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Dear Editorial Team, Authors, Viewers, Subscribers, and Readers

I would like to tell everyone that I like the excitement I feel every time new issue of Kesmas: National Public Health Journal published, because I always look for an Occupational Health and Safety (OHS) article. Not every issue has OHS article, but I found one in Volume 13 Issue 1 August 2018 titled “Unsafe Behaviour of Workers in Rotary Lathe Section in One of the Plywood Industries in East Kalimantan”. This article refers to the theory of relation between safety perception and behaviour and how in fact it occurred in one of industries in Indonesia. It is nice to get an OHS article discussing a plywood industry, as not many articles, especially located in Indonesia talk about this.

(Tiara, Bekasi)

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Pizza and Hamburger Consumption to Overweight among Adolescents in Jambi City

Konsumsi Pizza dan Hamburger terhadap Kegemukan pada Remaja di Kota Jambi

*Public Health Studies Program, Faculty of Public Health, Universitas Jambi, Jambi, Indonesia, **Jambi Health Office, Jambi, Indonesia, ***Department of Public Health and Clinical Medicine UMEA University, Sweden

Abstract
Junk food is unhealthy and poor in nutrient quality, and may result in weight gain, obesity, and coronary heart disease, if consumed regularly. The prevalence of overweight in adolescents is 5-10% higher in urban areas. Adolescents undergo lifestyle changes, including in food consumption behavior. This study aimed to determine relation between junk food consumption patterns and overweight in adolescents. This study was conducted based on a cross-sectional design. A total of 137 high school students in Jambi City were involved in this study. Patterns of junk food consumption were assessed using food frequency questionnaires that examined the eating habits of study subjects. The variables were sex, maternal education, parents' occupation, and family's socio-economic level. Analysis was conducted using the chi-square test and multiple logistic regression. Nutritional status was measured using body mass index-for-age with WHO Antro software. The results of this study indicated a 23.4% prevalence of overweight in adolescents. After controlling for maternal education, father's occupation, instant noodle eating habits, and tea, coffee and cookies consumption, final model showed that consumption of pizza and hamburgers among adolescents was the dominant determinant for overweight (OR=3.55). Consumption of pizza and hamburger was related to overweight among adolescents in Jambi City.

Keywords: Adolescent, junk food, nutritional status, overweight


Correspondence: Ummi Kalsum, Public Health Studies Program, Public Health Faculty, Universitas Jambi, Raya Jambi-Muara Bulian Street Km. 15 Mendalo Darat Jambi, Phone: +62741-582965, E-mail: kalzoem@gmail.com
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Revised: March 26th 2018
Accepted: September 26th 2018
Introduction

Adolescence is a transition period from childhood to adulthood. The teenage phase is between 13 and 18 years old. Adolescents are vulnerable, particularly during the second phase of rapid growth called the adolescent “growth spurt”, they need plenty of nutrients for their growth. Alongside the physical growth in adolescents, they also experience social and psychological growth. This growth exposes adolescents to a variety of lifestyles and behaviors, including food consumption influenced by environment, family and media campaigns. Such advertising may highlight new low-nutrient food products, foods that supposedly maintain a slim body outline, or Western foods such as pizza and hamburgers.

According to data from the 2007 National Basic Health Research, consumption of unhealthy and poor quality junk food in the population aged 10 years was at 65.2%. Long term consumption of junk food may result in conditions such as obesity. The prevalence of obesity in adolescents aged 13-15 years in Jambi Province was 6.0%. In youths between 16 and 18 years old, prevalence of obesity rose from about 1.4% in 2010 to 7.3% in 2014. Several studies observed a relationship between the consumption of junk food and the nutritional status of adolescents, particularly the incidence of overweight. The increase in prevalence of overweight among adolescents, particularly in urban areas, has led to a double burden of nutritional problems in Jambi, and in Indonesia as a whole. Excess nutrients can result in obesity, which occurs in children, youths and adults. Junk food causes obesity because it creates an imbalance between the amount of energy obtained and the amount of energy consumed by the body's need for growth and development, activity and immunity. Common complications from being overweight or obese include non-communicable diseases such as heart disease, hypertension, and diabetes mellitus.

The aim of this study was to determine relation between the consumption of junk food such as pizza and hamburgers, and overweight in adolescents. Other risk factors were to be studied as well.

Method

This study utilized a cross-sectional design with primary data collected from grade 10 high school students in Jambi City, Jambi Province. Data were collected in October of 2015. The study population included all 679 students at the Jambi 5 State Senior High School in Jambi City. A total of 149 participants were randomly selected from 18 classes of grade 10 students that met the inclusion criteria, were aged < 18 years, and willing to participate in the study. Grade 10 students were selected because they were on average younger than 18 years of age. All subjects in this study obtained permission from the school to participate in this study. Students with an underweight nutritional status (-3 SD to <-2 SD) were excluded, as this study aimed to compare overweight and obese participants to those of a normal nutritional status. As a result, a total of 137 subjects participated and completed this study.

The sample size calculated by hypothesis tests for a population proportion (two-sided) was carried out by the sample size determination software, Lemeshow and Lwanga. It used $\alpha = 5\%$ and $\beta = 20\%$. The dependent variable was being overweight, which was measured using body mass index-for-age (BMI/A). Calculation of BMI/A was performed using the WHO Anthro software. The criteria for BMI/A (5-18 years old) was based on the Indonesian Ministry of Health (2011). To evaluate nutritional status, subjects were grouped into normal (-2 to 1 standard deviation of the Z curve), and overweight (overweight + obese) ($\geq$ 1 SD of the Z curve). Underweight subjects (-3 to -2 SD of the Z curve) were excluded and not analyzed.

The main independent variable was consumption patterns of junk food including pizza and hamburgers, instant noodles, popcorns, chips and French fries, cake and sugary foods, soft drinks, as well as tea, coffee, cappuccino, cookies, and cakes.

Data were collected using a food frequency questionnaire (FFQ) with structured questionnaires which used a Likert scale with outcomes such as “never”, “rarely”, “sometimes”, “often” and “always” to assess junk food consumption habits. The five Likert scale outcomes were re-coded into two categories. Outcomes 1-3, i.e. “never to sometimes” were re-coded into a single outcome of “rarely” (1), and outcomes 4-6, i.e. “often and always” were re-coded into “often” (2).

Nutritional status was measured directly using a digital scale (weighing scale) to the nearest 0.1 kg. Height was measured using a portable height instrument made of super aluminum, with a tool accuracy of 0.1 cm. It was previously used for measurement by the 2013 National Basic Health Research study. Measurements were conducted by a team of four trained enumerators, and monitored by the researchers from this study team.

As the research questionnaire was designed to be self-administered, all other variables were filled directly into the research questionnaire. Analysis, including univariate analysis, bivariate analysis using the chi-square test, and multiple logistic regression analysis at the 95% confidence level was conducted using a statistical software. Modelling with consideration of screening candidates was entered into the model using p value 0.25, with the confounding test using the formula (crude-adjusted/adjusted*100%) > 10%).

As a total of ten variables were analyzed in this study, the variables with a p value 0.25 were pizza and ham-
Results

Table 1 shows that 23.4% of the adolescents in this study were overweight. The study participants had a higher percentage of females, subjects with highly educated parents, unemployed mothers, fathers with an unstable occupation, and families in the middle to high socioeconomic range.

Figure 1 shows that “often” consumption of pizza and hamburgers, instant noodles and soft drinks in adolescents was 15%. However, “often” consumption of popcorn, chips and fries and cake and sweets, and of tea, coffee, cappuccino and cookies was relatively high at >30%.

Table 2 shows that adolescents who consumed pizza and hamburgers “often” had a greater risk of being overweight than those who “rarely” consumed (OR = 3.17; 95% CI = 1.13-8.89; p value = 0.035). Adolescents with a father who held a steady job had a greater risk of being overweight than those with a father who did not hold a steady job (OR = 2.5; 95% CI = 1.11-5.65; p value = 0.040). Consuming popcorn, chips and fries “often”, having a highly educated mother, having an employed mother, and having a family in the middle to high socioeconomic level, all increased the risk of becoming overweight in adolescents of overweight in adolescents (OR = 1.14; 3.58; 1.37 and 2.21, respectively). However, these increases were not proven to be statistically significant. Subjects with overweight and normal nutritional status were similarly distributed to “often” and “rarely” consuming instant noodles, soft drinks, tea, coffee, cappuccino and cookies, cake, and sweet foods. There was no statistical difference in overweight incidence across both sexes.

A final model based on multivariate logistic regression analysis is shown in Table 3. After controlling for consumption of instant noodles, tea, coffee, cappuccino and cookies, mother’s education level, and father’s occupation, the model revealed that adolescents who consumed hamburgers and pizza “often” had a greater risk of being overweight (OR = 3.54) than those who consumed them “rarely”. Maternal education, father’s occupation, consuming instant noodles, tea, coffee, cappuccino and cookies, cake, and sweet foods.

Table 1. Prevalence of Overweight and Distribution of Sociodemographic Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Criteria</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional status</td>
<td>Overweight</td>
<td>23.4</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>76.6</td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>52.6</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>47.4</td>
</tr>
<tr>
<td>Father’s education*</td>
<td>High</td>
<td>88.1</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>11.9</td>
</tr>
<tr>
<td>Maternal education**</td>
<td>High</td>
<td>83.3</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>16.7</td>
</tr>
<tr>
<td>Mother’s occupational status</td>
<td>Employed</td>
<td>38.0</td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>62.0</td>
</tr>
<tr>
<td>Father’s occupation</td>
<td>Steady</td>
<td>45.3</td>
</tr>
<tr>
<td></td>
<td>Not</td>
<td>54.7</td>
</tr>
<tr>
<td>Socioeconomic level</td>
<td>Middle to high</td>
<td>94.2</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Notes:

n = 137 for all variable except *n=135 and **n=132
pastries were confounding factors for the incidence of overweight in adolescents in this model. The most dominant predictor for becoming overweight in adolescents aged 14-17 years was consuming pizza and hamburgers. More highly educated adolescents had a 20% risk of being overweight, and those with employed fathers had a 10% risk of being overweight. This model was satisfactory because it was able to predict adolescent overweight incidence by 79.5%.

**Discussion**

As a group, adolescents are susceptible to malnutrition because they are in a second phase of growth spur, just before adulthood. Adolescents who live in urban areas are greatly influenced by their external environment including friends, family, and hedonistic lifestyle. The characteristics of urban adolescents are relatively different from rural adolescents. Middle to high socioeconomic class, highly educated parents, and working mothers tend to influence the lifestyle and food consumption patterns of adolescents.

The growth of the fast food industry has been accelerated by aggressive advertisement of low-nutrient food products, particularly visible to adolescents in urban areas. This increases the consumption of junk food among adolescents.

This study intended to prove the hypothesis that consuming junk food "often" may increase the risk of adolescents becoming overweight. After controlling for maternal academic level, father's occupation, consuming instant noodles "often", and consuming tea, coffee, cappuccino and cookies, this study found that consuming pizza and hamburgers "often" was the dominant predictor for being overweight in adolescents. This is similar to

---

**Table 2. Bivariate Analysis for Factors Related to Overweight in Adolescents**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Criteria</th>
<th>Overweight</th>
<th>Normal</th>
<th>POR</th>
<th>95% CI</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pizza and Hamburger</td>
<td>Often</td>
<td>8</td>
<td>44.4</td>
<td>10</td>
<td>55.6</td>
<td>3.17</td>
</tr>
<tr>
<td></td>
<td>Rarely</td>
<td>24</td>
<td>79.8</td>
<td>9</td>
<td>20.2</td>
<td>2.02</td>
</tr>
<tr>
<td>Instant Noodle</td>
<td>Often</td>
<td>1</td>
<td>7.1</td>
<td>13</td>
<td>92.9</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td>Rarely</td>
<td>31</td>
<td>25.3</td>
<td>92</td>
<td>74.8</td>
<td>1.14</td>
</tr>
<tr>
<td>Pop Corn, Chips, French Fries</td>
<td>Often</td>
<td>16</td>
<td>24.6</td>
<td>49</td>
<td>75.4</td>
<td>1.14</td>
</tr>
<tr>
<td></td>
<td>Rarely</td>
<td>16</td>
<td>22.2</td>
<td>56</td>
<td>77.8</td>
<td>1.14</td>
</tr>
<tr>
<td>Soft Drink</td>
<td>Often</td>
<td>3</td>
<td>18.8</td>
<td>13</td>
<td>81.3</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>Rarely</td>
<td>29</td>
<td>24</td>
<td>92</td>
<td>76</td>
<td>0.73</td>
</tr>
<tr>
<td>Tea, Coffee, Cappuccino and Cookies</td>
<td>Often</td>
<td>10</td>
<td>16.1</td>
<td>52</td>
<td>83.9</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>Rarely</td>
<td>22</td>
<td>29.3</td>
<td>53</td>
<td>70.7</td>
<td>0.72</td>
</tr>
<tr>
<td>Cake and Sweet Snacks</td>
<td>Often</td>
<td>9</td>
<td>19.6</td>
<td>37</td>
<td>80.4</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>Rarely</td>
<td>23</td>
<td>25.3</td>
<td>68</td>
<td>74.7</td>
<td>0.63</td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>14</td>
<td>19.4</td>
<td>58</td>
<td>80.6</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>18</td>
<td>27.7</td>
<td>47</td>
<td>72.3</td>
<td>0.63</td>
</tr>
<tr>
<td>Maternal Education Level</td>
<td>High</td>
<td>29</td>
<td>26.4</td>
<td>81</td>
<td>73.6</td>
<td>3.58</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>2</td>
<td>9.1</td>
<td>20</td>
<td>90.9</td>
<td>0.73</td>
</tr>
<tr>
<td>Mother's Occupational Status</td>
<td>Employed</td>
<td>14</td>
<td>26.9</td>
<td>38</td>
<td>73.1</td>
<td>1.37</td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>18</td>
<td>21.2</td>
<td>67</td>
<td>78.8</td>
<td>1.37</td>
</tr>
<tr>
<td>Father's Job</td>
<td>Steady</td>
<td>20</td>
<td>32.5</td>
<td>42</td>
<td>67.7</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Not steady</td>
<td>12</td>
<td>16</td>
<td>63</td>
<td>84</td>
<td>2.5</td>
</tr>
<tr>
<td>Socio-economic</td>
<td>Middle to high</td>
<td>31</td>
<td>24</td>
<td>98</td>
<td>76</td>
<td>2.21</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>1</td>
<td>12.5</td>
<td>7</td>
<td>87.5</td>
<td>2.21</td>
</tr>
</tbody>
</table>

Notes:

*p value < 0.05

**Table 3. The Final Model of Overweight and Junk Food Consumption Frequency, and Confounders**

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>Adjusted OR (95% CI)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pizza and hamburger habit: often/rarely (n=137)</td>
<td>1.27</td>
<td>3.54 (1.08-11.68)</td>
<td>0.037</td>
</tr>
<tr>
<td>Instant noodle habit: often/rarely (n=137)</td>
<td>-1.59</td>
<td>0.21 (0.02-1.83)</td>
<td>0.156</td>
</tr>
<tr>
<td>Tea, coffee, cappuccino and cookies: often/rarely (n=137)</td>
<td>-0.81</td>
<td>0.45 (0.18-1.17)</td>
<td>0.079</td>
</tr>
<tr>
<td>Maternal education level: high/low (n=132)</td>
<td>0.78</td>
<td>2.17 (0.44-10.73)</td>
<td>0.341</td>
</tr>
<tr>
<td>Father's occupation: steady/not (n=137)</td>
<td>0.68</td>
<td>1.97 (0.81-4.77)</td>
<td>0.135</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.96</td>
<td>0.14</td>
<td>0.011</td>
</tr>
</tbody>
</table>

Overall percentage = 79.5% (p value of omnibus test = 0.010)
results obtained from previous studies that found that obesity is influenced by the energy intake from junk food consumption (OR = 1.58, 95% CI= 1.08-2.32 and p value = 0.01). Also in line with a study by Badjebar, students who consume junk food ‘often’ at least three times a week are 3.28 times more likely to be overweight than those who consume “rarely”. This result was statistically significant. Damapolii et al showed that the occurrence of obesity was related to consumption of junk food. A strong association between the consumption of junk food and obesity was reported among adults in Michigan. Regular consumers of junk food were 60% to 80% more likely to be obese higher compared to those who consumed junk food less than once per week.

However, this study finding was not consistent with results from the study in Yogyakarta, which found that the frequency of junk food consumption was not related to a child’s nutritional status (p > 0.05). This difference is likely because the participants of the Yogyakarta study were elementary school children. The percentage of children who consumed junk food “often” in the Yogyakarta study was only 4.6%, 63% of the children consumed junk food at a “rare” frequency, and 32% never consumed junk food. Due to limited financial power, primary school children only bought or consumed junk food when facilitated by their parents. In a study by Grace and Indasari, excessive consumption of carbohydrates was associated with the incidence of obesity among high school students in Makassar (p value = 0.000). However, frequency of junk food consumption was not related to obesity (p value = 0.686).

Adolescents in Indonesia are currently experiencing a lifestyle change. Today, Western junk food such as fried chicken, French fries, pizza, doughnuts, burgers, hot dogs and ice cream are preferred and desirable. Most junk food are nutritionally imbalanced with high calories, fat, sugar and sodium levels but low fiber, vitamin A, ascorbic acid, calcium and folate levels. Excessive consumption of such foods causes nutritional problems such as overweight and obesity.

Burgers and pizzas are main components of the Western diet. Consumption of pizza and burgers in Indonesia began in the 1990’s. Furthermore, the proliferation of fast food restaurants with menus including hamburgers and pizza has increased their popularity. Previously, pizza and hamburgers could only be enjoyed by the upper and middle class. However, due to socioeconomic progress, hamburgers and pizza are now more accessible and affordable (IDR 2,500-4,000), making them available to people in the middle and lower socioeconomic class.

The hamburgers currently in the market are composed of 13% cholesterol and carbohydrate, and 30% fat and saturated fat. Compared to hamburgers, pizzas are quite nutritious, containing minerals, fiber, vitamins B1, B2, B3 and vitamin A. Eating two slices of pizza, will provide most major nutrients and up to 410 calories (20.5% of the daily requirement); 126 calories of fat (6.3%); 14 grams total fat (22%); 40 mg cholesterol (13%); and 1,178 mg sodium (49%). Consumption of pizza satisfies of a person’s daily saturated fat requirements. However, saturated fats are linked to degenerative diseases e.g. heart disease.

