the highest incidence in Indonesia for all genders, namely breast cancer, cervical cancer and colorectal cancer. In the Asian region, cases and deaths due to colorectal cancer in 2018, mostly occurred in East Asia (there were 736,573 cases and 325,128 of them died), then Southeast Asia (there were 95,223 cases and 52,475 of them died), and then Central Asia - South and West Asia (World Health Organization, 2018).

Colorectal cancer is a malignancy of the colon tissue, which consists of the colon and / or rectum (American Cancer Society, 2014). Dietary history is one of the factors that can increase the risk of this

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type of cancer (Rahmadania et al., 2016). Diet habits with a low fiber consumption pattern are thought to increase the risk of colorectal cancer (Chen et al., 2015). Research by Afrah and Makhmudi (2013) states that the daily fiber intake of the Indonesian population is still low, which is around 10.5 g / day.

Indonesian Cancer Foundation (2017) states that the main problem in cancer prevention is a lack of knowledge about cancer in the community and a lack of public awareness in implementing healthy living behaviors to reduce cancer risk and early detection of cancer. As a result, most cancers are found at an advanced stage and are difficult to treat, thus placing a huge burden on cancer patients and their families.

Research on the causes and risk factors for colorectal cancer related to diet showed different results between each study. However, there are also those showing the same research results. For example, 7 out of 14 studies stated that low fiber intake was a risk factor of colorectal cancer, while the rest showed insignificant results. The difference in the results from various studies regarding risk factors for colorectal cancer related to diet can cause problems, especially in constructing a theory of risk factors for colorectal cancer or making the results of these studies as a basis for decision-making to intervene. Therefore, we need a literature review study that uses a method to summarize several studies with similar discussion topics, so as to produce conclusions.

This study aims to apply a meta-analysis method with an effect size odds ratio in primary studies regarding the effect of a low-fiber diet on an increased risk of colorectal cancer in Southeast and East Asia, so that accurate conclusions can be obtained.

## METHODS

This study used a meta-analysis based on research articles on how fiber consumption can as a protective factor in the increased risk of colorectal cancer in Southeast and East Asia region, which was published in 2001 to 2020 in the online publication database of scientific articles PubMed and Google Scholar.

Articles are selected based on inclusion criteria, that is using a case-control study, articles accessible to full-paper, and topics discussed regarding a low-fiber diet that can increase the risk of colorectal cancer. In addition, a critical appraisal is carried out on each article by following the framework of PRISMA (the Preferred Reporting Items for Systematic Review and Meta-Analysis) as shown in Figure 1.

Identification of the articles found was carried out by reviewing the article titles and abstracts, then conducting a full-paper review. Articles are excluded from the analysis if: (a) the subject is irrelevant, (b) is not a case-control study, (c) the information provided in the study results is insufficient for data extraction, (d) the consumption pattern is not a low-fiber diet.

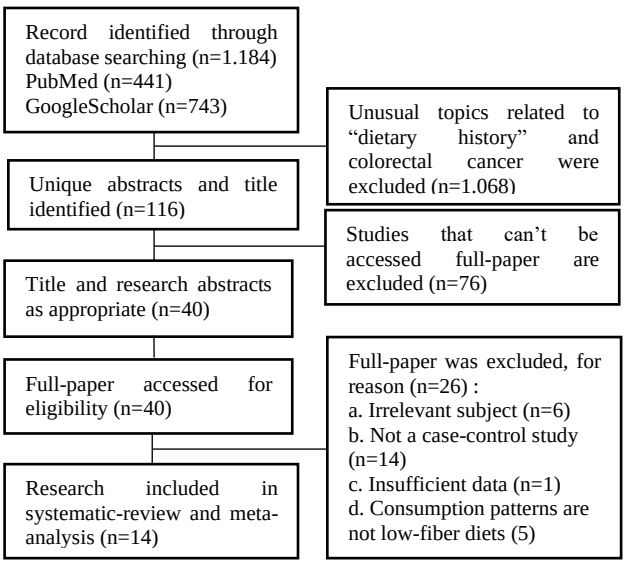


**Figure 1**. PRISMA flow chart

Random-effect model or fixed-effect model was used to calculate the combined of risk ratio. Data were analyzed using the CMA 3.0 software and presented in the form of a forest plot.. This research has passed the Ethics Commission Faculty

of Public Health, Universitas Airlangga No. 93/EA/KEPK/2020.

