Determinants of Fruits and Vegetables Consumption among Primary School Students: A Path Analysis Evidence

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ABSTRACT

Background: Around 3.9 million deaths worldwide in 2017 were caused by a lack of fruit and vegetable consumption. Consumption of fruits and vegetables in Indonesia is still less than recommended by World Health Organization. This study aimed to examine determinants of fruits and vegetables consumption among primary school children.

Subjects and Method: This was an analytic observational study with a cross sectional design. The study was conducted at 25 elementary schools in Tegal, Central Java, from April to May 2019. A sample of 200 primary schools was selected by simple random sampling. The dependent variable was fruits and vegetables consumption. The independent variables were gender, knowledge, economic status, fruit and vegetable availability, sources of information, food preference, food selection, and parental role. The data were collected by food frequency questioner (FFQ) and questionnaire. The data were analyzed by path analysis.

Results: Fruit consumption was directly influenced by male gender (b=0.99; 95% CI=-1.86 to -0.12; p=0.025), knowledge (b=0.92; 95% CI=0.04 to 1.79; p=0.039), economic status (b=1.96; 95% CI=1.09 to 2.83; p<0.001), fruits and vegetables availability (b=0.92; 95% CI=0.07 to 1.76; p=0.034), source of information (b=0.92; 95% CI=0.01 to 1.82; p=0.047), food selection (b=1.77; 95% CI=0.01 to 3.54; p=0.049), and parental role (b=1.19; 95% CI=0.27 to 2.13; p=0.012). Vegetables consumption was directly influenced by male gender (b=-0.71; 95% CI=-1.37 to -0.05; p=0.035), economic status (b=0.81; 95% CI=0.05 to 1.56; p=0.036), fruits and vegetables availability (b=0.98; 95% CI=0.33 to 1.64; p=0.003), and parental role (b=0.95; 95% CI=0.19 to 1.69; p=0.013). Fruit and vegetable consumption was indirectly influenced by gender, food preference, and economic status.

Conclusion: Fruit consumption is directly influenced by male gender, knowledge, economic status, fruit and vegetable availability, source of information, food selection, and parental role. Vegetables consumption is directly influenced by male gender, economic status, fruits and vegetables availability, and parental role. Fruit and vegetable consumption is indirectly influenced by gender, food preference, and economic status.

Keywords: consumption, fruits and vegetables, path analysis

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BACKGROUND

Fruits and vegetables were one of the important components in a healthy diet. Around 3.9 million deaths worldwide in 2017 were caused by inadequate consumption of fruits and vegetables. This is related to the increase in non-communicable diseases (PTM) (Hartley et al., 2013). The lack of consumption of fruits and vegetables is one of the 10 risk factors for death in the world (FAO, 2017).

Fruits and vegetables were part of food that must be consumed every day because it can help prevent weight gain and
reduce the risk of obesity (Hartley et al., 2013). Increased consumption of carotenoid-rich fruits and vegetables can maintain cholesterol levels in the blood and can reduce the risk of colon, thyroid, pancreatic, and lung cancers (Pem and Jeewon, 2015).

WHO recommends to consume 400 grams or more fruits and vegetables every day to improve overall health. The recommendations for fruit and vegetable consumption consist of 250 grams of vegetables and 150 grams of fruit (WHO, 2003 in the Indonesian Ministry of Health, 2014).

The consumption of fruits and vegetables in Indonesia in 2016 was less than half the consumption recommended by WHO. Most Indonesians consume 173 g of fruit and vegetables per day, which is smaller than the recommended Nutrition Adequacy Rate (RDA). Fruit and vegetable consumption shows a downward trend over the past five years (Central statistics agency, 2017).

Noia and Byrd-Bredbenner (2013) and Rachman et al. (2018) concluded that the availability of fruits and vegetables in the home and school environment, the influence of the family and school environment, and the role of the mass media also affected the consumption of fruits and vegetables.