Previously, pizza was considered a healthy food because it was made with an ideal composition of flour, tomato, olive oil and mozzarella. However, because of the use of many commercially affordable processed products, pizza now contains too much fat, calories, sodium but is low in nutrition value. As a result, pizza is now categorized as junk food. This study showed that consuming pizza and hamburgers “often” was the dominant predictor for being overweight among adolescents in Jambi City.

In a study by Bowman, consuming large portions of foods, foods with high energy density, high fat content, high sugar and salt content, high glycemic index and low in fiber increased energy intake, and spurred a positive energy balance. This increased the risk of obesity. Children and adolescents who consume junk food have higher levels of total calories, total fat, saturated fat, total carbohydrates, sugar but lower levels of fiber than children and adolescents who do not consume junk food.

The high energy density of fat promotes increased energy intake. Total fat is associated with accumulation of adipose tissue. Junk food contains high levels of starch and sugar, and has a high glycemic index value. Therefore, it can stimulate energy intake. When the body consumes a high glycemic index food, the source of energy used comes from glycogen (carbohydrate deposits), so that fat is accumulated unused. If this is repeated continuously, fat deposits will accumulate, become abnormal and cause overweight and obesity.

Some Western junk foods also contain several nutrients such as fat, protein, vitamins and minerals in moderate to high quantities. However, most of Western junk foods have a bad impact because they contain large amounts of saturated fat, cholesterol, sodium and high-calorie salt e.g. hamburgers and pizza. About 40-60% of calories from Western junk food are fat. Ingredients such as cheese, mayonnaise, creams and the use of deep-frying methods increase the high fat content of these foods.

Some types of foods contain higher than the recommended levels of sodium. Likewise, soft drinks have high sugar content, which contributes significantly to the number of calories consumed. Furthermore, the fiber content in junk food is way below the recommended levels. Junk food consumption begins to show a significant association with the incidence of obesity when it ex-
ceeds one-third of total daily caloric intake.\textsuperscript{17}

Junk food also affects the body’s energy level. Junk food does not contain many of the nutrients that the body needs. The high level of sugar in junk food causes metabolic dysfunction. The pancreas secretes high amounts of insulin to prevent dangerous spikes in blood sugar levels because fast food and junk food do not contain enough amounts of protein and carbohydrates. Junk food contributes to poor performance and obesity. The more overweight an individual is, the higher the risk for chronic diseases such as diabetes, heart disease, and arthritis.\textsuperscript{20}

A study by Mahdiah et al.\textsuperscript{20} showed that urban junior high school adolescents consumed more types of junk food, because fast food restaurants or counters in the city provided more varied menus than restaurants in rural areas.\textsuperscript{21} There is an increase in the number of overweight children and adolescents because children and adolescents consume Western junk food, which contains more energy and less fiber.\textsuperscript{13,22}

There are several limitations in this study e.g. the frequency of consuming junk food was only evaluated qualitatively (using a Likert scale with criteria ranging from “never” to “always consume”). However, the criteria range was defined to the respondents before they filled the questionnaire. Further studies need to utilize better study methods, add variables in accordance with the substance of the study, increase the number of samples, and utilize better measurements to identify junk food consumption patterns among adolescents or other vulnerable groups.

Conclusion

This study concludes that after controlling for maternal education levels, paternal occupation, consumption instant noodles, tea and coffee, cappuccino so cookies, consuming pizza and hamburgers “often” is the dominant risk factor for being overweight among adolescents. Consuming junk food “often” is mostly influenced by the high level of maternal education. Working mothers, on average, have less time to prepare and serve healthy foods at home. This influences the consumption pattern of the adolescent towards the consumption of low-nutrient junk food.

It is necessary to provide education, communication and information to parents, especially mothers on selecting healthy foods and providing a balanced diet for adolescents, to decrease the incidence of overweight or obesity. Creative and innovative communication and education programs on food consumption patterns and the dangers of junk food on adolescent health should be encouraged and implemented.

References


Work-Related Skin Diseases among Workers in the Sewing Section at PT. X Shoe Company in West Java

Penyakit Kulit Terkait Kerja pada Pekerja Bagian Penjahitan Perusahaan Sepatu PT. X di Jawa Barat

Hendra*, Eva Nirwana**, Marzuki Isahak***

*Occupational Health and Safety Department, Faculty of Public Health, Universitas Indonesia, Depok, Indonesia, **PT. Prima Yasa Medika, Sukabumi, Indonesia, ***Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, Malaysia

Abstract

Occupational skin diseases are the most common work-related diseases in many countries. Shoe industry workers are potential to be affected by work-related skin diseases (WRSDs). This study aimed to analyze the risk factors associated with WRSDs among workers in the sewing section at a shoe company in West Java. A total of 477 workers were examined and interviewed using the modified Nordic Occupational Skin Questionnaire-2002/LONG from May 2016 to July 2016. Chi-square test and logistic regression were used to analyze the risk factors related to WRSDs. The results showed that 57.7% of the workers suffered from WRSDs. Most of the workers (71.7%) did not wear gloves while working; however, they washed their hands adequately at work (67.1%). Multivariate analysis indicated that a term of work, allergy records, organic dust exposure and duration of exposure per day, handwashing habits, and use of gloves while working were significant to WRSDs. Having allergy records and not wearing gloves were the two dominant factors associated with WRSDs (odds ratio: 6.743 and 6.224, respectively). Understanding the importance of using chemical protective gloves while working and washing hands with running water are essential for the proper implementation of protective measures to ensure worker’s safety and health.

Keywords: Allergies, gloves, sewing, shoe company, work-related diseases

Abstrak

Penyakit kulit akibat kerja merupakan penyakit terkait kerja yang paling umum di banyak negara. Pekerja industri sepatu berpotensi terkena penyakit kulit terkait kerja (PKTK). Penelitian ini bertujuan menganalisis faktor risiko yang berhubungan dengan PKTK pada pekerja bagian jahit di sebuah perusahaan sepatu di Jawa Barat. Sebanyak 477 pekerja diteliti dan diwawancarai dengan menggunakan Nordic Occupational Skin Questionnaire-2002/LONG yang di-modifikasi, dari bulan Mei 2016 sampai Juli 2016. Uji kai kuadrat dan regresi logistik digunakan untuk menganalisis faktor risiko yang terkait dengan PKTK. Hasil menunjukkan bahwa 57,7% pekerja mengalami PKTK. Sebagian besar pekerja (71.7%) tidak memakai sarung tangan saat bekerja; namun mempunyai kebiasaan cuci tangan saat bekerja (67,1%). Analisis multivariat menunjukkan bahwa masa kerja, riwayat alergi, pajanan debu organik, dan lamanya pajanan per hari, kebiasaan mencuci tangan, dan tidak memakai sarung tangan saat bekerja signifikan terhadap PKTK. Memiliki riwayat alergi dan tidak memakai sarung tangan merupakan dua faktor dominan yang berhubungan dengan PKTK (masing-masing OR: 6,743 dan 6,224). Memahami pentingnya memakai sarung tangan pelindung bahan kimia saat bekerja dan mencuci tangan dengan air mengalir sangat penting untuk implementasi tindakan perlindungan yang tepat guna memastikan keselamatan dan kesehatan pekerja.

Kata kunci: Alergi, sarung tangan, jahit, perusahaan sepatu, penyakit terkait kerja

Introduction

The term work-related skin diseases (WRSDs) is defined as any disorder of the skin caused or made worse by work activity or workplace conditions. However, the skin problems directly caused by work was called occupational skin diseases (OSDs). The wider definition of skin problems in the workplace is called WRSDs.2

WRSDs account for approximately 50% of occupational diseases and are responsible for an estimated 25% of all lost workdays. These dermatoses are often underreported because their association with the workplace is not recognized. The annual incidence of WRSDs is reported to be between 5.7 and 101 cases per 100,000 workers.6 As per another study in Norway, about 5 million people and 2.65 million employees had a skin disease in 2010 were classified as WRSDs.4 OSDs are also found in 75% of patients in Victoria, and 45% were diagnosed as WRSDs.5 The annual incidence of WRSDs is reported to be between 5.7 and 101 cases per 100,000 workers.6 As per another study in Norway, about 5 million people and 2.65 million employees had a skin disease in 2014.7

In Indonesia is 29%.9 An epidemiological study with 389 workers with many complaints of skin problems in the sewing process work. The randomly selected 477 subjects were included in this study conducted from May 2016 to July 2016. The dependent variable was WRSDs experienced by the workers. The independent variables were a term of work, allergy records, organic dust exposure and duration of exposure per day, handwashing habit, and the practice of wearing gloves during work.

Method

A cross-sectional survey method was used to assess the prevalence of WRSDs and its risk factors at a shoe factory located in Sukabumi District, West Java Province, Indonesia. This shoe factory had 10,836 workers with many complaints of skin problems in the sewing process work. The randomly selected 477 subjects were included in this study conducted from May 2016 to July 2016.

The dependent variable was WRSDs experienced by the workers. The independent variables were a term of work, allergy records, organic dust exposure and duration of exposure per day, handwashing habit, and the practice of wearing gloves during work.

Data were collected using the modified Nordic Occupational Skin Questionnaire-2002/LONG.12 The survey is divided into four parts. Part A includes the characteristics of workers such as the name, age, sex, work location, and department, while Part B is related to the job, with questions about the work, duration of exposure to hazardous material, and additional workload other than their main job. Part C is related to individual factors and control programs, with questions about the habits of the respondents inside and outside the workplace, practices related to personal hygiene such as washing hands and wearing gloves while working, and allergy records, and Part D is related to physical examination and anamnesis as well as medical records and reports of clinic visits from January 2015 to December 2015.

Data were processed using a computer-assisted statistical program to calculate the frequency distribution and proportions of all independent and dependent variables. The subsequent bivariate analyzes were conducted using
the chi-square test to assess the relation of the dependent variable with every independent variable. Finally, multivariate logistic regression analysis was used to identify the dominant variable associated with WRSDs.

Results

This study included 141 (29.6%) male and 336 (70.4%) female workers in the sewing section. Most of the subjects were operators (n = 396; 85%) and then followed by leaders (9.7%) and supervisors (7.3%). In addition, 244 (51.2%) workers performed the sewing activity, while the others did the gluing. The detailed frequency distribution of all study variables is shown in Table 1.

As shown in Table 1, 275 (57.7%) workers in the sewing process had WRSDs. There were more participants with a term of work of 3 years (n = 288, 60.4%) than those with a term of >3 years (n = 189, 39.6%). Most workers (87%) in the sewing section had no allergy records. Based on the work process involved in sewing, 321 (67.3%) workers were being exposed to organic dust. Exposure to organic dust occurred at the time of contact with the shoe material during the sewing process. A total of 250 (52.4%) workers were exposed to organic dust for 5–7 hours per working day. Table 1 also shows that 320 (67.1%) workers had a habit of washing their hands during working hours. However, only 135 (28.3%) workers used gloves while working.

Table 2 shows the distribution of study participants according to the presence of WRSDs. Bivariate analysis showed that a term of work, records of allergies, organic dust exposure, duration of exposure per day, handwashing habits, and the practice of wearing gloves while working were significantly associated with WRSDs (p value < 0.005, odds ratio [OR]= 0.422–5.762). The finding that workers with a term of work of 3 years had a greater risk of WRSDs than those with a term of work of >3 years was noteworthy. Based on the OR from the chi-square test, a longer term of work became a protective factor to WRSDs.

Based on the final model results shown in Table 3, variables with a p value = 0.05 such as the term of work, allergy records, organic dust exposure, duration of exposure per day, handwashing habits, and the practice of wearing gloves while working were significantly associated with WRSDs among workers in the sewing section. The results of logistic regression analysis showed that out of all the independent variables, an allergy record was the most important risk factor for WRSDs (OR= 6.743, 95% confidence interval [CI]= 2.947–15.428) followed by the practice of not wearing gloves while working (OR= 6.224, 95% CI= 3.735–10.371). Logistic regression analysis also showed that the term of work of >3 years was a protective factor against the occurrence of WRSDs (OR= 0.334).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>WRSDs (n = 275)</th>
<th>Non-WRSDs (n = 202)</th>
<th>Total</th>
<th>p Value</th>
<th>Unadjusted OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term of work (years)</td>
<td>&gt;3</td>
<td>85 (30.9)</td>
<td>104 (51.5)</td>
<td>189</td>
<td>0.001</td>
<td>0.422</td>
<td>(0.289–0.614)</td>
</tr>
<tr>
<td></td>
<td>&lt;3</td>
<td>190 (69.1)</td>
<td>98 (48.5)</td>
<td>288</td>
<td>0.003</td>
<td>2.570</td>
<td>(1.393–4.742)</td>
</tr>
<tr>
<td>Allergy records</td>
<td>Yes</td>
<td>47 (17.1)</td>
<td>15 (7.4)</td>
<td>62</td>
<td>&lt;0.001</td>
<td>5.762</td>
<td>(3.711–8.945)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>228 (82.9)</td>
<td>187 (92.6)</td>
<td>415</td>
<td>2.545</td>
<td>2.618</td>
<td>(1.731–3.959)</td>
</tr>
<tr>
<td>Organic dust exposure</td>
<td>Yes</td>
<td>209 (76.0)</td>
<td>112 (53.4)</td>
<td>321</td>
<td>&lt;0.001</td>
<td>2.582</td>
<td>(1.642–4.354)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>66 (24.0)</td>
<td>90 (46.6)</td>
<td>156</td>
<td>1.920</td>
<td>3.248</td>
<td>(1.292–8.206)</td>
</tr>
<tr>
<td>Duration of exposure per day</td>
<td>5–7</td>
<td>169 (61.5)</td>
<td>81 (40.1)</td>
<td>250</td>
<td>&lt;0.001</td>
<td>2.582</td>
<td>(1.642–4.354)</td>
</tr>
<tr>
<td></td>
<td>&lt;5</td>
<td>106 (38.5)</td>
<td>121 (59.9)</td>
<td>227</td>
<td>1.920</td>
<td>3.248</td>
<td>(1.292–8.206)</td>
</tr>
<tr>
<td>Handwashing habit</td>
<td>No</td>
<td>114 (41.5)</td>
<td>43 (21.3)</td>
<td>157</td>
<td>&lt;0.001</td>
<td>2.618</td>
<td>(1.731–3.959)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>161 (58.5)</td>
<td>159 (78.7)</td>
<td>320</td>
<td>2.545</td>
<td>2.618</td>
<td>(1.731–3.959)</td>
</tr>
<tr>
<td>Wearing gloves while working</td>
<td>No</td>
<td>237 (86.2)</td>
<td>105 (52.0)</td>
<td>342</td>
<td>&lt;0.001</td>
<td>5.762</td>
<td>(3.711–8.945)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>38 (13.8)</td>
<td>97 (48.0)</td>
<td>135</td>
<td>2.545</td>
<td>2.618</td>
<td>(1.731–3.959)</td>
</tr>
</tbody>
</table>

Notes:
- WRSDs = Work-Related Skin Diseases, OR = Odds Ratio, CI = Confidence Interval, n = The Number of Samples
Discussion

The results of this study showed the prevalence of WRSDs at 57.7%. A study on garment workers in Bangladesh also found a high proportion of garment workers experiencing skin rash and skin itchiness (73%). Workers with a term of work of 3 years tend to be at a greater risk than those with a term of work of >3 years because new workers are more likely to complain than experienced ones and the worker with a term of work of >3 years became resistant to symptoms of WRSDs. A study on textile workers in Jepara, Central Java, also showed a correlation between a longer term of work and dermatitis (p value = 0.038). One factor suspected to be the cause of WRSDs in workers with a shorter term of work is the susceptibility of the skin to irritants or infection.

Moreover, workers with a term of work of >3 years sometimes stop complaining about the damage to their skin. A previous study has mentioned that workers with a term of work of 2 years have a 3.5 times higher risk of contact dermatitis than those with a term of >2 years. Another cause of WRSDs is poor awareness of the workers about the importance of wearing gloves while working and washing hands during work hours. A study of workshop workers in Surakarta showed that workers have an 18.8 times higher risk of WRSDs when handwashing habits are poor.

In this study, WRDSs occurred because of an inflammation that developed while in contact with shoe materials and organic dust produced during the work process. Inflammatory processes begin when agents (alkalis, acids, and solvents) come into contact with the skin and cause lesions in the corneal layer. This condition can lead to increased permeability, allowing the passage of hazardous substances, subsequently leading to the production of the inflammatory cytokines and keratinocytes. This also stimulates other cells, causing an inflammatory reaction (cellular immunity) that occurs in three phases that are: induction or immunization or sensitization, elicitation or development, and resolution (the end of the inflammatory reaction). The results showed that allergy records is a major factor contributing to WRSDs in the workers in the sewing section at PT. X. This result is the same with the study conducted by Chen et al., in clothing manufacturing workers in Beijing, China. The study found a significant risk of contact dermatitis among workers with allergic rhinitis (OR= 2.3, 95% CI = 1.12–4.55). Wearing gloves during work is a factor that contributes considerably to WRSDs among sewing workers at PT. X. Several workers in the sewing section at PT. X were not equipped with gloves during work. For workers who wore gloves, sometimes, the gloves did not comply with the required standard, and some workers used a glove on only one hand. The findings of this study are in line with those of a study on automotive workers in the industrial area of Cibitung where the habit of wearing personal protective equipment, including hats and work packs in addition to gloves, was significantly associated with the incidence of contact dermatitis. These findings are similar to those obtained in this study using multivariate modeling in which the use of gloves was found to be the most dominant risk factor of WRSDs (OR= 5.370).