## RESULT

This study found 14 primary studies with case-control study design that were relevant for meta-analysis (Table 1). The results of a meta-analysis are presented in Figure 2. It shows that there was a significant relationship between a low-fiber diet and an increased risk of developing colorectal cancer (OR = 0.605 [95% CI 0.421 - 0.876]).

**Table 1.** A Systematic Review of the Effect of Fiber Consumption on the Risk of Colorectal Cancer in Southeast Asia and East Asia

| Author, Year | Region | Number of Samples | Type of Fiber | Fiber Intake | Effect Size OR (95% CI) |
|---|---|---|---|---|---|
| Swari et al. (2019) | Denpasar-Bali, Indonesia | Case : 52<br>Control : 52 | Total fiber | <21 g/day | 6.750 (2.852-15.973) |
| Hapsari and Murbawani (2016) | Semarang, Indonesia | Case : 18<br>Control : 18 | Total fiber | <25 g/day | 0.153 (0.016-1.468) |
| Ramadas and Kandiah (2010) | Kuala Lumpur, Malaysia | Case : 59<br>Control : 59 | Total fiber | 3.93 vs 7.07 g/ day | 0.140 (0.049-0.396) |
| Sriamporn et al. (2007) | Khon Kaen, Thailand | Case : 253<br>Control : 253 | Fiber from vegetable/fruit | 198-528 portion/year | 1.000 (0.707-1.414) |
| Song et al. (2015) | Qingdao, Tiongkok | Case : 265<br>Control : 252 | Total fiber | 20.52 g/day | 0.440 (0.268-0.723) |
| Uchida et al. (2010) | Fukuoka, Jepang | Case : 816<br>Control : 815 | Total fiber | 13.7 vs 13.7 g/day | 0.870 (0.579-1.307) |
| Zhong et al. (2014) | Guangdong, China | Case : 613<br>Control : 613 | Total fiber | 9.2 vs 10.5 g/day | 0.380 (0.266-0.542) |
| Wang et al. (2018) | Shandong, China | Case : 317<br>Control : 317 | Total fiber | High/low | 0.350 (0.285-0.429) |
| Chun et al. (2015) | Korea | Case : 150<br>Control : 116 | Total fiber | 38 vs 49 g/day | 0.220 (0.,083-0.582) |
| Thohir (2019) | Padang, Indonesia | Case : 34<br>Control : 34 | Fiber from vegetable | <4x/week | 0.218 (0.068-0.700) |
| Ngelangel et al. (2009) | Filiphina | Case : 283<br>Control : 283 | Fiber from vegetable | <1x/week | 0.860 (0.493-1.500) |
| Kim et al. (2003) | Korea | Case : 125<br>Control : 247 | Fiber from vegetable | High/low | 0.800 (0.493-1.308) |
| Poomphakwaen et al. (2014) | Thailand | Case : 230<br>Control : 230 | Fiber from vegetable/fruit | High/low | 0.940 (0.623-1.418) |
| Wakai et al. (2006) | Nagoya, Jepang | Case : 507<br>Control:2.535 | Fiber from fruit | High/low | 0.730 (0.501-1.063) |

In the quantitative abstraction selection stage, 14 abstraction values were obtained which were sorted through systematic review. Based on the results of the heterogeneity test, the model selection used was the random effect model. This model is used if the heterogeneity test results show the effect size data is heterogeneous.

In addition, it is known that the p-value is 0.006 (p-value <α 5%), which means that the low-fiber diet variable is a factor that can increase colorectal cancer. The p-value combination value is influenced by the p-value of each study. Of the 14 primary studies, it is known that only seven studies showed a p-value <0.05. The summary effect that shows that a low-fiber diet as a factor that can increase of colorectal cancer is found in studies by Ramadas and Kandiah (2010), Zhong et al. (2014), Chun et al. (2015), Song et al. (2015),Wang et al. (2018), Swari et al. (2019) and Thohir (2019). While different results are shown by research conducted by Kim et al. (2003), Wakai et al. (2006), Sriamporn et al. (2007), Ngelangel et al. (2009), Uchida et al. (2010), Poomphakwaen et al. (2014) and Hapsari and Murbawani (2016), .