Wati et al. (2017) found a relationship between the prevalence of obesity and low consumption of fruits and vegetables. Tegal City is the area that the highest prevalence of obesity in Central Java Province with the age group of 5-12 years which amounted to 15.9% with Central Java number at 7.9% (Central statistical agency, 2017). This study aimed to analyze the determinants of fruit and vegetable consumption behavior in primary school children.

SUBJECT AND METHOD

a. Study Design
This was a cross sectional study conducted in 25 elementary schools in Tegal, Central Java, from April-May 2019.

b. Population and Sample
The target population of this study was all elementary school students in Tegal. A sample of 200 elementary school students was selected by simple random sampling.

c. Study Variables
The dependent variable was fruits and vegetables consumption. The independent variables were gender, knowledge, economic status, fruits and vegetables availability, source of information, food preference, food selection, and parental role.

d. Operational Definition of Variables
Gender. Gender was a difference in sex acquired from birth that was distinguished between men and women. The measurement scale was categorical.

Knowledge. Knowledge was information about nutrition related to fruit and vegetable consumption of the respondents. The measurement scale was continuous.

Economic status. Economic status was a situation that shows the family's financial capabilities. The measurement scale was continuous.

Fruits and vegetables availability. Fruits and vegetables availability was the availability of fruits and vegetables every day at home and around it. The measurement scale was continuous.

Food preference. Food preference was the preference of respondents of fruits and vegetables. The measurement scale was continuous.

Source of information. Source of information was the amount of information media both print and electronic to get information about fruits and vegetables. The measurement scale was continuous.
Food selection. Food selection was a form of food that is often consumed by children and its intensity. The measurement scale was continuous.

Parental role. Parental role was the habit of parents to consume fruits and vegetables everyday. The measurement scale was continuous.

Fruits consumption. Fruits consumption was the frequency and portion of fruit consumed every day. Measuring instrument using a sheet of Food Frequency Questioner (FFQ).

Vegetables consumption. Vegetables consumption was the frequency and portion of vegetables consumed every day. The data were measured by food frequency questionnaire. The measurement scale was continuous.

e. Data Analysis
Univariate analysis described sample characteristics. Bivariate analysis in the study was conducted to determine the relationship between the independent variables and the dependent variable using the chi square test. Path analysis was conducted to determine factors influencing fruits and vegetables consumption directly and indirectly.

f. Research Ethic
The study ethics in this study include informed consent, anonymity, and confidentiality. Ethical research was obtained from Research Ethics Committee in Dr. Moewardi Hospital, Surakarta, Central Java, with number: 498/ IV/ HREC/ 2019.

RESULTS
1. Univariate Analysis
Table 1 and 2 present data on sample characteristics in continuous and categorical data. Table 1 and table 2 showed that as many as 57% sample were male. Most of them were dominated by students with high economic status (72.5%). 94.0% students were exposed to media about information on fruits and vegetables, 79.0% had good sources of information, 94.5% had good food preference, and 74.0% had good parental role.

Table 1. Sample characteristics (continuous data)

| Variables                          | (n) | Mean   | SD    | Min | Max   |
|------------------------------------|-----|--------|-------|-----|-------|
| Knowledge                          | 200 | 5.89   | 1.84  | 2   | 9     |
| Economic status                    | 200 | 2,133,000 | 993,350.25 | 1,000,000 | 8,000,000 |
| Fruits and vegetables availability | 200 | 9.25   | 2.58  | 5   | 15    |
| Source of information              | 200 | 2.48   | 1.29  | 0   | 5     |
| Food selection                     | 200 | 30.28  | 2.99  | 20  | 35    |
| Influence of parents               | 200 | 10.75  | 2.88  | 5   | 15    |
| Fruit consumption                  | 200 | 3.14   | 1.26  | 1.0 | 6.4   |
| Vegetable consumption              | 200 | 0.55   | 0.49  | 0   | 1.0   |

2. Bivariate Analysis
Table 3 showed the results of bivariate analysis of fruit consumption behavior in children. Table 4 showed the results of bivariate analysis of fruit consumption behavior in children.