Another factor with a high OR is the habit of handwashing. A study on motorcycle repair workers found that workers with poor handwashing habits had an 18.8 times higher risk of developing contact dermatitis than those with good handwashing habits (OR= 18.791, 95% CI = 4.897–72.104). Studies on fishermen in Rembang also found a statistically meaningful relation between personal hygiene and the incidence of contact dermatitis. Personal hygiene, in this study, refers to the habit of washing hands with soap and running water. The data pertaining to the condition of the handwashing stations at PT. X were unavailable. PT. X has provided handwashing stations in the five toilets, but soap was occasionally unavailable. The limited number of washing stations acted as an obstacle for the 500 workers in implementing the habit of washing hands to reduce the incidence of skin diseases.
This study has certain limitations with respect to data collection. The respondents themselves filled the questionnaires; this could have triggered communication and discussion among the respondents about the questions, resulting in inaccurate and biased responses. In addition, permission from the company’s management to observe the working conditions in the sewing section was not obtained; therefore, the exposure was based on self-reporting.

Conclusion

Almost 57.7% of the workers in the sewing section experience WRSDs. Based on multivariate analysis, the risk factors significantly associated with the WRSDs among workers in the sewing section are the shorter term of work, having allergy records, organic dust exposure, longer duration of exposure per working day, poor hand-washing habit, and not wearing gloves while working.

Therefore, to decrease the incidence of WRSDs in workers, especially among workers in the sewing section, PT. X should provide standard gloves to the workers and encourage their use during work, counsel and supervise the workers, and provide adequate and accessible hand-washing facilities at the workplace.

References

Adolescents' Attitude toward HIV/AIDS Prevention in Yogyakarta

Meysa Tiranda, Nanik Setiyawati, Anita Rahmawati

Midwifery Department Yogyakarta Health Polytechnic of Ministry of Health, Yogyakarta, Indonesia

Abstract
Acquired immunodeficiency syndrome (AIDS) is the second leading cause of death in adolescent groups in the world. In Indonesia, the rate of human immunodeficiency virus (HIV)-infected adolescents increases annually. Yogyakarta, well-known as the education city, has the highest number of HIV/AIDS cases in the productive age group of 20–29 years old, which means that they have been already infected with HIV since teen age. This study aimed to determine influential factors that affect adolescents' attitude toward HIV/AIDS prevention. The study was an analytic survey research with a cross-sectional design. Stratified random sampling was applied to select a sample size of 128 respondents of class XI at Muhammadiyah 3 Yogyakarta Senior High School in 2017. Data were taken by using questionnaires that had been tested for validity and reliability. Data were analyzed by chi-square test and logistic regression. The results revealed that most of the respondents received information on HIV/AIDS from media (47.7%), have a good knowledge level (82%), and support the prevention of HIV/AIDS (96.9%). The source of information and knowledge level had a statistically significant relation with adolescents' attitude toward HIV/AIDS prevention. Knowledge level is the most influential factor to adolescents' attitude toward HIV/AIDS prevention (p value = 0.006, PR = 1.199; 95% confidence interval = 1.052–1.367).

Keywords: Adolescent, attitude, HIV/AIDS prevention, knowledge
Introduction

The Joint United Nations Programme on Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS; UNAIDS) said that the world is committed to end AIDS epidemic by 2030. To achieve this target, the transmission prevention efforts should be strengthened. According to UNAIDS, an estimated 36.7 million people are living with HIV by the end of 2015.1

According to the United Nations Children’s Fund (UNICEF), adolescents are dying of AIDS at an alarming rate. Globally, AIDS is the second leading cause of death in adolescents aged 10–19 years. The rate of AIDS mortality in adolescents aged 15–19 years has more than doubled since 2000, with an average of 29 new infections every hour.2

The Directorate General of Disease Control and Environmental Health of the Ministry of Health stated that in Indonesia, there are 17,784 HIV and 3,267 AIDS cases reported by mid-2016. The age group of 25–49 years has been dominant, with 12,357 cases of HIV infection until June 2016. Also, the number of AIDS cases in school children or students is 61.3

According to the Quarter I report of the AIDS Commission of the Special Region of Yogyakarta in 2016, Yogyakarta ranks the first in the region with 759 cases of HIV/AIDS. Based on the report, the productive age group of 20–29 years has the highest percentage at 30.98%. On the other hand, new infections are found every year in the age group of 15–19 years from 2012 to March 2016.4

Adolescence is a period of instability. At this time, adolescents are looking for an identity and likely converging to a peer group or peers, so there is an enormous environmental influence to their attitudes and perspectives on something during this time.5

Yogyakarta City has the highest percentage of HIV/AIDS cases, among other cities and districts in the province, in the age group of 15–19 years at 0.15%. Muhammadiyah 3 Yogyakarta Senior High School is one of the high schools in the city that holds annual activities in cooperation with the Indonesian Planned Parenthood Association of the Special Region of Yogyakarta to implement reproductive health education including HIV/AIDS for the students.

Therefore, this study aimed to determine the influential factors to the attitude of adolescents toward HIV/AIDS prevention. The results of this study are expected to elevate the knowledge of the factors that influence adolescents’ attitude toward HIV/AIDS prevention.

Method

This study used analytic survey research with a cross-sectional design. The independent variables were sex, residence, subject major, the source of information, and knowledge level. The dependent variable was the attitude toward HIV/AIDS prevention. This study was conducted on April 2017 at Muhammadiyah 3 Yogyakarta Senior High School.

The study populations comprised 259 students of class XI at Muhammadiyah 3 Yogyakarta Senior High School consisting of four natural science classes and three social science classes. The minimum sample size required was 119 and was obtained using a stratified random sampling technique. In this study, 128 respondents came from two natural science classes and two social science classes.

Results

The study was conducted at Muhammadiyah 3 Yogyakarta Senior High School on April 2017 with a total sample of 128 respondents. Table 1 shows that most of the respondents are women (52.5%), living in an urban area (96.9%), majoring in natural science (53.1%), and receiving information on HIV/AIDS from non-media (52.3%). The knowledge level of most respondents is categorized as good at 82.1%, and 96.9% has shown to have a supportive attitude toward HIV/AIDS prevention.

In this study, there were many factors that theoretically formed attitudes, but not all of them shaped the attitudes of adolescents toward the prevention of HIV/AIDS. In Table 2, several variables are not related to the attitude of adolescents, including sex with more number of female respondents at 98.5%, and not statistically related with the attitude toward HIV/AIDS prevention (p value = 0.347). Majority of the respondents were living in an urban area (96.8%), which was not statistically associated with adolescents’ attitude toward HIV/AIDS prevention (p value = 1.000). Another variable not statistically related was natural science major (p value = 1.000).

The results of the multivariate analysis in Table 3 indicated that knowledge level was the most influential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Characteristic</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>61</td>
<td>47.7</td>
</tr>
<tr>
<td>Residence</td>
<td>Urban</td>
<td>124</td>
<td>96.9</td>
</tr>
<tr>
<td>Major</td>
<td>Natural sciences</td>
<td>68</td>
<td>53.1</td>
</tr>
<tr>
<td>Source of information</td>
<td>Media</td>
<td>61</td>
<td>47.7</td>
</tr>
<tr>
<td>Knowledge level</td>
<td>Good</td>
<td>105</td>
<td>82.1</td>
</tr>
<tr>
<td>Attitude</td>
<td>Support</td>
<td>124</td>
<td>96.9</td>
</tr>
</tbody>
</table>

Table 1. Univariate Analysis

variable to the attitude toward HIV/AIDS prevention ($p$ value = 0.006; $PR = 1.199$). This means that adolescents with knowledge in good and adequate levels or are reasonably likely to support attitudes toward HIV/AIDS prevention were 1.199 times higher than the adolescents with a poor knowledge level.

**Discussion**

This study focused on the influential factors to adolescents’ attitude toward HIV/AIDS prevention. According to the Theory of Planned Behavior by Ajzen,\(^6\) there are several factors that could affect the confidence of how one behaves toward something. This study took demographic or social factors including sex, residence area, the education major, information sources, and knowledge level in consideration. The results showed that most respondents (96.9%) were supportive toward the prevention of HIV/AIDS.

A study by Sohn and Park,\(^7\) on high school students in Seoul, South Korea, revealed that more girls (53.3%) were using condoms as prevention of HIV/AIDS than boys (35.3%). Another study by Majelantle \textit{et al}.,\(^8\) found no significant relation of sex, age, and residence area with knowledge of HIV/AIDS prevention among adolescents in Botswana. A study by Rahnama,\(^9\) on public university students in Malaysia mentioned that there is no relation of age, sex, education level, maternal status, and residence place with the attitude toward HIV/AIDS.

This study is also in line with the study by Rahmawan,\(^10\) that stated that no statistically significant difference was found on the grade level between natural science and social science classes about their interest in health education ($p$ value = 0.214). The characteristics of the natural science students differ with that of the social science students on their way of thinking. The natural science students have a scientific way of thinking, and they have reasoning patterns based on certain targets, which developed from a regular and careful habit of scientific thinking based on mathematical logic and statistics. On the other hand, the way of thinking of the social science class students is more natural, and their reasoning pattern is based on daily habits from the social influence of their surrounding.\(^10\) This is in line with the results of this study showing that the natural science student’s attitude to support HIV/AIDS prevention has a greater percentage than the social science students.

This study is not in line with the study conducted by Rina \textit{et al}.\(^11\) that revealed that there is no relation between exposure to information on premarital sex and adolescents’ attitude toward premarital sex ($p$ value = 1.000).

Uddin \textit{et al}.\(^12\) mentioned that for adolescents in Bangladesh, media have an important role in spreading health information. Overall, the study indicated that half of the adolescents have a sufficient knowledge level and most of them have a neutral attitude toward HIV/AIDS.
The respondents were predominantly at a good and adequate level of knowledge with a supportive attitude toward HIV/AIDS prevention. This is consistent with the statement by Handayani,13 that knowledge will support good adolescents’ attitude on HIV/AIDS. Rasumawati stated that knowledge and behavior on the prevention of HIV/AIDS have a positive relation.

A further study by Thanavah,14 found that high school students with sufficient and high knowledge of HIV/AIDS have a positive attitude to people living with HIV/AIDS (odds ratio = 4.3; 95% confidence interval [CI] = 2.1–9.0; p value < 0.001).14 The results of the multivariate analysis in this study indicated that knowledge level is the most influential variable to adolescents’ attitude toward HIV/AIDS prevention (p value = 0.006; PR = 1.199; 95% CI = 1.052–1.567). This means that the adolescents with a high or adequate level of knowledge were likely to have a supportive attitude toward HIV/AIDS prevention by 1.199 times greater than the adolescents with a low level of knowledge.

According to the study by Nubed and Akoachere,15 in Cameroon, although it is not statistically significant, knowledge raises the willingness of respondents to behave in safe sex. In addition, respondents with adequate and high levels of knowledge would have more positive attitudes toward HIV/AIDS.

Christiane et al,16 in a study on adolescents in Libreville, stated that the right knowledge of HIV will support young people in making decisions for their behavior in preventing the transmission HIV. A study by Ghojavand et al,17 on adolescents in Isfahan City, Iran, stated that there is a direct relation between adolescents’ knowledge of HIV/AIDS and supportive attitude toward HIV/AIDS prevention. Adolescents’ knowledge is important, and the attention of the government and school programs are also necessary.

Verma et al,18 said that the source of knowledge of HIV/AIDS among adolescents was mostly from electronic media and then followed by printed media. Most of the adolescents also agreed to the introduction of HIV/AIDS as a topic in the curriculum. Education programs on HIV/AIDS should be held in the classrooms, and teachers should be trained to educate students about the infection and the ways to prevent HIV/AIDS effectively. A study by Etrawati et al,19 also stated that reproductive health education for high school students is needed to increase their knowledge of reproductive health and decrease risky sexual behaviors.

**Conclusion**

The level of students’ knowledge of HIV/AIDS is mostly good, and the students’ attitudes largely support the prevention of HIV/AIDS. There is no statistically significant relation of sex, residence area, and education majors with adolescents’ attitude toward HIV/AIDS prevention. Sources of information and knowledge level are statistically related to adolescents’ attitude toward HIV/AIDS prevention. The knowledge level is the most influential factor to the adolescents’ attitude toward HIV/AIDS prevention.

**Recommendation**

Schools that already have health education programs are expected to maintain and improve existing activities, as well as form a discussion forum, so that information of HIV/AIDS will be more easily accepted by students. Furthermore, researchers should not only examine attitudes that cannot be observed directly, but also investigate one’s own behavior in preventing HIV/AIDS. In addition, the media can be used as a study instrument.

**References**


Health Promotion toward Knowledge and Intention for Early Detection of Cervical Cancer in Commercial Sex Workers

Promosi Kesehatan terhadap Pengetahuan dan Niat untuk Deteksi Dini Kanker Serviks pada Pekerja Seks Komersial

Desi Rusmiati*, Tiurlan Yunetty Silitonga**, Warendi*

Abstract
Cervical cancer is one of the cancer types that become a haunting danger for many women in the world. In Indonesia, the prevalence rate reached 0.8% or an estimated 98,692 patients. Its prevalence increased to 10% in the commercial sex worker group. This study aimed to explain the effect of health promotion on knowledge and intention for early detection of cervical cancer using the inspection of visual acetate method in the commercial sex workers. This study was quantitative with a quasi-experimental type, one group of pretest and posttest design. The population sample included the commercial sex workers at Genteng Subvillage, Patimban Village, Pusakanegara Subdistrict, Subang District and was determined by using an accidental sampling technique with 35 respondents. Data analysis used McNemar’s test. The results showed that there was an increase in knowledge after the health promotion activity and a significant change in intention to perform early detection of cervical cancer. From the statistical test, a p value of 0.000 was obtained for each variable. In conclusion, health promotion has a significant effect on the improvement in the knowledge and intention of the respondents.

Keywords: Cervical cancer, health promotion, inspection of visual acetate

Abstrak
Salah satu jenis kanker yang menjadi hal yang menakutkan bagi perempuan di dunia adalah kanker serviks. Di Indonesia, jumlahnya mencapai 0,8% atau diperkirakan sebanyak 98.692 penderita. Prevalensinya meningkat sampai 10% pada kelompok pekerja seks komersial (PSK). Penelitian ini bertujuan menjelaskan pengaruh promosi kesehatan terhadap pengetahuan dan niat untuk melakukan deteksi dini kanker serviks dengan metode inspeksi visual asetat (IVA) pada PSK. Penelitian ini merupakan penelitian kuantitatif dengan jenis kuasi eksperimen dengan rancangan one group pretest and posttest design. Sampel populasi adalah PSK di Dusun Genteng, Desa Patimban, Kecamatan Pusakanegara, Kabupaten Subang ditentukan dengan menggunakan teknik accidental sampling dengan sampel sebanyak 35 responden. Analisis data menggunakan uji McNemar. Hasil menunjukkan bahwa terdapat peningkatan pengetahuan setelah kegiatan promosi kesehatan serta peningkatan niat untuk melakukan deteksi dini kanker serviks yang signifikan. Dari uji statistik, didapatkan nilai p 0,000 untuk masing-masing variabel. Dapat disimpulkan bahwa promosi kesehatan berpengaruh signifikan terhadap peningkatan pengetahuan dan niat responden.

Kata kunci: Kanker serviks, promosi kesehatan, inspeksi visual asetat

Introduction

Cervical cancer is considered the fifth most common cancer in women worldwide. According to the GLOBOCAN data from the International Agency for Research on Cancer, in 2012, there were 14.1 million new cancer cases and 8.2 million cancer deaths worldwide. Cervical cancer is a frightening specter for women in the world. Similarly in Indonesia, an estimated 40,000 cases of cervical cancer are found every year. According to pathology-based cancer data in 13 laboratory pathology centers, cervical cancer is a cancer type that has the largest number of patients in Indonesia at approximately 56%. All women are at risk to develop cervical cancer, but some evidence suggests a strong relation between a sexual relationship and the risk of cervical cancer. For instance, women who engaged in a sexual relationship at an early age (<18 years) and women with many sexual partners have a higher risk of cervical cancer. Commercial sex workers are a group susceptible to cervical cancer because they usually have many sexual partners, increasing their risk to as much as 10–14.2 times.

In general, cervical cancer patients who come to seek treatment are already at the final stage, and then it is often too late to do the treatment, although determining the presence and absence of cervical cells can be done through early detection. One of the ways is the inspection of visual acetate (IVA) method, which is fairly cheap and easy to do and is very effective in detecting the presence of cervical cancer. A study showed that IVA has a sensitivity of 90.9%, specificity of 99.8%, positive predictive value of 83.3%, and negative estimation value of 99.9% compared with cytology. This suggests that the IVA examination has a similar ability to cytologic examination in detecting cervical pre-cancer lesions.

A limited access to accurate information is believed to be one of the causes of high cervical cancer cases in Indonesia. Another cause is due to less awareness to perform early detection. That is why most of the cases are found at the final stage and can cause death.

In West Java, there are about 8,000 cases of cervical cancer each year, in which the highest number of patients comes from the northern coast (pantura). This can be understood because pantura is a popular place that practices prostitution. From the preliminary study conducted, one of the known prostitution areas is Genteng, Patimban Village, Pusakanegara Subdistrict, Subang District. Therefore, the study was conducted in the region and intervention was applied through a health promotion activity expectedly to improve the knowledge and intention of the commercial sex workers to perform early detection of cervical cancer with the IVA method.

The aim of the study was to explain the effect of health promotion on increasing the knowledge and intention to perform early detection using the IVA method in commercial sex workers.

Method

This study was a quasi-experimental study type with an analytical descriptive of one group pretest and posttest design. The measurement was done before and after the intervention. Knowledge and intention to do early detection were measured using questionnaires. The intervention used for this study was a health promotion activity through a lecture, video playback, booklet, and poster. The population sample included 35 commercial sex workers at Genteng Subvillage, Patimban Village, Pusakanegara Subdistrict, Subang District that were counted using a formula of two means. Data were collected using questionnaires, and univariate analysis was done to determine the knowledge and intention of the commercial sex workers on early detection of cervical cancer using the IVA method, both before and after the promotion efforts. Bivariate analysis was initially planned using the t-dependent test, but the data collected were not normally distributed to explain the effect of the promotion effort to increase the knowledge, attitude, and intention of the commercial sex workers on early detection of cervical cancer using the IVA method. This study used the McNemar test instead.