The summary effect is depicted on the forest plot with the diamond symbol (♦). In the diamond figure, it can be seen that the confidence interval lines of the combined 14 primary studies are narrower than for each primary study indicated by the lines that pass through each primary study square. The narrow confidence interval line on the summary effect indicates that the results of combining 14 primary studies are more accurate than the results of each study.

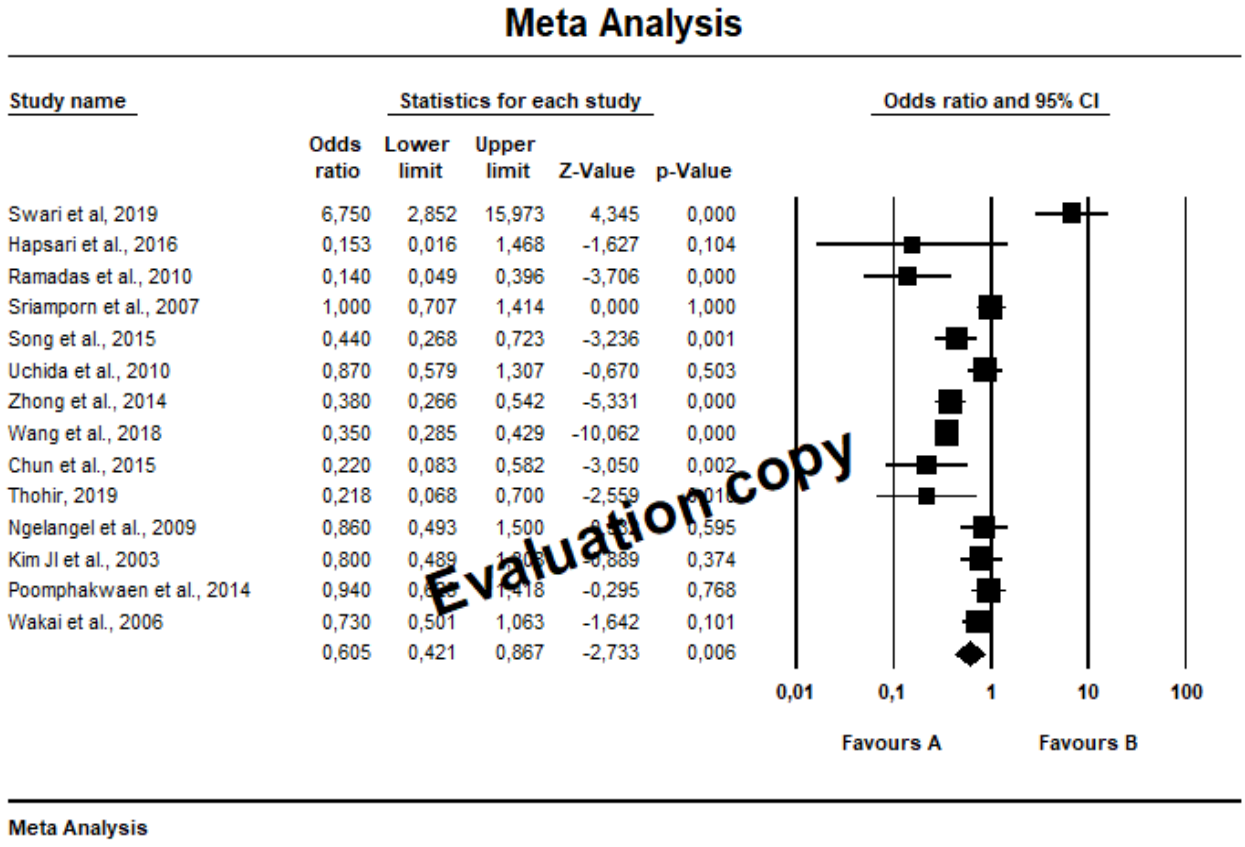



**Figure 2.** The Forest Plot Meta-Analysis on Low-Fiber Diet Research

## DISCUSSION

Colorectal cancer is a malignant tumor that appears in the epithelial tissue of the colon/rectum (Wijaya and Putri, 2013). In 1990, Fearon-Vogelstein introduced the colorectal carcinoma carcinogenesis pathway, called the