3. Path Analysis
a. Model Specifications
Model specifications described the relationship between the variables in this study included gender, knowledge, economic status, fruits and vegetables availability, source of information, food preference, food selection, parental role, fruits and vegetables consumption.

b. Model Identification
The degree of freedom (df) in this study is:
1. Total of measured variable : 10
2. Exogenous variable : 6
3. Endogenous variable : 4
The formula for degree of freedom (df) is:
\[ \text{df} = \frac{\text{number of measured variables} \times (\text{number of measured variables} + 1)}{2} - (\text{endogenous variable} + \text{exogenous variable number of parameters}) \]

\[ \text{df} = \frac{10 \times (11)}{2} - (4 + 6 + 10) = 35 \]

Table 2. Sample characteristics (categorical data)

| Variables                              | (n) | (%) |
|----------------------------------------|-----|-----|
| Gender                                 |     |     |
| Female                                 | 114 | 57.0|
| Male                                   | 86  | 43.0|
| Knowledge                              |     |     |
| Good                                   | 91  | 45.5|
| Poor                                   | 109 | 54.5|
| Family economic status                 |     |     |
| High                                   | 145 | 72.5|
| Low                                    | 55  | 27.5|
| The availability of fruits and vegetables |     |     |
| Good                                   | 105 | 52.5|
| Poor                                   | 95  | 47.5|
| Media exposure                         |     |     |
| Yes                                    | 188 | 94.0|
| No                                     | 12  | 6.0 |
| Source of information                  |     |     |
| Good                                   | 158 | 79.0|
| Poor                                   | 42  | 21.0|
| Preferences                            |     |     |
| Yes                                    | 178 | 89.0|
| No                                     | 22  | 11.0|
| Food selection                         |     |     |
| Good                                   | 189 | 94.5|
| Poor                                   | 11  | 5.5 |
| Influence of parents                   |     |     |
| Good                                   | 148 | 74.0|
| Poor                                   | 52  | 26.0|
| Fruit consumption                      |     |     |
| Adequate                               | 150 | 75.0|
| Poor                                   | 50  | 25.0|
| Vegetables consumption                 |     |     |
| Adequate                               | 109 | 54.5|
| Poor                                   | 91  | 45.5|

Path analysis can be done if df ≥ 0. The results of the degree of freedom calculation in this study were 35, and it was over identified so that path analysis can be done.

Table 5 showed the results of path analysis on the determinants of fruits consumption. Table 5 showed that male was directly and negatively associated with fruit consumption (b= -0.99; 95% CI= -1.86 to -0.12; p= 0.025). Male had logodd to consume fruits 0.99 units lower than female.

Good knowledge was directly and positively associated with fruit consumption (b= 0.92; 95% CI= 0.04 to 1.79; p= 0.039). Good knowledge increased logodd to consume fruits by 0.92 units.

High economic status was directly and positively associated with fruit con-
sumption (b = 1.96; 95% CI= 1.09 to 2.83; p<0.001). High economic status increased logodd to consume fruit 1.96 units.

Table 3. The results of bivariate analysis of fruit consumption behavior in children