Results

Table 1 shows that prior to a health promotion activity, most respondents had poor knowledge of cervical cancer detection using the IVA method (82.9%) and more than half had no intention to perform cervical cancer detection using the IVA method (54.5%). Table 2 shows that after a health promotion activity, most respondents had good knowledge of cervical cancer detection using the IVA method (68.6%), and almost all respondents had an intention to perform cervical cancer detection using the IVA method.

In Table 3, there is a significant change in the knowledge of respondents by 63%, from 6% before to 69% after the health promotion activity. Based on the results of the statistical test, a p-value of 0.000 was obtained, which means that the health promotion activity implemented had a significant effect on knowledge. Table 4 shows a significant change in the intention of respondents by 48%. Before the efforts of health promotion were made, only 46% of the respondents intended to take early detection of cervical cancer through the IVA method, but the rate increased to 94% after the health promotion activity. From the results of the statistical test, a p value of 0.000 was obtained, which means that the health promotion activity conducted had a significant effect on the intention.

In Table 5, the results of the multivariate analysis indicated two variables affecting intention on early detec-
tion of cervical cancer using the IVA method, namely, attitude (p value = 0.009) and education level (p value = 0.046). The dominant variable was the attitude with an OR value = 10.9 after being controlled by a variable of education level.

Discussion

The results of the study showed that most respondents had poor knowledge of cervical cancer before the health promotion activity, which is caused by many factors, such as limited access to health information. This is evident on the respondents’ answer when asked if they have ever heard of cervical cancer. Almost all of the respondents had a negative response. The respondents also said there were no healthcare providers who visit, socialize, and provide counseling on cervical cancer.

The low education level of the respondents, most of them were elementary school graduates, affected the low intention in reading concerning health issues. This also has an impact on their low knowledge level. A study mentioned that formal education relates significantly to one’s level of knowledge.6-8 Similarly, in theory, it can be explained that knowledge is the result of human sensing or of knowing something is done by someone to the object through the senses he or she has, among them are the eyes and ears. Influential factors to knowledge include education, information media, socio-cultural and economic backgrounds, environment, experience, and age.9

After performing health promotion including a lecture, video playback, and leaflet and poster distribution, the analysis results in this study showed that the level of

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Number (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of cervical cancer and early detection of cervical cancer using the IVA method</td>
<td>Poor</td>
<td>29</td>
<td>82.9</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>6</td>
<td>17.1</td>
</tr>
<tr>
<td>Intention in early detection of cervical cancer using the IVA method</td>
<td>No intention</td>
<td>19</td>
<td>54.3</td>
</tr>
<tr>
<td></td>
<td>With intention</td>
<td>16</td>
<td>45.7</td>
</tr>
</tbody>
</table>

<table>
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<th>Category</th>
<th>Number (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Poor</td>
<td>11</td>
<td>31.4</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>24</td>
<td>68.6</td>
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<tr>
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<td>No intention</td>
<td>2</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td>With intention</td>
<td>33</td>
<td>94.3</td>
</tr>
</tbody>
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<table>
<thead>
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<th>Variable</th>
<th>Category</th>
<th>Number (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge before health promotion</td>
<td>Poor</td>
<td>11</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>18</td>
<td>49%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>29 (83%)</td>
<td>54%</td>
</tr>
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<table>
<thead>
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<th>Category</th>
<th>Total</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention before health promotion</td>
<td>No Intention</td>
<td>2 17</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>With Intention</td>
<td>0 16</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>33 (94%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>Wald</th>
<th>p Value</th>
<th>OR 95% CI for Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>2.4</td>
<td>6.8</td>
<td>0.009</td>
<td>10.9</td>
</tr>
<tr>
<td>Level of education</td>
<td>1.9</td>
<td>5.9</td>
<td>0.046</td>
<td>6.5</td>
</tr>
</tbody>
</table>

Notes:
OR = Odds Ratio, CI = Confidence Interval
knowledge of the respondents improved. The number of respondents with poor knowledge decreased from 29 to 11 after the health promotion. Meanwhile, the number of respondents with good knowledge increased from 6 to 24 after the health promotion. The statistical test also indicated that the health promotion activity had a significant impact on improving the respondents’ knowledge of cervical cancer and early detection using the IVA method.

Better knowledge is gained through the sense of sight (eyes) as well as through direct and other people’s experiences. Thus, it can be understood that the health promotion activity, both as individuals and as groups, includes various ways such as counseling, demonstrating, and providing printed media, which allow for the transfer of knowledge that can impact people to increase or change their knowledge level toward the better. Therefore, health promotion activity is very effective in providing and improving the knowledge of health. Thus, one of the ways to prevent cervical cancer is to elevate the knowledge of reproductive health, especially on cervical cancer and its detection method, which can be done through health promotion activities.

Most respondents did not have the intention to take early detection of cervical cancer using the IVA method, but after the health promotion activity, almost all expressed their intention. The number of respondents with no intention to do early detection of cervical cancer decreased from 19 to 2 after the health promotion. On the other hand, the number of respondents with the intention to do so increased from 16 to 33 after the health promotion. The statistical test showed a significant effect of the health promotion activity on the respondents’ intention. The results of this study indicated the existence of conformity with some previous studies.

Health promotion activities aimed at predisposing factors are in the form of providing information due to lack of knowledge, information, description, and awareness-raising notification. The purpose of this health promotion activity can provide or increase someone’s knowledge, in this case, it is the knowledge of cervical cancer and early detection efforts through the IVA method. Knowledge is a very important domain for the formation of someone’s actions.

After the health promotion activity, almost all of the respondents had the intention to take early detection of cervical cancer with the IVA method. The change in intention was affected by the improvement of the respondents’ knowledge after the health promotion activity. The improved knowledge will raise the respondents’ awareness of the importance of early detection of cervical cancer. Furthermore, they belong to the group who are at risk of cervical cancer. Other than affecting the intention, good knowledge will also affect the respondents’ behavior to do early detection of cervical cancer. This means that the respondents’ awareness grows because of the improvement in knowledge, and this will also grow their intention to take early detection of cervical cancer in the end. Good knowledge will shape a good attitude, and a good attitude will grow intention to do good things.

The IVA is a cheap, easy to do, and very effective method to detect the presence of cervical cancer. However, so far, the coverage of IVA is still low at 5.15%. Several factors influence a person to do early detection of cervical cancer, but the awareness is the most important, especially among the commercial sex worker group who are highly susceptible. Therefore, it is important for the government and especially health workers to raise awareness of early detection of cervical cancer to high-risk communities such as commercial sex workers. From the results of this study, after the health promotion, the knowledge of the commercial sex workers improved and then the intention followed. Therefore, increasing the knowledge of the commercial sex workers first will improve their scope of the IVA. Once they have an intention to do early detection of cervical cancer, it should be followed up by local health workers using the IVA. It is also much better if it is performed in the localization of the commercial sex workers as they tend to be afraid to go to healthcare facilities.

**Conclusion**

Before the health promotion activity, 8 out of the 10 respondents have less knowledge, and almost all expressed no intention to perform early detection of cervical cancer using the IVA method. However, after the health promotion activity, more than half of the respondents show better knowledge, and almost all express their intention to do early detection of cervical cancer using the IVA method. Increasing the commercial sex workers’ knowledge and intention first will improve their scope of early detection of cervical cancer using the IVA method.

**Recommendation**

To increase the knowledge that has an impact on the change in intention, a health promotion activity can be done at a time. But to change the attitude, the health promotion activity needs to be performed repeatedly. It requires a repeated and sustainable health promotion activity.

**References**

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Risk Factors Associated with Low Birth Weight

Mohammad Zen Rahfiludin*, Yudhy Dharmawan**

*Public Health Nutrition Department, Faculty of Public Health Diponegoro University, Semarang, Indonesia,
**Biostatistics & Population Studies Department, Faculty of Public Health, Diponegoro University, Semarang, Indonesia

Abstract
Neonatal deaths are associated with preterm birth complications. The aim of this study was to analyze risk factors associated with LBW. This was a cross-sectional study held in Bulu Primary Health Care, Temanggung, Central Java, Indonesia. The sample size required for this study was 69 based on the Slovin formula. Data were collected using questionnaires and semi-quantitative Food Frequency Questionnaire forms. Data on infant birth weight was taken from midwives’ delivery cohort records. Mid upper arm circumference (MUAC), hemoglobin level, blood pressure, maternal age, parity, nutritional intake, and serum transferrin receptor data were taken from the infant's mother using a MUAC tape, automatic blood pressure monitor and blood laboratory analysis by Prodia. Data analysis procedures were carried out with quantitative methods. Descriptive statistics were analyzed as means and standard deviations. Inferential statistics used the chi-square test for bivariate analysis and binary logistic regression for multivariate analysis. The results of this study showed that mean infant birth weight was 2917.68 ± 374.673 kg. Inferential analysis showed that MUAC and pregnancy at a risky age were significant risk factors associated with LBW, while serum transferrin receptor levels, anemia, parity, energy and protein consumption levels, and systolic and diastolic blood pressure were nonsignificant risk factors. The probability of LBW in pregnant women with LILA under 23.5 cm and pregnancy at a risky age was 68.9%.

Keywords: Low birth weight, risk factors, Central Java

Abstrak

Kata kunci: Berat bayi lahir rendah, faktor risiko, Jawa Tengah


Correspondence: Mohammad Zen Rahfiludin, Faculty of Public Health Diponegoro University, Prof. Sudharto Street, Semarang, Indonesia, Phone: +6224-7460044, E-mail: yudrahfiludin@yahoo.com
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Introduction

Child mortality is a core indicator of child health and well-being. The proposed Sustainable Development Goals target for child mortality represents a renewed commitment to the world’s children under 5 years of all age, with all countries aiming to reduce neonatal mortality to 12 deaths per 1000 live births or lower and under-5 mortality to 25 deaths per 1000 live births or lower. The worldwide neonatal mortality rate in 2015 was 19 deaths per 1000 live births.1 This number shows that the worldwide neonatal mortality rate is still high. Among the top 10 countries that contribute 67% of neonatal deaths in the world, Indonesia contributes 2%.2

Neonatal deaths are caused by intrapartum complications and severe infections, and the leading cause of death in all regions of the world is preterm birth complications.3 Preterm birth is also related to low birth weight (LBW). LBW is defined as a weight at birth of less than 2500 gram. Not only is LBW a major predictor of perinatal mortality and morbidity, but recent studies have found that low birth weight also increases the risk of non-communicable diseases, such as diabetes and cardiovascular disease, later in life.4 There are multiple causes of LBW, including low income, maternal age under 20 years or over 35 years, heavy physical work, low maternal education, maternal complications (placenta previa, pregnancy-induced hypertension, premature rupture of membranes), anemia, malaria, inadequate antenatal care, and maternal nutritional factors.5-6

National Basic Health Research in 2013 showed that LBW occurs in Indonesia at a rate of 10.2%. In Central Java, the rate of LBW was 9.7%.7 In Temanggung, specifically in the working area of Bulu Primary Health Care, the incidence of LBW in 2013, 2014, and 2015 was 6.94%, 7.09%, and 7.88%, respectively.8

The aim of this study was to analyze risk factors of LBW, including mid upper arm circumference (MUAC), hemoglobin levels, blood pressure, maternal age, parity, nutritional intake, and serum transferrin receptor levels. There have been many studies on risk factors associated with LBW, but only a few studies have examined the relation between the serum transferrin receptor and LBW. The transferrin receptor is the best indicator of iron deficiency in pregnant woman. The serum level of this receptor can be measured easily by conventional techniques and presents a large distinction between iron deficiency anemia and chronic anemia disease.9

Method

This was a cross-sectional study held in Bulu Primary Health Care, Temanggung, Central Java, Indonesia. The study population consisted of 114 pregnant women in the second and the third trimesters. The required sample size for this study was 69 samples based on the Slovin formula.10 A random sampling technique was applied. MUAC, maternal age, serum transferrin receptor, hemoglobin, parity, and systolic and diastolic blood pressure data were collected using a questionnaire, while energy and protein consumption data were collected using semi-quantitative food frequency questionnaire forms. MUAC was measured using a MUAC Tape accurate to 1 mm. Blood samples were taken for measurement of hemoglobin and serum transferrin receptor levels according to standard protocols in the Prodia Laboratory. Hemoglobin was measured using cyanmethemoglobin, and serum transferrin receptor was measured using the Quantikine IV D, human sTfR Immunoassay, R&D systems, Minneapolis, MN, USA.11-12 Anemia is defined as a hemoglobin level of less than 11 gram/dl or a transferrin receptor level of more than 21 nmol/l. Data on the infant’s birth weight was taken from the midwives in Bulu Primary Health Care, by copying the infant’s weight recorded by the midwives in a baby cohort. The data were collected a week after delivery. Data analysis procedures were carried out with quantitative methods. Descriptive statistics were analyzed by mean and standard deviation. Categorical data were analyzed by cross tabulation. Inferential statistics used the chi-square test for bivariate analysis and binary logistic regression for multivariate analysis. A significant correlation between independent and dependent variables was shown at p value = 0.05. Ethical clearance was obtained from the Commission of Ethics of Medical and Public Health Research, Faculty of Public Health, Diponegoro University (approval no. 252/EC/FKM/2016).

Results

The mean (SD) birth weight was 2917.68 (374.673) kg, and the mean age of the pregnant women was 26.71 (5.806) years; furthermore, the mean and standard deviation of each variable are presented in Table 1. The results of this study, shown in Table 2, indicated that MUAC and pregnancy at a risky age were significant risk factors causing LBW, while serum transferrin receptor, anemia, parity, energy and protein consumption levels, and systolic and diastolic blood pressure were nonsignificant risk factors.

Multivariate analysis with multiple logistic regression showed a significance of 0.905 for the Hosmer and Lemeshow Test, indicating an acceptable goodness of fit to the model tested. A Nagelkerke R Square of 0.328 showed that risky age and MUAC variable models are risk factors for LBW at 32.8%. The values of B and the exponential B, along with their significance, can be seen in Table 3.

The odds ratio for maternal age was 3.7 and that of MUAC was 15.38 for the incidence of LBW. Based on the table above, Exp(B) can be used to construct a logistic
Table 1. Infant Birth Weight According to Selected Maternal Factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Birth Weight</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anemia</td>
<td>Anemia (&lt;11 gr/dl)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal ( 11 gr/dl)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid upper arm circumference</td>
<td>Chronic Energy Deficiency (&lt; 23.5 cm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal ( 23.5cm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum transferrin receptor</td>
<td>Iron Deficiency ( 21 nmol/l)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal (&lt;21 nmol/l)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal age at pregnancy</td>
<td>Risky Age (&lt;19 years or &gt;35 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal Age (19-35 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td>Multipara ( 2 live births)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primipara ( 1 live birth)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of energy consumption</td>
<td>Less (&lt;80%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal ( 80%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>Prehypertension (&gt;120 mmHg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal ( 120 mmHg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td>Prehypertension (&gt;80 mmHg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal ( 80 mmHg)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
SD = Standard Deviation

Table 2. Prevalence Risk of Maternal Factors (n = 69)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>PR</th>
<th>95% CI</th>
<th>p Value</th>
<th>95% CI</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia</td>
<td></td>
<td>1.33S 0.275</td>
<td>6.457</td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid upper arm circumference</td>
<td></td>
<td>19.33S 3.172</td>
<td>117.853</td>
<td>0.0001*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum transferrin receptor</td>
<td></td>
<td>2.857 0.322</td>
<td>25.330</td>
<td>0.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal age at pregnancy</td>
<td></td>
<td>5.893 0.140</td>
<td>22.7</td>
<td>0.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td>0.798 0.140</td>
<td>4.545</td>
<td>0.799</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of energy consumption</td>
<td></td>
<td>0.684 0.076</td>
<td>6.323</td>
<td>0.743</td>
<td></td>
<td></td>
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<tr>
<td>Systolic blood pressure</td>
<td></td>
<td>0.216 0.025</td>
<td>1.903</td>
<td>0.135</td>
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<tr>
<td>Diastolic blood pressure</td>
<td></td>
<td>0.571 0.063</td>
<td>5.133</td>
<td>0.614</td>
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<td></td>
</tr>
</tbody>
</table>

Notes:
PR = Prevalence Risk, CI = Confidence Interval, Significant < 0.05

Table 3. Variables in the Equation

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>p Value</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Age at Pregnancy</td>
<td>1.312</td>
<td>.101</td>
<td>1.687</td>
<td>1</td>
<td>0.194</td>
<td>3.713</td>
</tr>
<tr>
<td>MUAC</td>
<td>2.732</td>
<td>.955</td>
<td>8.176</td>
<td>1</td>
<td>0.004</td>
<td>15.358</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.212</td>
<td>.662</td>
<td>25.331</td>
<td>1</td>
<td>0.000</td>
<td>0.040</td>
</tr>
</tbody>
</table>

Equation 1. Probability of LBW

\[
\text{Probability of LBW: } 1 + e^{-(13.3 + 1.312 \text{ Maternal Age Pregnancy} + 2.732 \text{ MUAC} - 3.212)}
\]

Discussion

Anemia is the most common nutritional deficiency in the world. The World Health Organization has estimated that the prevalence of anemia is 51% in developing countries. In Southeast Asia, anemia during pregnancy has a 48.2% prevalence, equal to 18.1 million cases. In Indonesia, the prevalence of anemia during pregnancy is 50.9%. In this study, anemia in pregnant women was nonsignificant as a risk factor for having a LBW infant. Anemia in pregnant mothers associated with adverse outcomes may be related to other maternal complications, such as hemoglobinopathy, malnutrition, chronic infection, and inadequate access to prenatal care, and anemia itself may be a marker of these underlying conditions. A study by Xiong, et al. also showed that anemia was not statistically significantly associated with infant LBW.

MUAC is another anthropometric measure used to evaluate adult nutritional status that has been found to be particularly effective in determining malnutrition in adults in developing countries. This study used an MUAC measure threshold of 23.5 for pregnancy outcome, infant morbidity, and mortality. The results showed that a MUAC of less than 23.5 cm increased the risk of LBW by a factor of 19. Women with MUAC less than 23.5 cm had more LBW infants than those with MUAC of 23 cm and more. A study by Assefa, also showed a statistically significant association between LBW and MUAC less than 25 cm.