adenoma-carcinoma sequence pathway. This pathway begins with the presence of atypical cells, then progresses to mild dysplasia, adenoma hard dysplasia and finally colorectal cancer. In this pathway, APC (adenomatous polyposis coli) mutations occur (Sheridan et al., 2006; Spring et al., 2006 Freeman, 2008). Then in 2003, a new carcinogenesis pathway was discovered by Longacre and Fenoglio-Preiser, called serrated pathways. This pathway is preceded by the presence of a KRAS (Kirsten rat sarcoma viral oncogene homolog) or BRAF (B-Rapidly Accelerated Fibrosarcoma) mutation, with the presence of ACF (Aberrant Crypt Foci) morphological picture. Furthermore, developing into hyperplastic polyps, forming serrated adenoma (SA) and colorectal carcinoma. In the process of carcinogenesis, there is an increase in the number of epithelial cells and decrease in the number of apoptosis, which will then provide a picture of serrated and dysmaturation crypt (Goldstein, 2005; Aust and Barreton, 2010).

Carcinoma is a malignant disease that has multifactorial causes. One of them is the mutation of protooncogens into oncogens (mutant genes). The result of the mutant gene is an oncoprotein, namely Rapidly Accelerated Fibrosarcoma (RAF) (Ziai and Hui, 2012). This gene plays a role in MAPK (Mitogen-Activated Protein Kinase) pathway. In this pathway, RAF has an important role in the processes of cell cycle, starting from proliferation, differentiation, survival to apoptosis (Kolch, 2000; Ducreux et al., 2019). The RAF protein kinase is divided into three, namely A-RAF, B-RAF and C-RAF. Among the three, B-RAF is the gene with the most potential to cause cell proliferation activity (Rahman et al., 2013). Mutations in the B-RAF protein will cause disruption of hydrophobic interactions, which causes the protein to continue to be active and increase the activity of the B-RAF kinase up to 500 times (Ziai and Hui, 2012; Rahman et al., 2013). This occurs because of an obstacle in the process of defosphorylation of GTP to GDP so that the MEK signal pathway on regulation and cell growth continues to be active (Rahman et al., 2013).

In the serrated pathway, it shows impaired Mismatch Repair (MMR), and influences the presence of DNA methylation in the promoter region containing nucleotides (cytosine and guanine) in several tumor suppressor genes. This methylation area is called the CIMP (CpG Island Methylator Phenotype). Disruption in this pathway can lead to genetic instability and eventually tumor formation (Yachida et al., 2009). Several studies suggest that the serrated pathway can develop into colorectal cancer faster than the adenoma-carcinoma sequence (Torlakovic et al., 2008; Aust and Barreton, 2010), which is about eight months (Higuchi and Jass, 2004).

The occurrence of colorectal cancer can be caused by irreversible factors, such as age> 50 years (Mustofa and Kurniawaty, 2013), genetics (Abdullah et al., 2012), history of diabetes mellitus (Yudhani, 2016), ulcerative colitis (Bresalier, 2003), and a history of Chron's disease *(*Thia et al., 2010). In addition, colorectal cancer can also be caused by factors that can actually be changed, such as obesity (Afrah and Makhmudi, 2013), excessive alcohol consumption (Rahdi and Wibowo, 2015), smoking habits (Mustofa and Kurniawaty, 2013), low physical activity (Slattery, 2014), and a history of poor eating habits (Rahmadania et al., 2016).

Dietary history is a detailed retrospective method of dietary assessment to describe foods and / or drinks commonly consumed over a long time period (e.g. 1 month, 6 months, or 1 year). To get quality assessment results, experienced and skilled interviewers are needed (Fegundez et al., 2015). The study design selection in this study is in line with the objective of a case control study, namely to identify risk factors that can cause colorectal cancer.

The high incidence of colorectal cancer in Asia is often associated with poor dietary patterns (Azeem et al., 2015). The influence of the Westernized diet, which generally uses more red meat and processed meat, is low in vegetables and fruit, contributes to an increase in colorectal cases (Yee et al., 2009). The existing Westernized diet in Asia, both in terms of quantity, variety and cooking methods, differing substantially from the Westernized diet in Western countries. This may lead to differences in the body's response to the Asian population to these food components compared to residents of Western countries (Ozaslan et al, 2015).