| Independent Variable              | Fruit Consumption | Total | OR | p     |
|----------------------------------|-------------------|-------|----|-------|
|                                  | Poor              | Adequate | n | % | n | % |
| Gender                           |                   |         |    |    |    |    |
| Female                           | 19                | 38      | 95 | 63 | 114 | 57 |
| Male                             | 31                | 62      | 55 | 37 | 86  | 43 |
| Knowledge                        |                   |         |    |    |    |    |
| Poor                             | 37                | 74      | 72 | 48 | 109 | 54.5 |
| Good                             | 13                | 26      | 78 | 52 | 91  | 45.5 |
| Family economic status           |                   |         |    |    |    |    |
| Low                              | 30                | 60      | 25 | 16.7 | 55 | 27.5 |
| High                             | 20                | 40      | 125 | 83.3 | 145 | 72.5 |
| The availability of fruits and vegetables | | | | | |
| Poor                             | 37                | 74      | 58 | 38.7 | 95  | 47.5 |
| Good                             | 13                | 26      | 92 | 61.3 | 105 | 52.5 |
| Media exposure                   |                   |         |    |    |    |    |
| Yes                              | 5                 | 10      | 7  | 4.7 | 12  | 6 |
| No                               | 45                | 90      | 143 | 95.3 | 188 | 94 |
| Source of information            |                   |         |    |    |    |    |
| Poor                             | 20                | 40      | 22 | 14.7 | 42  | 21 |
| Good                             | 30                | 60      | 128 | 85.3 | 158 | 79 |
| Preferences                       |                   |         |    |    |    |    |
| No                               | 9                 | 18      | 13 | 8.7 | 22  | 11 |
| Yes                              | 41                | 82      | 137 | 91.3 | 178 | 89 |
| Food selection                   |                   |         |    |    |    |    |
| Poor                             | 8                 | 16      | 3  | 2 | 11  | 5.5 |
| Good                             | 42                | 84      | 147 | 98 | 189 | 94.5 |
| Parents influence                |                   |         |    |    |    |    |
| Poor                             | 20                | 40      | 32 | 21.3 | 52  | 26 |
| Good                             | 30                | 60      | 118 | 78.7 | 148 | 74 |

Fruits and vegetables availability was directly and positively associated with fruit consumption (b= 0.92; 95% CI= 0.07 to 1.76; p= 0.034). Fruits and vegetables availability increased logodd to consume fruit 0.92 units.

Good sources of information was directly and positively associated with fruit consumption (b= 0.92; 95% CI= 0.01 to 1.82; p= 0.047). Good sources of information increased logodd to consume fruit 0.92 units.

Good food selection was directly and positively associated with fruit consumption (b= 1.77; 95% CI= 0.01 to 3.54; p= 0.049). Good food selection increased logodd to consume fruit 1.77 units.

Foods consumption was indirectly affected by food preference through food selection.

Table 6 showed the results of path analysis on the determinants of vegetables consumption. Table 6 showed that male gender was directly and negatively influenced vegetables consumption (b= -0.71; 95% CI= -1.37 to -0.05; p= 0.035). Male decreased logodd for consuming vegetables by 0.71 units than female.
Table 4. The results of bivariate analysis of vegetables consumption behavior in children

| Independent Variables          | Vegetables Consumption | Total | OR   | p     |
|-------------------------------|------------------------|-------|------|-------|
|                               | Poor n %                | Adequate n % | n % |       |       |
| Gender                        |                        |        |      |       |       |
| Female                        | 42 46.2 72 66          | 114 57 | 0.44 | 0.005 |
| Male                          | 49 53.8 37 34          | 86 43  |      |       |
| Knowledge                     |                        |        |      |       |       |
| Poor                          | 58 63.7 51 46.8        | 109 54.5 | 1.99 | 0.017 |
| Good                          | 33 36.3 58 53.2        | 91 45.5 |      |       |
| Family economic status        |                        |        |      |       |       |
| Low                           | 36 39.6 19 17.4        | 55 27.5 | 3.10 | <0.001|
| High                          | 55 60.4 90 82.6        | 145 72.5 |      |       |
| Fruits and vegetables availability |                    |        |      |       |       |
| Poor                          | 59 64.8 36 33         | 95 47.5  | 3.74 | <0.001|
| Good                          | 32 35.2 73 67         | 105 52.5 |      |       |
| Media exposure                |                        |        |      |       |       |
| Yes                           | 6 6.6 6 5.5           | 12 6    | 1.21 | 0.747 |
| No                            | 85 93.4 103 94.5      | 188 94  |      |       |
| Source of information         |                        |        |      |       |       |
| Poor                          | 28 30.8 14 12.8       | 42 21   | 3.02 | 0.002 |
| Good                          | 63 69.2 95 87.2       | 158 79  |      |       |
| Food preference               |                        |        |      |       |       |
| No                            | 15 16.5 7 6.4         | 22 11   | 2.88 | 0.024 |
| Yes                           | 76 83.5 102 93.6      | 178 89  |      |       |
| Food selection                |                        |        |      |       |       |
| Poor                          | 10 11 1 0.9           | 11 5.5  | 13.33 | 0.002 |
| Good                          | 81 89 108 99.1        | 189 94.5 |      |       |
| Parental role                 |                        |        |      |       |       |
| Poor                          | 32 35.2 20 18.3       | 52 26   | 2.41 | 0.007 |
| Good                          | 59 64.8 89 81.7       | 148 74  |      |       |