Serum transferrin receptor was a nonsignificant as a risk factor in LBW. Transferrin is the main iron transport protein found in the blood and plays a role in maintaining cellular iron homeostasis through regulation of cellular

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Iron intake. Serum transferrin receptor is largely derived from developing red blood cells. Assessment of serum transferrin receptor levels has been used to distinguish iron deficiency anemia from anemia of chronic disease because the receptors are generally unaffected by concurrent infection or inflammation. The results of the present study showed that the serum transferrin receptor was not significant as a risk factor in LBW. Although many studies found an association between iron deficiency and pregnancy outcomes, A previous study by Khambalia et al. did not detect a significant association between iron deficiency and preterm birth. The inconsistencies may have been caused by study population differences and confounders.

Maternal age affects fertility. Fertility starts to decrease at the age of 20 years and decreases rapidly after the age of 35 years. Getting pregnant at a young age is also a risk factor, as the endometrium has not yet matured, whereas the endometrium is less fertile after the age of 35 years. This will increase the likelihood of having congenital syndrome and affecting maternal and child health during pregnancy. A previous study indicated that mothers at the younger and older ends of the childbearing age range are at increased risk for LBW. This study showed that maternal age increase the risk of LBW by a factor of 5. A study by Fraser, found that adolescent mothers aged 13 to 17 years had a significantly higher risk (p value < 0.001) than mothers aged 20 to 24 years of delivering an infant with LBW (relative risk, 1.7; 95% CI, 1.5 to 2.0). Kartasurya, also found that pregnancy at a risky age (<20 or >35 years) was also a risk factor associated with LBW (<20 or >35 years; OR = 1.95 with CI = 1.16–3.36) in Batang District, Central Java Province.

Based on the result, parity was nonsignificant as a risk factor in LBW. Parity and maternal age have been shown to increase the risk of adverse neonatal outcomes, such as intrauterine growth restriction, prematurity, and mortality. Nulliparity may confer risk through complications during childbirth, such as obstructed labor, whereas high parity has been linked to an increased risk of hypertension, placenta previa, and uterine rupture. A meta-analysis by Shah, concludes that multiparity, although it is associated with reduced birth weight, is not associated with LBW or preterm birth, in which multiparity is often confounded by socioeconomic status. Higher complications in terms of birth outcome associated with multiparity are valid for communities with poor socioeconomic status, low levels of education, and inadequate access to health care.

In this study, energy consumption was found to be nonsignificant as a risk factor in LBW. It should be that deficient energy consumption or weight during pregnancy can cause impaired fetal growth and increase the risk of LBW in newborns. Furthermore, LBW infants have serious health problems, such as cerebral palsy, mental retardation, and even cardiovascular disease, when they become adults. In study by Karima, pre-pregnancy weight, weight gain during pregnancy, maternal age, and birth order were factors affecting birth weight significantly, with pre-pregnancy weight as the dominant factor (OR = 6.643, CI: 2.3–18.8). Therefore, it is important to pay more attention to undernourished women who are planning a pregnancy. Pre-pregnancy weight and maternal weight gain in the first, second, and third trimesters have a moderate power relation and positive pattern.

Protein is important for fetal development because one of its roles is to form fetal cells and tissues. Protein consumption is increased during pregnancy to prevent protein deficiency and malnutrition. In this study, the level of protein consumption was nonsignificant as risk factor in LBW. Even though a previous study by Ramakrishnan, stated that poor nutrition is one of factors associated with LBW babies, this inconsistency may be due to the limitation of sample size in this study (n = 69) with only seven infants with LBW.

The maternal cardiovascular system undergoes progressive adaptations throughout pregnancy, including decreased vascular resistance, increased blood volume, and other metabolic changes. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) decreased from the first to second trimester and then increased up to the postpartum period. The causes of LBW are multifactorial, and one such factor is blood pressure. This study showed that SBP and DBP were nonsignificant as risk factors in LBW infants. A study by Walker et al. indicated an association between blood pressure and infants with LBW. This inconsistency may be due to the inclusion of subjects with pre-hypertension, whose blood pressures were not very high (<120 mmHg for SBP and <80 mmHg for DBP).

LBW is one of the risk factors for perinatal death. LBW has a PAR value of 14.90. This means that if the focus of the intervention program is on decreasing the perinatal mortality rate by decreasing the prevalence of LBW infants, there will be a 15% reduction in the risk of perinatal death out of all live births in the population. Interventions for pregnancy at a risky age and mothers with MUAC less than 23.5 cm are indispensable for reducing LBW occurrence, as confirmed in a study by Kartasurya.

Conclusion

It can be concluded that MUAC and age are risk factors associated with LBW in newborns, with a probability of 68.2%. It is suggested that public education on the importance of nutrition during pregnancy be increased to increase MUAC and avoid pregnancy under the age of
19 years or above the age of 35 years to reduce the incidence of infants with LBW.

Acknowledgment
The authors would like to thank the Directorate of Research and Community Services and the Ministry of Research, Technology and Higher Education of the Republic of Indonesia, as well as the Research Institute of Diponegoro University that facilitated and funded this study.

References
Role Stress, Personality Type, Burnout, and Performance of Midwives towards Postnatal Care Program Achievement in Surabaya City

Tekanan Peran, Tipe Kepribadian, Kejenuhan Kerja, dan Kinerja Bidan dalam Pencapaian Program Pelayanan Nifas di Kota Surabaya

Abstract
The coverage of postnatal care program in Surabaya City had declined since 2011–2013 and could not reach the target. This analytic observational study used a cross-sectional design and was conducted during April–May 2015 to analyze the effect of role stress, personality type, and burnout on midwives’ performance towards postnatal care program achievement in Surabaya City. A total sample of 45 midwives was collected from eight primary health care centers in Surabaya City with basic emergency obstetric and neonatal care services. Accidental sampling was used for sample selection. This study indicated that most of the midwives were aged 20–30 years and had an diploma level of education in midwifery. Majority of them were married and were predominantly contract workers with <5 and 5 to <10 years workers experiences. Most of the midwives did not have role stress and had agreeableness personality type. However, majority of them had mild burnout and showed medium performance level. There was no influence of demographic characteristics, role stress, and personality type on burnout, whereas the performance was affected by role stress and personality type. The midwives’ performance was more influenced by personality type than by role stress.

Keywords: Burnout, performance, personality type, role stress

Abstrak

Kata kunci: Kejenuhan kerja, kinerja, tekanan peran, tipe kepribadian

Introduction

One of health problems in Indonesia is high maternal mortality rate (MMR). Data from Surabaya Health Office collected during 2011–2013 indicate that MMR was still quite high in Surabaya City, and the city also had the second highest rate of maternal deaths in East Java. Data from the Surabaya Mother and Child Health Local Monitoring collected during 2011–2013 also revealed a decline in the coverage of the postnatal care program, with an average decrease of 2.92% every year and being unable to reach the target. Average achievement was of 92.99% of the target 95%. More than half of all maternal deaths occurred within 24 hours after birth primarily due to heavy blood loss. In several countries, at least one-quarter of all maternal deaths are caused due to hemorrhage; the proportion ranges from <10% to almost 60%. Although a woman may survive after suffering from postnatal hemorrhage, she would suffer from severe blood loss (severe anemia) and experience the problems. To decrease maternal mortality, midwife personnel as one of the health care workers becomes an important human resource because of their ability to provide services in accordance with established standards. Due to their numerous roles, midwives may potentially suffer from role stress that can result in the emergence of burnout. Furthermore, their personality type also determine the onset of burnout, which can affect their performance in postnatal care.

According to the Ministry of Health Republic of Indonesia, the midwives’ performance in postnatal care involves checking the blood pressure, pulse, respiration, temperature, fundus uteri (uterine involution), lochia and other vaginal discharges, and the breast and recommending exclusive breastfeeding for 6 months, vitamin A supplements 200,000 IU twice, and postnatal family planning services. Regarding burnout, according to Maslach and Pines in Yusuf, it is an emotional fatigue syndrome, characterized by depersonalization and decreased sense of self-efficacy, experienced by individuals who work and always keep in touch with others. Burnout is an important issue in an organization as it can result in decreased performance. Sopiah argued that role stress is a condition where a person has difficulties in understanding his/her duties; thus, the roles he/she played would become too heavy or he/she would play a variety of roles in the organization where he/she works. Role stress can decrease the level of individual performance in an organization. Hence, it can affect the quality of work production, which would not be in accordance with the expectations of the organization itself. Lestari emphasized the beneficial effects of personality assessments to both individuals and organizations, as such assessments could identify individuals with motivation and match them with the right job. When the personality type of an employee is suited to their jobs, it would result in high satisfaction to the employee. He or she would therefore will be loyal and contribute maximally to the organization.

This study was conducted to analyze the effect of role stress, personality types, and burnout on the performance of midwives in the achievement of postnatal care program in Surabaya.

Methods

This analytic observational study using cross-sectional design was conducted during April–May 2015. The study population consisted of 45 midwives from eight primary health cares in Surabaya City having basic emergency obstetric and neonatal care services. Accidental sampling was used for sample selection. The following hypothesis testing formula for proportions was used to determine the minimum sample size of the midwives.

The values of \( \pi_1 \) and \( \pi_2 \) were obtained based on the study by Maharani and Triyoga, on the effect of burnout and performance of nurses on the delivery of nursing care.

Maharani and Triyoga demonstrated that there were two groups of burnout (mild burnout and no burnout). The values of \( \pi_1 \) and \( \pi_2 \) in the present study were obtained from the percentage between the group with good performance and mild burnout and the group with mild burnout (\( \pi_1 = 31/45 \times 100\% = 69\% \)) and from the percentage between the group with good performance and no burnout and the group with no burnout (\( \pi_2 = 8/8 \times 100\% = 100\% \)).

Data collection was carried out using questionnaire for its validity and reliability and also using observations to check midwives’ examination on two or three first postnatal visits (KF-1). The observations of midwives’ performance were conducted on KF-1 because postnatal maternal mortality primarily occurred within the first 24 hours after delivery. Data processing was done through data editing, data scoring, data coding, and data cleaning. Data were analyzed descriptively and analytically to determine the influence of independent variables on dependent variables simultaneously. The data were then assessed using multiple linear regression analysis. In the analysis of influence, independent variables such as education level, marital status, role stress, and personality types were converted into dummy variables, and then each dummy variable was compared with the variable of their reference group.

The role stress variable was assessed through the as-
The personality type variable was assessed using Big Five Inventory (BFI), a 44-item scale adapted from John and Srivastava. The indicators of personality types were neuroticism (8 items), extraversion (8 items), openness to experience (10 items), agreeableness (9 items), and conscientiousness (9 items). Respondents indicated their level of agreement on each statement by applying a four-point response scale (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree).

The personality type variable was assessed using Big Five Inventory (BFI), a 44-item scale adapted from John and Srivastava. The indicators of personality types were neuroticism (8 items), extraversion (8 items), openness to experience (10 items), agreeableness (9 items), and conscientiousness (9 items). Respondents indicated their level of agreement on each statement by applying a four-point response scale (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree).

The burnout variable was assessed using Maslach Burnout Inventory, which was a 22-item scale adapted from Maslach and Jackson. The indicators of burnout were emotional exhaustion (9 items), depersonalization (5 items), and personal accomplishment (8 items). Respondents indicated their level of burnout frequency on each statement by applying a four-point response scale (0 = never, 1 = rarely, 2 = often, and 3 = always).

The midwives’ postnatal care performance variable was assessed using a questionnaire with six indicators that were appropriate with the postpartum health care program based on the manual book of Surabaya Mother and Child Health Local Monitoring. To determine midwives’ postnatal care performance, 45 midwives were observed while they were performing postnatal care on two or three KF-1, and they were then assessed by filling out a six-indicator questionnaire with a two-point response scale (0 = if the item of postnatal care was not performed and 1 = if the item of postnatal care was performed).

### Results

Majority of midwives were 20–30 years and primarily diploma in midwifery. These midwives (86.7%) were married, and >50% of them (62.2%) were contract workers with working experiences <5 years and 5 to <10 years. More than half (62.2%) did not have role stress, whereas only 6.7% of them had severe role stress. Most majority of them have agreeableness personality type, and only 8.9% have conscientiousness personality type. Almost all midwives had mild burnout, whereas only 6.7% of them did not have this experience. Most of them (55.6%) showed medium-level performance, and the remaining showed good and bad performance of the same measure (22.2%) (Table 1).

As shown in the Table 2, the personality type variable (conscientiousness type with p value = 0.010, β= 0.356) and role stress (severe role stress with p value = 0.014, β = –0.340) had significant effect on midwives’ postnatal care performance. This implies that midwives with the conscientiousness personality type (accuracy) showed a higher performance level than midwives with the openness to experience personality type (openness to experience) and the agreeableness personality type (deal). This also implies that the greater the role stress experienced by the midwives, the lower the performance they produced. Conscientiousness personality type is found to have a more significant effect on midwives’

### Table 1. Frequency Distribution of Midwives’ Postnatal Care Performance

<table>
<thead>
<tr>
<th>Performance</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Performance</td>
<td>10</td>
<td>22.2</td>
</tr>
<tr>
<td>Medium Performance</td>
<td>25</td>
<td>55.6</td>
</tr>
<tr>
<td>Bad Performance</td>
<td>10</td>
<td>22.2</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Mean = 3.29 and Standard Deviation = 0.94

### Table 2. The Effect of Demographic Characteristics, Role Stress, Personality Type, and Burnout on Midwives’ Postnatal Care Performance

<table>
<thead>
<tr>
<th>Variable (Subvariable)</th>
<th>B</th>
<th>Beta</th>
<th>p Value</th>
<th>95% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
</tr>
<tr>
<td>Agreableness</td>
<td>0.201</td>
<td>0.176</td>
<td></td>
<td>0.289</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>1.168</td>
<td>0.356</td>
<td>0.010</td>
<td>0.289</td>
</tr>
<tr>
<td>Openness to Experience</td>
<td></td>
<td></td>
<td></td>
<td>0.289</td>
</tr>
<tr>
<td>Mild Role Stress</td>
<td>0.067</td>
<td>0.627</td>
<td>0.931</td>
<td>-2.273</td>
</tr>
<tr>
<td>Moderate Role Stress</td>
<td>0.012</td>
<td>0.931</td>
<td></td>
<td>-2.273</td>
</tr>
<tr>
<td>Severe Role Stress</td>
<td>-1.270</td>
<td>-0.340</td>
<td>0.014</td>
<td>-2.273</td>
</tr>
<tr>
<td>No Role Stress</td>
<td></td>
<td></td>
<td></td>
<td>0.289</td>
</tr>
<tr>
<td>Burnout</td>
<td>-0.007</td>
<td>0.936</td>
<td></td>
<td>0.289</td>
</tr>
<tr>
<td>Age</td>
<td>-0.099</td>
<td>0.300</td>
<td></td>
<td>0.289</td>
</tr>
<tr>
<td>D4 Midwifery</td>
<td>0.112</td>
<td>0.406</td>
<td></td>
<td>0.289</td>
</tr>
<tr>
<td>Married</td>
<td>-0.087</td>
<td>0.523</td>
<td></td>
<td>0.289</td>
</tr>
</tbody>
</table>

Notes:

p < 0.05 significant, multiple linear regression analysis, B = regression coefficient
postnatal care performance than severe role stress. The demographic characteristics and burnout variables had no significant influence on midwives’ postnatal care performance (Table 2).

Discussion

This study demonstrated a difference in the performance of midwives who experienced mild, moderate, and severe role stress, indicating that the greater the role stress experienced by the midwives, the lower the performance they produced. Kahn et al. introduced the role theory in organizational behaviour. They stated that an organization’s environment can affect individual’s expectation in terms of their role behavior. The expectation includes norms or pressure to act in a certain manner. Individuals receive the messages, interpret, and respond in a variety of ways. Role stress is divided into: role conflict, role ambiguity, and role overload types. Based on field observations, this role stress is generally due to conditions in the field, that is, the unmet number of personnel in primary health cares in accordance with the required fields, so that midwives carry out their duties and responsibilities that do not match with their competencies.

Kinicki and Kreitner in Tewal and Tewal, stated that when individuals feel conflicting demands from the surrounding people, then they are said to experience role conflict. Role conflict is experienced by individuals when internal values, ethics, or their standards collide with other demands. Robbins in Rozikin, defined role conflict as “a situation in which an individual (person) is faced with the expectations of different roles.” Hence, a conflict arises when individuals in certain roles are confused by demands or necessity to do something different from what they need, or when that is not a part of their work field. According to Fanani et al., role conflict can cause discomfort in working and may reduce the motivation to work because it has a negative impact on an individual’s behavior, such as the onset of work tension, turnover, and job dissatisfaction that can degrade the overall performance. In this study, role conflict was also found in almost all the midwives, which affected them in performing their duties. The study conducted by Agustina, Widyastuti, and Sumiati, showed that role conflict can affect performance, wherein the greater the role conflict experienced by the individuals, the lower the performance they produced.

According to Ahmad and Taylor, role ambiguity is a concept that describes the availability of information relating to the roles. The role holders must know whether these expectations are appropriate and in accordance with the activities and responsibilities of their positions. In addition, people must understand whether the activities have been able to fulfill the responsibilities of a position and how the activities are carried out. Role ambiguity is due to unclear job descriptions, incomplete orders from work leaders, and lack of experience. Tang and Chang, stated that a high role ambiguity may reduce one’s confidence on his/her ability to work effectively. Midwives who experience role ambiguity tend to be inefficient and unfocused in working, thus causing deprivation of their performance. Agustina, demonstrated that role ambiguity can affect performance, wherein the greater the role ambiguity experienced by the individuals, the lower the performance they produced.

According to Suyanto, workload can be calculated based on three aspects, physical, mental, and time utilization. The physical aspect includes workload based on human physical criteria. The mental aspect is a computation of workload by considering the mental aspect (psychological). The time utilization aspect considers more in using time to work. The amount of additional jobs to be done by midwives can interfere their job performance. High task demands in working have the negative effect of the emergence of burnout among midwives, which can lead to a drop in performance and quality of services delivered. This condition has also been confirmed by the study by Agustina, which found that role excess or workload can affect the performance, wherein the higher the role excess or the workload experienced by the individuals, the lower the performance they produced.