Dietary fiber is known to be an important component in preventing several diseases. Several studies suggest that a high-fiber diet has a negative relationship with colorectal cancer. Winaktu (2011) states that fiber has different roles in the upper and lower digestive tract which can prevent the developing of colorectal cancer. In the upper digestive tract, fiber has the ability to bind cations by forming cationic bridges. The binding by these fibers is an adsorption mechanism for bile salts, fatty acids and minerals which are carcinogenic. Whereas in the lower digestive tract, fiber serves to provide a substrate for the fermentation process of the intestinal microflora and speed up transit time.

Dietary fiber can be classified based on its solubility, namely fiber that is soluble in water and fiber that is not soluble in water. Fiber components classified as insoluble fiber are cellulose (vegetables), hemicellulose (cereals), and lignin (woody plants). While the fiber components classified as soluble fiber are pectin (fruits, vegetables, beans, potatoes) and gums (nuts, extra seaweed seeds, xanthan).

High soluble fiber intake is known to prevent developing of colorectal cancer. This is attributed to the influence of soluble fiber on insulin and glucose control or short chain fatty acid production. This soluble fiber can slow down the process of glucose absorption from the small intestine, which can reduce hyperinsulinemia (Giacco and Parillo, 2000). Insulin is a growth factor that has a role in cell proliferation and apoptosis, and there is an increased risk of developing colorectal cancer if you have high insulin levels and poor glucose control (Saydah et al., 2003). Soluble fiber can also be converted into short chain fatty acids by bacteria (Sengupta and Tjandra, 2001). In vitro studies have shown that short chain fatty acids (SCFA) are able to inhibit growth and induce differentiation of cancer cells (Gamet et al., 1992).

High consumption of insoluble fiber is known to decrease the developing of colorectal cancer. This is because insoluble fiber can increase the amount of feces, reduce intestinal transit time, and dilute fecal carcinogens, thereby reducing the potential for interactions between mutagens in feces and colonic mucosa (Lipkin et al., 1999).

Based on the image of the forest plot using the random effect model in primary research with a low fiber diet variable (Figure 2), it shows that the square size that interprets the weight of each primary study in producing the summary effect has a different size. The largest square size is owned by a study initiated by Wang et al. (2018), which is 9.22. This shows that the research of Wang et al. (2018) made the largest contribution to

determining the effect size of 14 primary studies with a low-fiber diet variable.

Research by Wang et al. (2018) was conducted in Shandong province, China involving 317 cases and 317 control groups. The case group had similar characteristics based on age and sex and were diagnosed by two gastrointestinal pathologists, while the control group was a healthy population living in the same area as the case group for more than five years. Data collection was carried out by trained interviewers and applied quality control in data collection so that the data obtained were accurate. Wang et al. (2018) also mentioned that people in Shandong province have the habit of consuming foods high in fat and foods that are processed at high temperatures, such as fried foods and grilled meats.

The summary effect of the primary research on low-fiber diet variables using the random effect size, obtained an odds ratio value of 0.605, with a lower level value of 0.421 and an upper level value of 0.867. This odds ratio value shows that someone with a low-fiber diet will have a 0.605 greater risk of developing colorectal cancer than someone who consumes adequate amounts of fiber.

Research by Swari et al. (2019) was conducted in Denpasar-Bali, Indonesia involving 52 cases and 52 control groups. The case group consisted of patients diagnosed with colorectal cancer at Sanglah General Hospital. Data collection was carried out through Sanglah Hospital medical records and outcome data questionnaires based on interview guidelines. Fiber intake is categorized as deficient if the daily intake of fiber is ≤21 g / day.

Research with the same results was also presented by Ramadas and Kandiah (2010). This research was conducted in Kuala Lumpur, Malaysia involving 59 cases and 59 control groups. The included case group was patients who had been diagnosed histologically with polypectomy, did not have polyps with other types (hyperplastic polyps, FAP and HNPCC), and did not suffer from other chronic diseases. Data collection was carried out directly through interviews. Dietary assessment was carried out 3 x 24 hours via recall (1x weekend and 2x weekdays). The dietary assessment was carried out three times because the study subjects came from the group that did not make dietary restrictions so that daily consumption may vary. The food and drink groups are presented in the form of a household size (URT) so that it is easily understood by the subject. From the research results, it was stated that the case group consumed an average of 3.93 ± 2.42 g / day of fiber, while the control group had an average of 7.07 ± 5.34 g / day.