Knowledge was directly and positively associated with vegetables consumption (b= 0.55; 95% CI= -0.10 to 1.20; p= 0.101). Knowledge increased logodd for consuming vegetables by 0.55 units.

High economic status was directly and positively associated with vegetables consumption (b= 0.81; 95% CI= 0.05 to 1.56; p= 0.036). High economic status increased logodd for consuming vegetables by 0.81 units.

Fruits and vegetables availability was directly and positively associated with vegetables consumption (b= 0.98; 95% CI= 0.33 to 1.64; p= 0.003). Fruits and vegetables availability increased logodd for consuming vegetables by 0.98 units.

Source of information was directly and positively associated with vegetables consumption (b= 0.72; 95% CI= -0.10 to 1.54; p= 0.087). Source of information increased logodd for consuming vegetables by 0.72 units.

Parental role was directly and positively associated with vegetables consumption (b= 0.95; 95% CI= 0.19 to 1.69; p= 0.013). Strong parental role increased logodd for consuming vegetables by 0.95 units.

Good food selection was directly and positively associated with vegetables consumption (b= 2.23; 95% CI= -0.06 to 4.52; p= 0.056). Good food selection increased
logodd for consuming vegetables by 2.23 units.

Vegetables consumption was indirectly affected by gender, food preference, and socio economic status.

![Figure 1. Structural model on the determinants of fruits consumption](image)

**Table 5. The results of path analysis of fruit consumption behavior in children**

| Dependent Variable | Independent Variable                  | b      | CI (95%)          | p     |
|--------------------|--------------------------------------|--------|-------------------|-------|
|                    |                                       |        | Lower Limit       | Upper Limit |
| Direct Effect      | Gender (Male)                        | -0.99  | -1.86             | -0.12 | 0.025 |
|                    | Knowledge (Good)                     | 0.92   | 0.04              | 1.79  | 0.039 |
|                    | Family economic status (tinggi)       | 1.96   | 1.09              | 2.83  | <0.001|
|                    | Fruits and vegetables availability (good) | 0.92 | 0.07              | 1.76  | 0.034 |
|                    | Source of information (Good)         | 0.92   | 0.01              | 1.82  | 0.047 |
|                    | Food selection (Good)                | 1.77   | 0.01              | 3.54  | 0.049 |
|                    | Parental role (Good)                 | 1.19   | 0.27              | 2.13  | 0.012 |
| Indirect Effect    | Food selection                       | -2.74  | -4.85             | -0.62 | 0.011 |
|                    | Food Preferences (Yes)               | 2.18   | 0.79              | 3.57  | 0.002 |
|                    | Fruits and vegetables availability   | 1.13   | 0.47              | 1.78  | 0.001 |

N observation: 200
Log likelihood: -239.97

**DISCUSSION**

1. **The effect of fruit and vegetables availability on fruits and vegetables consumption**

Fruits and vegetables availability was directly and positively associated with fruits consumption (b= 0.92; 95% CI= 0.07 to 1.76; p= 0.034). Fruits and vegetables availability increased fruits consumption 0.92 units.