The present study showed that midwives with the conscientiousness personality type (accuracy) produced better postnatal care performance than midwives with the agreeableness personality type (deal) and the openness to experience personality type (openness to experience). Conscientiousness personality type (accuracy) is one dimension of the big five personalities that are consistently associated with performance and success of work. Individuals with this personality type are characterized as hard workers, highly self-disciplined, reliable, organized, meticulous and detailed, and likely to be industrious; thus, it would have an impact on improving the performance. A person with this personality type has a strong motivation to achieve success and has a task-oriented behavior. Individuals with the agreeableness personality type (agreement) may work together in a team and be trustworthy, caring, kind, helpful, unselfish, and forgiving and do not like to quarrel with others. The study by Barrick et al. in Rustiarini, showed that this personality has a strong effect on a person’s performance. However, the tendency of the individuals with this personality type to create a conducive working environment, avoid conflicts with colleagues, and reduce
the chances of conflict at the workplace can in fact cause these conditions that are not favorable for them as it can reduce the enthusiasm in competing for success and achieving higher performance than the achievements of other colleagues. Therefore, the creation of these conditions will indirectly reduce the spirit of work and performance of the individuals.23

Individuals with the openness to experience personality type are characterized as imaginative, ingenious, loving variety, curious, creative, innovative, free-thinkers, and artistic. McAdams and Pals in Rustiarini,23 described that persons with this personality type have high intellect and thus possess innovation and ingenuity in solving problems. However, the study conducted by Rustiarini,23 demonstrated that individuals with this personality type when carrying out the standard type of assignments, which are less varied and even performed on the clients repeatedly for each year, can make them feel less challenged while carrying out their assignments. This is because they are not able to use their creativity and intellect to solve new problems. In addition, the less variety as well as the repetitive routine form of any given assignments can make them to get bored quickly, which would then have an impact in declining the performance they produced.

Midwives with mild burnout produced lower performance on postnatal care than midwives with no burnout because mild burnout was often found on midwives with moderate and severe role stress. Midwives with openness to experience and agreeableness personality types had lower performance than midwives with no role stress and midwives with conscientiousness personality type. In this study, it was observed that burnout occurred among the midwives only in the early stages, which is entirely possibly due to the limited population size of the midwives studied, resulting in limitations to evaluate the midwives who experienced moderate and severe burnout.

Conclusion

Most of the midwives were 20–30 years with education level is dominated by diploma in midwifery, married, and >50% of them are contract workers with working experiences of <5 and 5 to <10 years. More than half did not experience role stress, whereas only 6.7% of them have severe role stress. Most of the midwives tend to have an agreeableness personality type, whereas a small proportion tend to have a conscientiousness personality type. Almost all midwives have mild burnout, whereas only 6.7% of them do not experience burnout. Most of them show medium-level performance, whereas the remaining showed good and bad performance of the same measure. The performance of midwives is affected by role stress (severe role stress with p value = 0.014, β = −0.340) and personality types (conscientiousness type with p value = 0.010, β = 0.356). The performance of midwives is found to be more affected by the conscientiousness personality type than by severe role stress.

Recommendation

Primary health cares should recruit new employees who will fit into the required fields to avoid inadequate human resources, which could have an impact on administering tasks to midwives that do not match with their competencies. Midwives who get new tasks that are not suitable to their competencies should be trained first, so that they can understand better about their duties and responsibilities in carrying out the new tasks, thus avoiding role ambiguity. Primary health cares should conduct a personality test on the process of recruitment and selection of midwives and prioritize those midwives who are hard workers, highly self-disciplined, reliable, organized, meticulous and detailed, and likely to be industrious (midwives with the tendency of conscientiousness personality type). Subsequent researchers who would conduct studies on the same topic can develop more complex variables that have not been examined in this study, such as social support, job satisfaction, and organizational commitment. Furthermore, a larger population size can be considered.

References

Family Perception Towards Health Role in Filariasis Countermeasures Using the Health Belief Model Approach in Aceh Besar District

Persepsi Keluarga terhadap Tugas Kesehatan dalam Penanggulangan Filariasis dengan Pendekatan Health Belief Model di Kabupaten Aceh Besar

Said Devi Elvin, Mutia Yusuf, Wirda Hayati, Teuku Alamsyah

Nursing Department, Aceh Health Polytechnic of Ministry of Health, Aceh, Indonesia

Abstract

Aceh Besar District is a filariasis endemic area. This endemic state is strongly influenced by people’s perception of filariasis countermeasures. This study aimed to determine relation between family perceptions towards health role in filariasis countermeasures using the Health Belief Model. An analytical survey was applied with a cross-sectional study approach. The study population was families at three villages that are Lambaro Bileu, Lambaet, and Cot Preh of Kuta Baro Primary Health Care. This represents 1,113 families with a sample of 92 families that were selected using a proportionate stratified random sampling technique. The study instrument was a questionnaire and data were analyzed in a univariate, bivariate, and multivariate. This study showed that the families' perceived susceptibility to filariasis disease and the families' perception of the benefits from filariasis preventive actions are influenced the health role in filariasis countermeasures (p value = 0.012 and 0.0001). However, the families' perception of the seriousness of filariasis disease and the families' perception of barriers in filariasis preventive action did not influence the health role in filariasis countermeasures (p value = 0.259 and 0.230). The families' perceived benefits of preventive action were the dominant factor related to the families' health role in filariasis countermeasures (OR = 12.863; 95% CI = 2.566–93.537) after adjusting with perceived susceptibility to diseases (OR = 8.316; 95% CI = 1.769–26.949).

Keywords: Family’s health role, filariasis, Health Belief Model, perception

Kata kunci: Peran kesehatan keluarga, filariasis, Health Belief Model, persepsi

Introduction

Filariasis is a parasitic chronic infectious disease caused by filarial worms. Filariasis is transmitted through mosquito bites containing filarial worms in its body. In the human body, the worm grows into an adult worm and settles in the lymph tissue, causing swelling in the legs, limbs, breasts, arms, and genital organs.\(^1\)

The number of filariasis patients in Indonesia is increasing every year. In 2016, the provinces of East Nusa Tenggara (2,864), Aceh (2,732), West Papua (1,244), Papua (1,184), and West Java (955) had the highest cases of chronic filariasis. The Aceh Province ranks the second in the number of filariasis patients after East Nusa Tenggara.\(^1\)

Aceh Besar District is one of the districts in the Aceh Province recorded as a filariasis-endemic district. In 2015, they were 49 cases of filariasis in Aceh Besar District. The subdistrict with the highest number of filariasis case was Kuta Baro Subdistrict with 17 cases.\(^2\)

Filariasis elimination program becomes a priority in Aceh Besar District and the main agenda is to perform Mass Drug Distribution activities to break the chain of filariasis transmission in all the filariasis-endemic subdistricts. The Aceh Besar District Government through the Health Office provides filariasis drugs for the people in 2016.\(^2\) In 2015, only 75% of the population wanted to take filariasis drugs, and in the district, the coverage was more than 65%, but this coverage was not evenly distributed, and several subdistricts had low coverage.\(^3\)

To achieve the elimination of filariasis, people need to understand the dimensions of the problems and influential risk factors associated with filariasis. Therefore, people’s active participation in filariasis countermeasures is very important.\(^4\)

Taken together, the main factors in filariasis countermeasures are people’s behavior in protecting themselves and taking filariasis drugs. The complete eradication of filariasis becomes challenging when people’s behavior toward maintaining the environment hygiene is poor and the level of filariasis drug compliance is low. One of the models associated with the people’s perception of filariasis countermeasures is the Health Belief Model (HBM), which was first developed in the 1950s by the social psychologists Hochbaum, Rosenstock, and Kegels from the United States of America. HBM produces a set of perception patterns that give rise to possible behaviors of countermeasures.\(^5\)

According to Hayden,\(^6\) the application of HBM in a study on people’s behavior in filariasis countermeasures can predict the likelihood of taking the recommended preventive health actions based on the results of the assessment of the people’s perceived susceptibility to diseases, perceived seriousness of diseases, perceived benefits of preventive action, and perceived barriers to preventive action.

There is a great paucity in regards to research on the families’ perception of health role in filariasis countermeasures in Aceh Besar District. Therefore, the aim of this study was to determine the relation of the families’ perception of health role in filariasis countermeasures in the working areas of Kuta Baro Primary Health Care, Aceh Besar District using the HBM approach.

Method

This study used an analytical survey with a cross-sectional approach. The study population involved families from three villages in the working areas of Kuta Baro Primary Health Care, namely Lambaro Bileu, Lambae, and Cot Preh. A total of 92 families were selected using a proportionate stratified random sampling technique. Data collection was conducted from January 22 to February 20, 2018. The independent variable in this study was families’ perception based on HBM construct, which are the perceived susceptibility to diseases, perceived seriousness of diseases, perceived benefits of preventive actions and perceived barriers to preventive actions. The dependent variable was the family’s health role in filariasis countermeasures in filariasis countermeasures are people’s behavior in protecting themselves and taking filariasis drugs. A questionnaire was administered, and its results were analyzed by univariate, bivariate, and multivariate statistics. The results are presented in tables.

The study was reviewed and approved by the Ethics Committee of the Faculty of Nursing, University of Syiah Kuala Kuala Banda Aceh (Number 160551622).

Results

According to results as shown in Table 1, the variable of families’ perceived susceptibility to diseases was present in 55 families with good health perception, and 48 (87.3%) families played a good health role in filariasis countermeasures. Further, 37 families had poor health perception, and 14 (37.8%) families had a good health role in filariasis countermeasures. The results of the chi-square test indicated that there was a relation between the family’s perceived susceptibility to diseases and the health role in filariasis countermeasures (p value =

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Health Role</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susceptibility</td>
<td>Good</td>
<td>48 (87.3%)</td>
<td>7 (12.7%)</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>14 (37.8%)</td>
<td>25 (62.2%)</td>
</tr>
<tr>
<td>Seriousness</td>
<td>Good</td>
<td>46 (76.7%)</td>
<td>14 (23.3%)</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>16 (50.0%)</td>
<td>16 (50.0%)</td>
</tr>
<tr>
<td>Benefit</td>
<td>Good</td>
<td>50 (86.2%)</td>
<td>8 (13.8%)</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>12 (35.3%)</td>
<td>22 (64.7%)</td>
</tr>
<tr>
<td>Barrier</td>
<td>Good</td>
<td>47 (85.9%)</td>
<td>9 (16.1%)</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>15 (41.7%)</td>
<td>21 (58.3%)</td>
</tr>
</tbody>
</table>
that most families felt susceptible to or at risk of filariasis disease, thus they followed a health role to prevent filariasis. This is as stated by Hochbaum, Rosenstock, and Kegels that mentioned perceived susceptibility includes an estimation of susceptibility to diseases and is one of the stronger perceptions in promoting healthy behavior adopted by people. The greater the perceived risk, the greater the possibility to get involved in a decreasing risk behavior.7

When persons believe that they are at risk of diseases, they will do something to prevent the disease to happen. Otherwise, when a person believes that they are not at risk or less likely to suffer from a disease, they tend to perform unhealthy behaviors.8 For example, adults generally do not consider themselves at risk of filariasis, therefore, they do not make the maximum efforts to prevent mosquito breeding such as eradicating man-made mosquito nests from garbage cans, used tires, or other water storage containers.9

Based on the explanation above, it can be concluded that the health role in the forms of filariasis countermeasure practices through mosquito bite preventive actions, vector control through home hygiene maintenance, and participation at filariasis mass treatment would be performed by families if they felt susceptible to or at risk of mosquito bites and suffering from filariasis. The findings of this study can be an example for the Kuta Baro Primary Health Care, Aceh Besar District, for preparing filariasis-related health promotion programs in the community.

Perceived seriousness/severity of diseases refers to an individual belief about the seriousness and severity of a disease.10 According to results, most of the families in Kuta Baro Primary Health Care, Aceh Besar District had not considered filariasis as a serious/severe disease. This will affect the families understanding of the filariasis consequences and not perceive filariasis as a serious health threat which needs an immediate response.

Perceived seriousness or severity of diseases includes how a person sees any bad consequences of any serious health issue. Severity is considered as the person’s belief about the importance or the magnitude of a health threat. Perceived seriousness is often based on medical or insight information. It also may come from a belief of someone who has experienced the pain of illness previously and it impacts on his/her life.11

One factor of poor families’ perceived seriousness/severity of diseases is the lack of medical and insight information on bad consequences of filariasis. One mistake families make is the assumption that filariasis symptoms are common and not serious symptoms, hence the family tends to take self-treatment. However, if the family knows the examination results of the symptoms, which may indicate positive filariasis, then the perception of the family will change and they will start taking any

**Table 2. Summary of Logistic Regression Analysis for Family’s Perception as the Predictors**

<table>
<thead>
<tr>
<th>Family’s Perceived</th>
<th>OR</th>
<th>p Value</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susceptibility</td>
<td>8.316</td>
<td>0.012</td>
<td>1.769</td>
<td>26.949</td>
</tr>
<tr>
<td>Seriousness</td>
<td>0.340</td>
<td>0.259</td>
<td>0.052</td>
<td>2.210</td>
</tr>
<tr>
<td>Benefit</td>
<td>12.863</td>
<td>0.000</td>
<td>2.566</td>
<td>93.537</td>
</tr>
<tr>
<td>Barrier</td>
<td>2.256</td>
<td>0.230</td>
<td>0.597</td>
<td>8.522</td>
</tr>
<tr>
<td>Constant</td>
<td>0.057</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Based on the results of this study, it can be concluded that most families had a good perception of the seriousness of the diseases, and 46 (76.7%) families played a good health role in filariasis countermeasures. Further, 32 heads of families had a poorly perceived seriousness of the diseases, and 16 (50.0%) families had a good health role in filariasis countermeasures. The results of the chi-square test showed that there was a relationship between the families’ perceived seriousness of diseases and the health role in filariasis countermeasures (p value = 0.012).

Results revealed that the family’s perceived benefits of preventive actions had 58 families with good perception, 50 (86.2%) families played a good health role in filariasis countermeasures. Further, 34 families had poor perception, and 22 (64.7%) families played a good health role in filariasis countermeasures. Based on the results of the chi-square test, there was a relation between the family’s perceived benefits of preventive actions and the health role in filariasis countermeasures (p value = 0.001).

The study also shows that 56 families had well-perceived barriers to preventive actions, 47 (85.9%) families played a good health role in filariasis countermeasures. Further, 56 families had poorly perceived barriers to preventive actions, 21 (58.5%) families played a good health role in filariasis countermeasures. Based on the results of the chi-square test, there was a relation between the family’s perceived barriers to preventive actions and the health role in filariasis countermeasures (p value = 0.001).

Based on the results of the logistic regression analysis method (Table 2), the families’ perceived susceptibility to diseases (p value = 0.012) and the families’ perceived benefits of preventive action (p value = 0.001) were significant to predictors of families’ health role in filariasis countermeasures. The families’ perceived benefits of preventive action were the dominant factor related to the families’ health role in filariasis countermeasures (OR = 12.863; 95% CI = 2.566–93.537) after adjusting with perceived susceptibility to diseases (OR = 8.316; 95% CI = 1.769–26.949).
filaria symptoms seriously. As Carpenter\textsuperscript{12} points out, the understanding of perceived seriousness/severity of diseases can be illustrated with the example that most people consider fever a common symptom of illness. However, if a person has a fever and the examination result causes him/her to be hospitalized, then his/her perception of fever will change into a serious illness.\textsuperscript{12}

To increase families’ perceived seriousness/severity of diseases, the health workers at Kuta Baro Primary Healthcare, Aceh Besar Subdistrict must improve the families’ knowledge of filariasis dangers and consequences.

This study found a relation between the families perceived benefits of preventive action to the health role in filariasis countermeasures. The results of this study pointed that most families perceived that filariasis countermeasure actions such as avoiding mosquito bites, controlling vectors through home hygiene maintenance, and participation at filariasis mass treatment provide benefits and preventive actions to family members from filariasis disease. This result was closely associated with the good families’ perceived susceptibility to diseases.

A similar statement is also expressed by Jones, Christina Jane, Helen Smith, and Carrie Llewellyn,\textsuperscript{13} that mention the actions taken by a person for disease countermeasures (or treatment) depends on the consideration and evaluation from the perceived susceptibility to diseases and the perceived benefits of preventive actions. Therefore, the person would accept the recommended health actions if considered beneficial. A person tends to adopt healthy behaviors if they believe that healthy behavior will decrease their risk (susceptibility) of diseases. The perceived benefit plays an important role in adopting the behavior for secondary countermeasures like screening.\textsuperscript{15}

Based on the explanation above, the steps needed to be taken by the health workers, especially at Kuta Baro Primary Health Care, Aceh Besar District is to facilitate and actively motivate families to avoid mosquito bites, vector control through home hygiene maintenance, and participation at filariasis mass treatment. These are important actions, and if completed families would perceive the good benefits of filariasis countermeasure actions they have taken.

Results also indicated that there was a relation between the families’ perceived barriers to preventive action and the health role in filariasis countermeasures. The families perceived that there was no barrier to filariasis countermeasures action, thus the families perceived barriers to preventive action was a related variable in carrying out the health role for filariasis prevention.

The similar statement is also expressed by Amarillo where perceived barriers are the individual self-evaluation on barriers to adopting new behaviors. Of all HBM constructions, the most important barrier is determining the change of a person’s behavior. The family’s perceived seriousness of diseases did not significantly influence to the health role in filariasis countermeasures. However, the families’ perceived seriousness/severity of diseases can influence the families’ perceived barriers in filariasis countermeasures.\textsuperscript{14} Jones and Bartlett,\textsuperscript{7} also stated that to improve people’s behavior in filariasis countermeasures, the real threat of seriousness/severity of filariasis disease would motivate the people to take countermeasure actions by avoiding mosquito bites, controlling vector through home hygiene maintenance, and participating in filariasis mass treatment. Any barriers felt by people in mosquito nest eradication, it can be overcome if people have a high perception of the seriousness/severity of filariasis disease.