Research conducted by Song et al. (2015) also showed significant results. This research was conducted in Qingdao, China, involving 265 cases and 252 control groups. The case group included were patients with colorectal cancer based on electric colonoscopy and pathology examination, while the control group included was the group that had been adjusted for sex and age with a range of ≤ 3 years with the case group and had no gastrointestinal abnormalities after medical check-ups and no family history. Data collection was carried out directly by trained interviewers. Diet assessments were carried out using the SQ-FFQ with a span of> 1 year before data collection was carried out. In taking diet data, photos of food samples were also provided to make it easier for respondents. Fiber intake was

categorized as high if the daily fiber intake is> 27.6 g / day.

Research with significant results is also presented by Zhong et al. (2014). This research was conducted in Guangdong province, China, involving 613 cases and 613 control groups. The case group included in this study were inpatients at Sun Yat-sen University Hospital who had been diagnosed with colorectal cancer <3 months ago and had lived in Guangdong province for >5 years. Whereas the control group included in the study was hospitalized patients who has no history of cancer with examination <3 months ago, patients lived in Guangdong province for >5 years, and matched the case group based on age (range 5 years) and gender. Data collection was carried out directly by trained interviewers. Dietary assessments were carried out with the FFQ with a time span> 1 year prior to data collection. The food and drink groups were presented in the form of a household size (URT) so that it was easily understood by the subject. In addition, photo samples of food were also used to make it easier for the subject to understand the portion sizes of these foods. The average daily fiber intake of the subjects was 14.92 gr / day (male subjects) and 12.65 gr / day (female subjects).

Research by Chun et al. (2015) also showed significant results. This research was conducted in Korea involving 150 cases and 116 control groups. The case group consisted of patients at Seoul University Hospital, who had just been diagnosed with colorectal cancer in the last <3 months and did not have any other types of cancer or other chronic diseases. The control group included in this study were people who came from healthy populations who were not diagnosed with cancer or other chronic diseases based on the results of medical check-ups in the last <1 year. Data were collected directly by trained nutritionists. Diet assessments were carried out through the FFQ questionnaire developed by KDCA (Korea Disease Control and Prevention) with a time span of >1 year intake data prior to data collection. Fiber intake was categorized as low if the daily intake of fiber is <27.5 g/day.

Research with the same results was also presented by Thohir (2019). This research was conducted in Padang, Indonesia and involved 34 people as control group and 34 people as case group. The case group included in the study were inpatients or outpatients at M. Djamil Padang Central General Hospital who were diagnosed with colorectal cancer in 2019. Meanwhile, the control group was individuals from a healthy population who were not diagnosed with colorectal cancer. Data collection was carried out directly by researchers and assisted by five enumerators who were students of the Faculty of Nursing, Andalas University. Dietary assessments were carried out through the modified Epidemiological Questionnaire for Colorectal Cancer.

The results obtained were in accordance with the theory that states that soluble and insoluble fiber can decrease the developing of colorectal cancer. The presence of soluble fiber can affect insulin action and control blood sugar or bile acid production, while insoluble fiber can reduce the potential for interactions between mutagens and colonic mucosa (by increasing fecal mass and reducing transit time). To minimize the occurrence of colorectal cancer, a person is recommended to consume a minimum of 25 g/day of fiber (both soluble and insoluble fiber), while for someone who

has a family history of cancer, the recommended fiber consumption is 35-40 g/day (Duijnhoven, 2009).

## CONCLUSIONS

The summary effect of the primary research shows that low fiber diet is a variable that shows significant results (OR=0.605 [95% CI 0.421 - 0.876]). A low-fiber diet can increase of developing of colorectal cancer due to the role of soluble and insoluble fiber. Lack of intake of soluble fiber can decrease insulin action and blood sugar control or the production of SCFA (Short-Chain Fatty Acids), whereas insufficient intake of insoluble fiber can increase the potential for interactions between mutagens and colonic mucosa.

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