Fruit and vegetables availability was directly and positively associated with vegetables consumption (b= 0.98; 95% CI= 0.33 to 1.64; p= 0.003). Fruits and vegeta-
bles availability increased vegetables consumption 0.98 units.

Wolnicka et al. (2015) showed that the consumption of fruits and vegetables of 9 years old children was influenced by parental eating behavior, parental support, and the availability of fruits and vegetables at home (p = 0.001).

2. The effect of source of information on fruit and vegetables consumption

Source of information directly and positively associated with fruits consumption ($b = 0.92; 95\% CI = 0.01 to 1.82; p = 0.047$). Source of information increased fruits consumption 0.92 units.

![Figure 2. Structural model on the determinants of vegetables consumption](image)

Table 6. The results of path analysis on the determinants of vegetables consumption

| Dependent Variable                        | Independent Variable          | $b$  | CI (95%)            | p    |
|-------------------------------------------|------------------------------|------|---------------------|------|
|                                           |                              |      | Lower Limit | Upper Limit |      |
| **Direct Effect**                         |                              |      |              |              |      |
| Vegetables Consumption (Adequate)         | ← Gender (Male)               | -0.71| -1.37       | -0.05       | 0.035|
|                                           | ← Knowledge (Good)            | 0.55 | -0.10       | 1.20        | 0.101|
|                                           | ← Family economic (High)      | 0.81 | 0.05        | 1.56        | 0.036|
|                                           | ← The availability of fruit and vegetables (Good) | 0.98 | 0.33        | 1.64        | 0.003|
|                                           | ← Source of information (Good) | 0.72 | -0.10      | 1.54        | 0.087|
|                                           | ← Food selection (Good)       | 2.23 | -0.06      | 4.52        | 0.056|
|                                           | ← Parents influence (Good)    | 0.95 | 0.19        | 1.69        | 0.013|
| **Indirect Effect**                       |                              |      |              |              |      |
| Food selection                            | ← Gender (Male)               | -2.74| -4.85       | -0.62       | 0.011|
|                                           | ← Preferences (Yes)           | 2.18 | 0.79        | 3.57        | 0.002|
| Fruits and vegetables availability        | ← Family economic status (High)| 1.13 | 0.47        | 1.78        | 0.001|

N observation: 200
Log likelihood: -276.43
3. The effect of gender on fruits and vegetables consumption

Male was directly and negatively associated with fruits consumption \((b= -0.99; \ 95\% \ CI= -1.86 \ to \ -0.12; \ p= 0.025)\). Male had logodd 0.99 units lower to consume fruits than female.

Male was directly and negatively associated with vegetables consumption \((b= -0.71; \ 95\% \ CI= -1.37 \ to \ -0.05; \ p= 0.035)\). Male had logodd 0.71 units lower to consume vegetables than female.

Arganini et al. (2012) reported that men ate less fruits, vegetables and low-fat foods. Women choose foods that they consider healthy such as fruits, vegetables, high-fiber, and low-fat foods.

4. The effect of knowledge on fruits and vegetables consumption

Good knowledge was directly and positively associated with fruits consumption and it was statistically significant \((b= 0.92; \ 95\% \ CI= 0.04 \ to \ 1.79; \ p= 0.039)\). Good knowledge increased logodd to consume fruits 0.92 units than poor knowledge.

The results of this study were in line with Awuni et al. (2017), who stated that the low level of knowledge influenced fruit and vegetable consumption, and it was related to someone’s awareness to consume healthy foods.

5. The effect of economic status on fruits and vegetables consumption

The results of this study showed that high economic status directly and positively associated with fruit consumption \((b= 1.96; \ 95\% \ CI= 1.09 \ to \ 2.83; \ p<0.001)\). High economic status increased logodd to consume fruit 1.96 units than low economic status.