The results of the logistic regression showed that the family’s perceived susceptibility to diseases (p value = 0.012) and the family’s perceived benefits of preventive action (p value = 0.001) were the significant predictors of families’ health role in filariasis countermeasures. This result aligns with Hayden,\textsuperscript{6} that previously described that the actions taken by a person to prevent (or cure) the disease depends on the evaluation and consideration of the perceived susceptibility to diseases and the perceived benefits of any preventive action. A person will accept a health action if beneficial to them. A person tends to adopt health behaviors that decrease their risk of disease exposure. Perception of the perceived benefit had an important role in adopting secondary preventive behaviors.\textsuperscript{6}

Results of the logistic regression analysis showed predictors for both perceived susceptibility to diseases and perceived benefits of preventive action. The most dominant factor related to the family’s health role in filariasis countermeasures was the perceived benefits of preventive action (OR = 12.863; 95\% CI = 2.566–93.537) after adjusting for perceived susceptibility to diseases (OR = 8.316; 95\% CI = 1.769–26.949). Jones and Bartlett,\textsuperscript{7} had similar findings and suggestions. The construct of perceived benefits is a person’s opinion of the value or usefulness of a new behavior to decrease the risk of developing a disease. People tend to adopt healthier behaviors when they believe the new behavior will decrease their likelihood of developing a disease.\textsuperscript{7}

**Conclusion**

The families’ perceived susceptibility to diseases and the families’ perceived benefits of preventive action are significant predictors of the families’ health role in filariasis countermeasures. The families’ perceived benefits of preventive action are the dominant factor related to families’ health role in filariasis countermeasures such as protecting themselves and taking drugs after adjusting for perceived susceptibility to diseases.
Acknowledgment

The researchers would like to thank the Aceh Health Polytechnic for their financial support. We also would like to express our gratitude to the Kuta Baro Primary Health Care in Aceh Besar District, and all respondents who have participated in this study.

References

Impact of Budget Increase on Primary Health Care Performance in the Era of National Health Insurance: Case Study in Buleleng District

Dampak Peningkatan Anggaran terhadap Kinerja Puskesmas di Era Jaminan Kesehatan Nasional: Studi Kasus di Kabupaten Buleleng

Kadek Suranugraha*, Ni Made Sri Nopiyani**, Pande Putu Januraga**

*Buleleng District Health Office, Bali, Indonesia, **Department of Public Health and Preventive Medicine, Faculty of Medicine, Udayana University, Bali, Indonesia

Abstract
Since 2014, there has been an increase in funds for primary health care (PHC) coming from the National Health Insurance program capitation funds and the Health Operational Assistance Fund. This study aimed to explore the effect of this budget increase on the health care services at PHC. The case study used a qualitative approach and interviews from 19 PHC health workers with the highest and lowest budget. Data were analyzed using thematic analysis and supported by quantitative data. The positive impact of the increasing PHC budget was felt by PHC staff due to the addition of operational equipment and incentives provided. Nevertheless, there was also a negative impact such as feeling overwhelmed due to an increase in the quantity of PHC activities and additional administrative affairs. It also triggered a negative interaction between staff due to the number of incentives received. The regulation on the use of budget empowers PHC to better arrange the schedule of activities and manage human resources. However, these regulations are considered restrictive and the administrative flow of funds is too long that hinder the optimal use of the budget.

Keywords: Budget increase, Health Operational Assistance Fund, National Health Insurance, performance, primary health care

Introduction

The Government of Indonesia has made various efforts to improve the budget of health programs and services.1 In 2004, the Law No. 40 initiated the reform of the health financing system in the National Health Insurance (NHI). The government began to pay attention to the preventive program aspects by providing the Health Operational Assistance Fund for primary health care (PHC) since 2010.2 The government re-issued a Presidential Regulation (Law No. 12) on 2013 for Health Insurance, followed by the Regulation of Health Minister No. 71 of 2013 for NHI Health Services that regulates the granting of PHC funds. Since 2014, these regulations have resulted in a noticeable increase in the budget of PHC throughout Indonesia, including in Buleleng District.

Health financing is an important component of the health system and influences other factors.3 Changes in health financing can have an impact on human resources, types of service provided, fund allocation, the technology used, health information, and institutional leadership.3-8 However, there is evidence that while grant incentives for financing health care providers can increase the financial benefits of service providers and improve health care activities, these do not necessarily contribute to the improvement of health status in the community.9

Studying the impact of the increased budget on PHC’s performance in the NHI era has never been done before. Such a study is necessary in order to provide important input for policymakers and ensure the improvement of health system outcomes.10 This study aimed to examine the changes and impacts on PHC’s performance in Buleleng District.

Method

This was a case study with data collected on May 2017. PHC selection was determined by the budget level. The PHC with the highest budget was Buleleng I Primary Health Care and the PHC with the lowest budget was Seririt III Primary Health Care. Qualitative data were collected through semi-structured interviews using interview guidelines, and quantitative data were collected from the budget and performance reports of selected PHC. The interviewed participants included the head of PHC, head of the administrative sub-division, Public Health Program Manager, Individual Health Program manager, pharmaceutical service manager, and laboratory service manager at each PHC. From Buleleng I Primary Health Care 9 participants were interviewed and 10 were interviewed from Seririt III Primary Health Care.

Changes and impacts of PHC budget improvements were analyzed using thematic analysis methods based on the Quality of Care framework by Campbell. The analysis was performed on the structure and process components of health services. The component structure consisted of building and environment aspects of PHC, health equipment, medications, human resources, management and leadership, funding, information system, and process component consisting of health service and management implementation. The information obtained was coded, then grouped into a code list to make better define by theme. Validation strategies used were a triangulation of data, including the combination of data drawn from the different interviewed participant, and methodological triangulation using interviews and secondary data review.

This study was reviewed and approved by the Medical Ethics Committee of Udayana University/ Sanglah Public Hospital with Number 1256/UN.14.2/KEP/2017 on May 18th, 2017.

Results

Buleleng I Primary Health Care and Seririt III Primary Health Care are located in urban areas and carry out health services mandated by the government. However, Buleleng I Primary Health Care has a range of work area of 1,202 km² that is larger than Seririt III Primary Health Care with a working area of 754 km². Buleleng I Primary Health Care also has a larger population, 66,164 people compared to Seririt III Primary Health Care with a population of 13,121 people. The increase in funds led to an increase of Buleleng I Primary Health Care’s budget from IDR 1,894,829,000 in 2014 to IDR 3,750,456,000 in 2016, while Seririt III Primary Health Care’s budget increased from IDR 381,528,500 in 2014 to IDR 993,391,281 in 2016.

The existing budget was used to finance the implementation of Public Health Programs, improve the structure component, operational equipment, and human resources.

Analysis of secondary data revealed that the performance of both PHCs in terms of coverage of Individual and Public Health Program, and management was improved. Coverage of the Individual Health Program in both PHCs also increased after the increased budget. The coverage of Public Health Programs in both PHCs especially in maternal and child health services, family planning,
health education, integrated health care, integrated health care for non-communicable diseases, promotion of exclusive breastfeeding, and monitoring of vitamin A administration was also increased. Furthermore, improvements in management aspects were observed in both PHCs after the increase of fund.

Ultimately, an improvement on the health services and management leveled up the performance score of Buleleng I Primary Health Care and Seririt III Primary Health Care. Classification of PHC performance was presented in Table 1.

Table 1. The Performance Level of Buleleng I Primary Health Care and Seririt III Primary Health Care in 2012–2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Health Services Coverage</th>
<th>Management Coverage</th>
<th>PHC Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buleleng I</td>
<td>Seririt III</td>
<td>Buleleng I</td>
</tr>
<tr>
<td>2012</td>
<td>87.1</td>
<td>83.6</td>
<td>6</td>
</tr>
<tr>
<td>2013</td>
<td>88.0</td>
<td>85.5</td>
<td>6</td>
</tr>
<tr>
<td>2014</td>
<td>88.8</td>
<td>81.7</td>
<td>6.6</td>
</tr>
<tr>
<td>2016</td>
<td>86.8</td>
<td>86.3</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Table 2. Summary of the In-depth Interview Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>Improvement of the condition of PHC buildings and environment due to increased budget</td>
</tr>
<tr>
<td>Supporting facilities</td>
<td>Improvement of the quantity and quality of supporting facilities due to increased budget</td>
</tr>
<tr>
<td>Human resources</td>
<td>Improvement on the provision of financial incentives for staff due to increased budget</td>
</tr>
<tr>
<td></td>
<td>Improvement on staff performance due to a better PHC supporting facilities and environment</td>
</tr>
<tr>
<td></td>
<td>Increase in staff’s motivation due to improvement on incentive provision</td>
</tr>
<tr>
<td></td>
<td>Increasing staff’s work ethic due to additional service activities and administrative tasks</td>
</tr>
<tr>
<td></td>
<td>Decreased interaction among staff due to differences in the number of activities performed and the number of incentives received</td>
</tr>
<tr>
<td></td>
<td>Payment mechanism led to a change in work ethic. Some staff tend to work only on the basis of rewards given</td>
</tr>
<tr>
<td></td>
<td>Increased quantity of individual health service</td>
</tr>
<tr>
<td></td>
<td>Reactivation of some development activities in the Public Health Program</td>
</tr>
<tr>
<td></td>
<td>Increased quantity of individual health service</td>
</tr>
<tr>
<td></td>
<td>Regulation on the utilization of funds forces the PHC to better plan activities and more intensively manage human resources</td>
</tr>
</tbody>
</table>

Unfortunately, others problems have arisen, particularly regarding human resources. Higher budgets indirectly lead to an increase in the number of activities carried out, thereby requiring more people to perform those activities. On the other hand, the number of staff available did not align with the program’s needs, which made staff feel overwhelmed. Buleleng I Primary Health Care officials revealed that if the staff was forced to carry out activities in accordance with the existing budget, they would have difficulty being accountable. “If we are asked to do more nothing will get done properly because there simply aren’t enough of us…” (UKM2_PB)

Adequate administrative requirements and inadequate staff’s accountability has resulted in some staff feeling the strain of the additional workload. “That’s a matter of the administration; sometimes we don’t really understand how to make the accountability files.” (KU_T_PB)

Some program managers also revealed that the PHC’s budget increase has not been utilized in accordance with the needs of the health program. The budget for programs should be equitable across the board; however, this is not always the case, as one respondent explained. “There is a very small budget for child health because...” (UKM7_PS)

"We have always been enthusiastic about our work, but now we feel more appreciated, our contributions are better acknowledged…" (UKM7_PS)
it has been redirected to maternal health. You can see the difference in the quality and scope of activities in the early childhood health class, compared to the maternal health class...” (UKM2_PS)

PHC leaders should be more open to discussing these problems. Another staff was not aware of what a budget constraint entails.

“The thing is that not everyone fully understands what is going on, where the money is going and what for...” (KPS_PS)

“The funds are all divided according to the different programs in different PHC sections...” (UKM4_PS)

This gap ultimately leads to new problems, such as the changes in the interaction between health workers triggered by the difference in the number of activities between officers. The difference in the number of activities affects the number of incentives received by the officers, which decrease the interaction among the staff, as expressed by some program managers.

“In the past, those outside our direct management line didn’t have a lot to do, we only speak with them when needed something, but now that we have a competitive compensation program, people don’t want to get involved unless they are compensated...” (UKM2_PS)

These conditions indicate a change in the staff work ethic. The officer tends to only conduct activities for which they get paid, thus prioritizing work on the basis of rewards given. The differences in the size of compensation foster a feeling of dissatisfaction among the PHC staff. Some informants considered that the basis for the provision of services was not in accordance with the conditions at PHC. The assignment of managers of health programs at Buleleng I Primary Health Care and Seririt III Primary Health Care I was based on the criteria of healthcare worker suitability with the health program for which they will be responsible. At these two PHC, there was no degree of responsibility differentiating between the sizes of the programmer’s responsibilities from the level of education, thus the level of education does not guarantee that the staff performs more tasks than those with lower levels of education. It can be assumed that educational level did not have a significant effect on the workload of staff.

“For example, an undergraduate level officer is responsible for program development and has not a lot of paperwork to carry out, but those with a lower technical school degree are responsible for immunization which has more reporting, VCT services, and other activities...” (UKM6_PS)

The increased PHC’s budget has resulted in an increased number of Public Health Program activities, quality improvement of Individual Health Program, and PHC management quality improvement. The Health Operational Assistance Fund program report on both PHCs indicates that there is an increased frequency of implementation of 14 types of health activities. The director of Seririt III Primary Health Care also revealed that they had reactivated some development activities, such as sport health activities, nutrition, and traditional treatment activities.

“Because some activities have been reintroduced and we have funds to carry this out we really need to carry them out effectively...”(UKM4_PB)

In addition, the increase in budgetary revenues also has an impact on the addition of new activities such as high risk pregnant women’s home visits, postpartum home visits, exclusive breastfeeding, family and care coaching, a new type of laboratory examination, new immunization services that now include Japanese Encephalitis vaccination and the existence of a chronic disease management program.

On the Individual Health Program side, both PHCs experienced an increase in the number of outpatient visits since 2014, as indicated by reports from the Health Services Profile of Buleleng District Health Office from 2012 until 2016. This indicates an increase in the quantity of Individual Health Program activities inside the PHC building. There was also an increase in demand for blood samples. This is reiterated by laboratory service workers.

“There is an increase in patient’s seeking testing, sometimes up to 150 per month...” (PL_PB)

On the other hand, the PHC budget increase also has a positive effect on management aspects. All activities financed by the Health Operational Assistance Fund must be contained in the PHC’s activity implementation plan documentation. This is done to avoid administrative errors and compliance with applicable rules, hence the staff is able to carry out activities without having to worry about the division of tasks and implementation times that might clash with other activities.

Besides, the utilization of NHI capitation and Health Operational Assistance Fund also faces several obstacles, such as strict regulation that enable the optimal use of budget according to the PHC needs. The director of Seririt III Primary Health Care revealed that they did not need the extra funds for the procurement of consumables, as their consumables stock supplies exceed a one-year requirement, but every year a proportion of NHI capitation budget has been set for consumables procurement, and cannot be used for other purposes.

“For example, if only the regulation could be more flexible we could divide the funds for 60% staff wages and 40% operational costs, so it would be helpful if we could re-allocate those unused funds for something more urgent....” (KPS_PS)

Health program managers also felt the barriers to the use of funds because of such regulations. Because there
are regulations on budget utilization for certain health programs, the existing budget cannot be used for some health programs at PHC.

“The increase has helped us to better carry out activities...there are now available funds...but if these activities are not stipulated within the guidelines we can’t” (UKM6_PS)

This has resulted in the incomplete distribution of available funds for the PHC, as expressed by the director of administration.

“No...if there are funds leftover we cannot use these...there is some leftover...” (KTU_PS)

Officials also felt that the administrative flow of budget utilization was too time-consuming which complicates the process.

“There are funds from NHI...so things should be easier, but for example, we can’t simply make whatever purchases we like, we have to place a request to the District Health Office, and then getting signatures which is time-consuming” (UKP_PB)

Health providers attempted to increase budget absorption by maximizing the possibility of channeling funds in each health program.

“We always try to make sure that funds are used... and offer them across all the management programs... to help meet targets” (UKP_PB)

Discussion

This study suggests that improvement of the budget from the NHI and Health Operational Assistance Fund at both PHCs had positive and negative consequences. Financial improvement support enabled PHC to improve the procurement of supporting facilities, such as computers and medical equipment. This made the administrative works easier and supported the implementation of computerized health information system. Integrated health information with the computerized system has better accuracy, saves time, and is more efficient.\textsuperscript{11}

Moreover, budget improvement leads to more resources available to support operational PHC activities and provide incentives for PHC staff. It could be concluded that the budget improvement brought a direct positive impact in improving the quantity and quality of health management and health care at PHC. The regulatory aspect of NHI also had a positive impact on health care quality. The Regulation of Health Ministry HK.02.02/MENKES/514/2015 on Clinical Practice Guidelines for Physicians at First Level Medical Service Facilities elucidates that there are 179 diseases that should be treated by primary healthcare services. The PHC has an obligation to handle a number of diagnoses and/or follow through with the referral process so that the quality of the services is provided according to the patient’s needs. Regulation on clinical practices guideline for physicians in primary health care services is effective in improving the quality of individual health care and reducing non-specialist referrals.

On the other side, improvement in the financial aspect, healthcare equipment, and technology should be balanced with human resources optimization. Based on the Health Minister’s Regulation Number 75 of the Year 2014 concerning Primary Health Care, both PHCs in this study have not met the minimum quantity standard of human resources. Lack of human resources at PHC could impede healthcare provision and budget utilization.

A limited number of human resources at PHC caused a burden among the staff to conduct health care services and related administrative tasks. Improvement of the budget was accompanied by an increase in administrative tasks to report the use of NHI capitation fund and Health Operational Assistance Fund. Buleleng District Health Office and PHC have not undertaken workload analysis of their staff; therefore, job allocation was not equitable among staff. Disproportionate workload distribution leaves some staff with higher workload pressure than others.

This study reveals that the improvement of budget received by PHC has led to the improved implementation of Individual Health Program and Public Health Program, particularly the essential Public Health Program. The finding is in line with the result of a study by Nurmansyah & Kilic,\textsuperscript{12} that showed the improved revenue from capitation fund of NHI has improved health promotion activities of PHC in South Tangerang City. However, in line with the findings of other studies, improvement of budget does not necessarily result in an increase in financial support for all PHC programs. Availability of more funding does not guarantee the equitable improvement of resources across all the PHC programs. Some programs benefited more than others. Therefore, equity is an important aspect to ensure that all PHC programs receive an adequate allocation from the improved budget.\textsuperscript{13} Furthermore, disproportionate shares of the budget among programs affected the number of activities undertaken by the staff. The number of activities conducted by the staff will determine the number of their service incentives. Therefore, inequitable budget allocation indirectly leads to the different amount of service incentives and triggers jealousy among PHC staff.