High economic status directly and positively associated with vegetables consumption \((b= 0.81; \ 95\% \ CI= 0.05 \ to \ 1.56; \ p= 0.036)\). High economic status increased logodd to consume vegetables by 0.81 units.

Konttinen et al. (2013) found that there was a relationship between high income and fruits and vegetables intake \((p <0.001)\).

Utami et al. (2017) reported that energy intake was influenced by maternal education and family income \((p= 0.005)\). Landais et al. (2015) stated that women with high economic status ate more fruits. Vegetable consumption was more related to behavioral factors, while fruit consumption was influenced by economic status.

This study showed a positive and direct effect of information sources on vegetable consumption \((b= 0.72; \ 95\% \ CI= 0.10 \ to \ 1.54; \ p= 0.087)\). Good source of information increased logodd to consume vegetables by 0.72 units.

Elda and Kusharisupeni (2018) stated that healthy eating behavior was positively related to peer eating behavior and a good source of information.

Exposure to sources of information on nutritional information provided by the internet, magazines, posters, television, etc. provided a great influence on children. The interest in trying to see what was seen increased the chances of children to eat fruits and vegetables. Media in the form of audio-visual information proved to be statistically and positively related to fruit and vegetable intake among adolescents (Freisling et al., 2010).

6. The effect of food selection on fruit and vegetables consumption

Food selection was directly and positively associated with fruit consumption \((b= 1.77; \ 95\% \ CI= 0.01 \ to \ 3.54; \ p= 0.049)\). Good food selection increased logodd to consume fruit by 1.77 units.

Food selection was directly and positively with vegetables consumption \((b= 2.23; \ 95\% \ CI= -0.06 \ to \ 4.52; \ p= 0.056)\). Good food selection increased logodd to consume vegetables by 2.23 units.
Good food selection was influenced by various factors. Habits were preferences formed by past choices. Imitation behavior in children still dominated. Children were vulnerable to eating habits of peers and their parents. Once there was a habit, food preferences and choices were formed which have been influenced by various factors (Leng et al., 2016).

7. **The effect of parental role on fruit and vegetables consumption**

Strong parental role was directly and positively associated with fruit consumption (\( b = 1.19 \); 95% CI= 0.27 to 2.13; \( p = 0.012 \)). Strong parental role increased logodd to consume fruit by 1.19 units higher than lack of parental influence.

Strong parental role was directly and positively associated with vegetable consumption (\( b = 0.95 \); 95% CI= 0.19 to 1.69; \( p = 0.013 \)). Strong parental role increased logodd to consume vegetables by 0.95 units.

Pearson et al. (2009) found a positive relationship between parental intake and consumption of fruits and vegetables in children. Parents' preferences and eating habits provide opportunities for children to imitate good eating habits.

Healthy eating behavior of parents has been shown to have a positive relationship with children's food intake and preference for fruits and vegetables. Children are aware of their parents' eating behavior and imitate it. Parents have a great opportunity to become role models for children's eating behavior (Draxten et al., 2014).

8. **The Effect of food Preference on Fruit and Vegetables Consumption**

Food preferences was indirectly associated with fruits and vegetables consumption through food selection (\( b = 2.18 \); 95% CI= 0.79 to 3.57; \( p = 0.002 \)). Food preference increased logodd to consume fruits and vegetables by 2.18 units.

The study of Groele et al. (2018) reported that the types and portions of fruit consumed by parents affect the eating behavior of children. Exposure to fruit types was important to allow children to like and consume. The development of children's food preferences involved complex interactions between genetic, family, and environmental factors.

**AUTHOR CONTRIBUTIONS**

Siti Shafridha Hidayah collected data, analyzed data, and wrote the paper. Eti Poncorini Pamungkasari examined the conceptual framework and methodology. Endang Sutisna Sulaeman interpreted the results of data analysis and gave suggestion on analysis model.

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**CONFLICT OF INTEREST**

Nil.

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