Different amount of service incentives could negatively influence the staff’s satisfaction. Review of current regulation about the calculation of service incentives is perceived important by PHC staff since it is considered less fair and inappropriate with the current working situation on PHC. Similar findings from the previous study conducted in Karangasem District suggested that staff of
PHC in this District perceived that the scores given for each type of health workers was inappropriate and could diminish interaction among staff.14

Financial incentives may affect healthcare performance at PHC, but it could also be potentially harmful to the working environment.4 Incentives providing mechanisms should be undertaken cautiously as there is limited evidence to support the use of financial incentives for improving the quality of PHC services over the longer term.15,16 Performance-based financial incentives could change the staff’s work ethic. PHC staff prefer to take paid activities and avoid activities with no incentives. This practice resulted in a shifting of the organization culture.17,18

A complex effect of budget improvement on human resources has a significant implication for health care, as human resource is one of the main aspects of health care and it could influence other health care components.3,19 If the negative impacts of improved budget on human resources are not seriously overcome, it could lead to a decrease in staff quality of work, working satisfaction, bad communication, and consequently lead to poor health-care provision for the community.

PHCs in Buleleng District could have different results if compared to other PHCs. Therefore, the results of this study can be used as a theoretical reference on the intervention in a similar context or situation. Study replication in other locations could produce different results, and considering the design of this study is a case study, it is premature to make any conclusive deductions.

Conclusion
Increasing PHC’s revenue in the NHI era coincides with improved performance in both program and management coverage, but there are still some problems and barriers that have a negative impact. Human resources are affected by the increase in PHC’s budget. Considering that human resources are an integral aspect of the health system, the relevant actors need to make efforts to minimize the negative impact and inhibiting factors in order to have an optimum and profitable increase in the budget for the implementation of health care services at PHC in Indonesia.

References

Utilization of Styrofoam as Soundproofing Material with Auditory Frequency Range

Pemanfaatan Styrofoam sebagai Bahan Peredam Bising dengan Rentang Frekuensi Pendengaran

Abstract
The utilization of bricks made of styrofoam is expectedly able to be a soundproof for noise control and as a preventive action to reduce the steadily increasing prevalence of hearing loss. This study aimed to assess the use of sound absorption material in which styrofoam was utilized to reduce the noise exposure. In this study, fine aggregates (sand and styrofoam) were made with a mixture of cement with a composition of 1:4 and 1:6, also the addition of polystyrene waste with a percentage of 0%, 20%, 40%, 60%, and 80%. Determination of acoustical property of the mixture was done by testing the sound absorption coefficient (α) using Four Microphone Impedance Tube (ISO 140-3). The results showed that the highest value of absorption coefficient was at a frequency of 800 Hz with an additional 80% styrofoam for the composition of 1:4 at 0.4100 dB and at a frequency of 800 Hz with an additional 40% styrofoam for the composition of 1:6 at 0.5870 dB.

Keywords: Noise, sound absorption coefficient, sound transmission loss, styrofoam

Abstrak
Pemanfaatan batako yang terbuat dari styrofoam diharapkan dapat menjadi peredam bising guna pengendalian bising dan sebagai langkah pencegahan untuk mengurangi prevalensi penurunan pendengaran yang terus meningkat. Penelitian ini bertujuan mengkaji penggunaan bahan penyerap suara dimana styrofoam dimanfaatkan untuk mengurangi paparan kebisingan. Pada penelitian ini, agregat halus (pasir dan styrofoam) dibuat dengan campuran semen dengan komposisi 1:4 dan 1:6, serta penambahan limbah polistirena dengan persentase 0%, 20%, 40%, 60%, dan 80%. Penentuan kemampuan akustik dari campuran dilakukan dengan menguji koefisien penyerap suara menggunakan Empat Mikrofon Tabung Impedansi (ISO 140-3). Hasil menunjukkan nilai tertinggi koefisien penyerap suara berada pada frekuensi 800 Hz dengan penambahan styrofoam 80% untuk komposisi 1:4 sebesar 0.4100 dB dan pada frekuensi 800 Hz dengan penambahan styrofoam 40% untuk komposisi 1:6 sebesar 0.5870 dB.

Kata kunci: Bising, koefisien penyerap suara, kehilangan transmisi suara, styrofoam


Correspondence: Sjahrul Meizar Nasri, Faculty of Public Health Universitas Indonesia, Building D 1st Floor Kampus Baru UI Depok 16424, Phone: +6221-78849055, E-mail: sjahrul.mn@gmail.com
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Introduction

An ‘unwanted’ sound at certain amplitude that could cause discomfort and disturb is called noise.¹ In low- and middle-income countries, 80% of over 275 million people around the world suffer from noise-induced hearing loss (NIHL).² Although NIHL is irreversible but Hearing Loss Prevention Program (HLPP) can be implemented to prevent the damage. Employing engineering and administrative control are the innovation of the hearing conservation program for the exposure level that closes to 85 dBA which is benefited to decrease the number of NIHL.³ A method commonly implemented in many industries is employing personal protective equipment (PPE) program only, such as providing the earmuff and earplug, in which the use of the PPE depends on the workers’ behavior and habit. The PPE program only prevents the noise exposure indirectly, however, this program needs to be strictly supervised.⁴

One of the engineering controls that can be considered to reduce the noise exposure is by using a sound-proofing material (noise absorbent) which will reduce the level of noise received by the workers. Some previous studies are already conducted to develop any material capable of absorbing the noise by using many kinds of natural fiber wastes, such as cotton, jute fiber, palm fiber, rice husk, rice straw, coconut husk, sawdust, rice husk powder, tea fiber leaf waste, wheat straw, glass-wool and rockwool.⁵⁻¹⁴ However, the utilization of these fibers, particularly the glass-wool and rockwool, has health and safety impacts, such as damaging the lungs and eyes.¹⁴ Then the utilization of the fibers has disadvantages since the natural fibers easily absorb the water and are also flammable.¹³ In the previous study, styrofoam was added on a brick production and the study found that styrofoam created some air cavities within the transition zone of styrofoam and cement-sand.¹⁶ The more styrofoam being added, the more water will be absorbed by the cavities.¹⁶ This previous study also found that styrofoam is hydrophobic and has smooth surface which makes styrofoam suitable to be mixed with cement and sand as the aggregate. Based on these findings, it is hypothesized that styrofoam might be used as alternative material in brick production and reduce the noise since the air cavity created by the styrofoam in the brick material potentially absorbs the noise. In addition, the previous study presented that by employing styrofoam as a sound-absorbing material with a core thickness of around 30 mm and 40 mm, the absorption coefficient of 0.628 and 0.574 at 500 Hz frequency.¹⁷ In other words, the ability in absorbing the noise was shown by using the styrofoam as the sound-absorbing material.¹⁷

The utilization of styrofoam can be increased by conducting a further study to produce “light brick”. The ability of brick as a soundproof is expected to be used for noise control, also as the preventive action of hearing loss. Hence, the aim of this study was to obtain the appropriate material capable of reducing the noise exposure by finding the best composition of the mixture in which the styrofoam was added.

Method

This study used experimental method and primary data. Data analysis was by implementing ASTM E-1050-98 procedure to measure the sound absorption coefficient.¹⁸ Variable measured in this study was the ability of styrofoam in a mixture to reduce noise exposure based on different composition of styrofoam in the mixture. Sound-absorbing material was developed from cement, fine aggregate, and water and the ratio of cement to fine aggregate were 1:4, 1:6, and 1:8 as a composite. The treated styrofoam wastes added to the composite were 0%, 20%, 40%, 60% and 80% of the total volume of the composite (cement and fine aggregates). The styrofoam waste has been cleaned before being added to the composite to ensure that it was free of dirt and grease which could affect the composite’s quality. In addition, the styrofoam waste was also sieved to ensure that the composite met the requirements for fine aggregate referring to SNI-03-6821-2002.¹ There are three specimens on each mixture, and as a result, the total sample in this study was 45 samples. The specimens’ diameter was 10 cm. The detailed composition of each specimen is shown in the Table 1.

The sound absorption coefficient test was conducted in Acoustical Laboratory of Physics, Department Faculty of Mathematics & Natural Sciences Universitas Sebelas Maret Surakarta by using ASTM E-1050-98 procedure. The absorption coefficient (α) test was conducted at 250 Hz, 400 Hz, 500 Hz, 800 Hz, 1000 Hz, 1250 Hz, and 1600 Hz. The frequencies were obtained from the test results using Impedance Tube Method.

After the styrofoam was cleaned and ready, the mixture...
Nasri et al., Utilization of Styrofoam as Soundproofing Material with Auditory Frequency Range

The utilization process began and included the cement, sand, and styrofoam itself. The three mixture compositions were cement: fine aggregate with a ratio of 1:4, 1:6, and 1:8 with a percentage of 0%, 20%, 40%, 60%, and 80% styrofoam (value FAS = 0.645). This specimen fabrication refers to the requirement of acoustic testing at low frequency up to 1600 Hz. Then the absorption coefficient (α) was determined. Absorption coefficient (α) is the ratio of absorbed sound energy by the material towards total sound energy that hit the material itself. It has a range of 0 to 1. Material with α = 0 shows that material has the capability/potential to absorb 0 or reflection, and material with α = 1 shows that the material itself has the capability/potential of proper absorption, i.e. 100%.

Since there were three replications on each mixture, the absorption coefficient (α) value was obtained by calculating the mean of each mixture’s absorption coefficient. Then the equal variances across group of samples was determined by using Lavene test. This test is used to verify the assumption that the samples have equal variances. The ethical clearance of this study was obtained from the Ethics Committee of Faculty of Public Health, Universitas Indonesia (No.33/H2.F10/PPM.00.02/2014).

Results

Two parameters were taken to examine the acoustic capability or potential of styrofoam waste material, i.e., the sound absorption coefficient (α) and sound transmission loss (TL). The measurement of absorption coefficient (α) was performed at 125, 250, 500, 1000, 2000, and 4000 Hz frequencies. This test was carried out using an Impedance Tube.

Based on the table above, in composition of 1:4 between cement and fine aggregate, the maximum absorption coefficient (α) value was shown in sample code 4-8. In the other words, the maximum capability to absorb the noise was at which the styrofoam was added by 80% to the fine aggregate among the 1:4 composition. The maximum ability to absorb the noise was in the frequency at 800 Hz and the absorption coefficient (α) value was 0.4100 (Table 2).

On the other hand, in 1:6 compositions between cement and fine aggregate, the maximum value was presented in sample code 6-4. It means that the maximum ability to absorb the noise was at which 40% styrofoam was added to the fine aggregate. The maximum ability to absorb the noise among the 1:6 composition was in the frequency at 1000 Hz and the absorption coefficient (α) value was 0.2230

<p>| Table 2. Absorption Ability of Styrofoam Waste Material on Mixed Composition of 1:4 and 1:6 Based on Variation of Styrofoam Addition |</p>
<table>
<thead>
<tr>
<th>Sample Code</th>
<th>250Hz</th>
<th>400Hz</th>
<th>500Hz</th>
<th>800Hz</th>
<th>1kHz</th>
<th>1.25kHz</th>
<th>1.6kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-0</td>
<td>0.0466</td>
<td>0.0288</td>
<td>0.3640</td>
<td>0.0838</td>
<td>0.0516</td>
<td>0.0644</td>
<td>0.0777</td>
</tr>
<tr>
<td>4-2</td>
<td>0.0140</td>
<td>0.0770</td>
<td>0.1540</td>
<td>0.2740</td>
<td>0.0825</td>
<td>0.0661</td>
<td>0.0929</td>
</tr>
<tr>
<td>4-4</td>
<td>0.0280</td>
<td>0.0863</td>
<td>0.1610</td>
<td>0.2580</td>
<td>0.0944</td>
<td>0.0938</td>
<td>0.1630</td>
</tr>
<tr>
<td>4-6</td>
<td>0.0179</td>
<td>0.0903</td>
<td>0.1650</td>
<td>0.2680</td>
<td>0.1070</td>
<td>0.1730</td>
<td>0.1170</td>
</tr>
<tr>
<td>4-8</td>
<td>0.0217</td>
<td>0.0781</td>
<td>0.1250</td>
<td>0.4100*</td>
<td>0.2050</td>
<td>0.1625</td>
<td>0.136</td>
</tr>
<tr>
<td>6-0</td>
<td>0.0355</td>
<td>0.1550</td>
<td>0.3130</td>
<td>0.2490</td>
<td>0.1040</td>
<td>0.1050</td>
<td>0.1950</td>
</tr>
<tr>
<td>6-2</td>
<td>0.0380</td>
<td>0.2170</td>
<td>0.3260</td>
<td>0.2760</td>
<td>0.1710</td>
<td>0.1080</td>
<td>0.1640</td>
</tr>
<tr>
<td>6-4</td>
<td>0.0392</td>
<td>0.1130</td>
<td>0.1650</td>
<td>0.5870*</td>
<td>0.2250</td>
<td>0.1700</td>
<td>0.1940</td>
</tr>
<tr>
<td>6-6</td>
<td>0.0792</td>
<td>0.2720</td>
<td>0.4630</td>
<td>0.2590</td>
<td>0.1580</td>
<td>0.2050</td>
<td>0.2760</td>
</tr>
<tr>
<td>6-8</td>
<td>0.0689</td>
<td>0.2280</td>
<td>0.2740</td>
<td>0.2350</td>
<td>0.1850</td>
<td>0.1600</td>
<td>0.2030</td>
</tr>
<tr>
<td>8-0</td>
<td>0.0799</td>
<td>0.2729</td>
<td>0.4139</td>
<td>0.1421</td>
<td>0.1013</td>
<td>0.1325</td>
<td>0.2272</td>
</tr>
<tr>
<td>8-2</td>
<td>0.0387</td>
<td>0.2188</td>
<td>0.4558</td>
<td>0.3539</td>
<td>0.1399</td>
<td>0.1231</td>
<td>0.1766</td>
</tr>
<tr>
<td>8-4</td>
<td>0.0838</td>
<td>0.3502</td>
<td>0.5138</td>
<td>0.1991</td>
<td>0.1286</td>
<td>0.1625</td>
<td>0.2643</td>
</tr>
<tr>
<td>8-6</td>
<td>0.091</td>
<td>0.288</td>
<td>0.5169*</td>
<td>0.318</td>
<td>0.1795</td>
<td>0.1535</td>
<td>0.2398</td>
</tr>
<tr>
<td>8-8</td>
<td>0.1292</td>
<td>0.2681</td>
<td>0.3524</td>
<td>0.217</td>
<td>0.1497</td>
<td>0.1677</td>
<td>0.2524</td>
</tr>
</tbody>
</table>

Notes:
*The maximum absorption coefficient (α) value

<p>| Table 3. Lavene Test Results |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>p Value</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>2.730a</td>
<td>14</td>
<td>0.195</td>
<td>5.814</td>
<td>0.001</td>
<td>0.640</td>
</tr>
<tr>
<td>Intercept</td>
<td>119.643</td>
<td>1</td>
<td>119.643</td>
<td>2340.746</td>
<td>0.000</td>
<td>0.987</td>
</tr>
<tr>
<td>Prosen_Sty</td>
<td>0.462</td>
<td>4</td>
<td>0.115</td>
<td>2.258</td>
<td>0.086</td>
<td>0.231</td>
</tr>
<tr>
<td>Composition</td>
<td>1.469</td>
<td>2</td>
<td>0.734</td>
<td>14.367</td>
<td>0.000</td>
<td>0.489</td>
</tr>
<tr>
<td>Prosen_Sty*Komposisi</td>
<td>0.799</td>
<td>8</td>
<td>0.100</td>
<td>1.955</td>
<td>0.088</td>
<td>0.343</td>
</tr>
<tr>
<td>Error</td>
<td>1.533</td>
<td>30</td>
<td>0.051</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>123.906</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>4.263</td>
<td>44</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
was 0.5870.

Furthermore, in 1:8 composition between cement and fine aggregate, the maximum value was presented in sample code 8-6. It means that the maximum ability to absorb the noise was at which 60% styrofoam was added to the fine aggregate. The maximum ability to absorb the noise among the 1:8 composition was in the frequency at 500 Hz and the absorption coefficient ($\alpha$) value was 0.5169.

The test results (Table 3) indicated that the compositions of styrofoam (1:4, 1:6, and 1:8) were significantly correlated with the ability of styrofoam to absorb the noise ($p$ value < 0.05). In other words, the Laven test showed that the greater the composition of Styrofoam in the fine aggregate, the better it is to absorb the noise.

**Discussion**

According to the results, which is in line with the results of previous studies, styrofoam material can be used as noise absorbent as proven by the findings showing that the mixed compositions of styrofoam with 1:4, 1:6, and 1:8 had the potential to reduce noise. Another study declared that mixed composition of cement with fine aggregates (rice husk and sand) with 10% and 100% noise absorbent get the result of 0.42 – 0.05.17 The absorption coefficient value of composition mixture of 10% cement, 80% sand, and 10% rice husk was 0.42, in which this value was the highest one.20 A prior study also showed that the natural fibres, such as the rice straw and kenaf fiber, were able to wave the noise effectively. These fibers’ mass and diameters had a big effect on sound absorption coefficient.21

The previous study on noise absorbents using coconut coir showed the average value of absorption coefficients with a composition of 20% coconut coir, 20% recycled rubber, and 25% polyurethane was 0.50.22 While another study showed that the highest absorption coefficient in the utilization of coconut coir was 0.83 on 3784 Hz frequency with a 10 mm thickness of coconut coir.23 Based on these studies, it could be concluded that sound-absorbing materials could be made by utilizing fibers. There are some advantages in using natural fibers instead of styrofoam since the natural fibers are recyclable, biodegradable, also less in health hazards.24 However, the natural fibers commonly only have higher sound absorption coefficients at higher frequency range.25 In addition, all natural fibers usually absorb the moisture especially during the condition with high humidity.26 In general, the natural fibers are already hydrophilic in nature and tend to absorb the water even from the air.27

The results of this study presented that the composition of fine aggregate and styrofoam gained the highest absorption coefficient of 0.5870 on 800 Hz frequency in 1:6 composition. Styrofoam is one of the porous absorbing materials that contain cavities, channels or intersec-

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Conclusion
In this study, the results indicate that noise absorbent material can be developed by utilizing styrofoam. The potential use of styrofoam as ‘light brick’ to reduce the noise is also suggested by the findings. Since styrofoam is cheaper and lighter than other synthetic materials, its utilization as noise absorbent performs a good potential.

Acknowledgment
This study is funded by PUPT BOPTN Grant. Hence, the researchers would like to express gratitude for the funder’s support.

References
The undersigned:

Name : .............................................................................................................
Address : .............................................................................................................
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Phone Number : .............................................................................................................
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