Food Consumption Patterns in Colonial Dutch-Indies Transmigrant Farmer Households in Wonomulyo, West Sulawesi

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**Abstract:** In a developing country such as Indonesia, food resilience is a critical issue. Food consumption patterns are suboptimal, and there is a lack of understanding regarding the diversity of available food options and their alternatives for consumption. Ensuring diverse, nutritious, balanced, and safe food consumption patterns is crucial when developing alternative solutions and recommending strategies to improve nutrition for underserved populations, such as rural farmers. This study analyzes food consumption patterns of farmers’ families based on an empowerment program. The survey was conducted from May 1, 2023, to July 30, 2023, involving 34 samples of farmers’ families, various agencies, and institutions. The questionnaire on eating frequency was distributed to the 34 samples of farmers’ families. Descriptive analysis, desired food pattern (pola pangan harapan) analysis, Spearman’s rank, and variable linear regression were used to analyze the data. This research emphasizes that social, economic, cultural, and nutritional knowledge, income, number of family members, and age significantly influence the food consumption patterns of farmers’ families, most of which have a low consumption of tubers, animal products, oils, and fats. Applying an ideal consumption pattern with various alternatives like animal-based food from the sea and beaches, food management, nutritional knowledge that will push food consumption pattern toward the ideal, affordable healthy food, management of institutions in planning awareness campaigns, and government programs pushing for production of and access to nutritious food should be advocated.

**Keywords:** farmers; consumption pattern; household

西苏拉威西沃诺穆廖的荷属印度殖民地移民农民家庭的食品消费模式

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**摘要:** 在印度尼西亚这样的发展中国家，粮食复原力是一个关键问题。食品消费模式并不理想，
人们对可用食品选择及其消费替代品的多样性缺乏了解。在制定替代解决方案并推荐战略以改善农村农民等服务不足人群的营养时，确保多样化、营养、平衡和安全的食品消费模式至关重要。本研究基于赋权计划分析了农民家庭的食物消费模式。调查时间为2023年5月1日至2023年7月30日，涉及农户家庭、各机关、事业单位34个样本。对34个农户家庭样本进行了饮食频率调查问卷。使用描述性分析、所需食物模式（波拉潘甘哈拉潘）分析、斯皮尔曼等级和变量线性回归分析数据。本研究强调，社会、经济、文化和营养知识、收入、家庭成员数量和年龄显著影响农民家庭的食物消费模式，其中大多数农民家庭对块茎、动物产品、油类和食品的消费较低。脂肪。将理想的消费模式与各种替代品相结合，例如来自海洋和海滩的动物性食品、食品管理、将食品消费模式推向理想的、负担得起的健康食品的营养知识、规划宣传活动的机构管理以及推动的政府计划应提倡生产和获取营养食品。

1 Introduction

The low participation rates of farmers and their families in food consumption programs and knowledge about nutrition are the root problems in building food resilience. This is shown in the low involvement of the people in rural areas in assessing needs, problems, and opportunities for building food resilience because of the dominant role of the government. Although the people possess potential stemming from natural and socio-cultural resources, such as local wisdom, this potential has not been fully realized due to a lack of strategies that cater to the needs of the entire society.

The majority of past research has focused on the technical aspects of increasing agricultural production. However, socio-cultural dynamics and the participation of individuals, particularly women, in decision-making and management of agricultural innovation are frequently overlooked. The utilization of emerging communication platforms for the exchange of agricultural products and services and the involvement of farmers and stakeholders in the implementation of agroforestry innovations remain an area ripe for further exploration.

This study addresses these gaps by examining the impact of technological adaptation and new communication media on the exchange of agricultural products and services. In addition, this research further studies the inclusion of women and integration of stakeholders in the management of agroforestry innovation as key factors in improving food resilience and the well-being of farmers.

Polewali Mandar Regency, known for its robust economy and thriving service industry, stands out as an ideal location for this case study in West Sulawesi. Despite the agricultural sector still being dominant, challenges in diversifying food consumption and the role of sustainable food consumption counseling remain the main problem areas. This research offers new insights into how participative and integrative strategies in extension and communication can improve the application of agricultural innovation that matches local conditions.

This research attempts to overcome challenges in diversifying food consumption and increase the role of sustainable consumption pattern counseling. This is achieved through an approach that integrates technical, social, and cultural aspects in developing food consumption strategies that are sustainable at the farmers' household level. This aspect has not been thoroughly researched before, making the contributions from this research novel and significant.

This research optimizes the potential of local resources through the application of food consumption strategies that are ideally tailored to the needs of farmers and their families. The novel contributions of this research lie in the comprehensive integration of increasing agricultural production output and meeting diverse, nutritious, balanced, and safe food consumption needs at the household level.

The per capita Gross Regional Domestic Income (Pendapatan Domestik Regional Bruto) in Polewali Mandar steadily increases, reflecting positive growth in the income of each citizen. However, this condition is not balanced with an improvement in reaching the ideal food consumption pattern goal. This highlights the importance of optimizing food consumption strategies, particularly in terms of diversification and food consumption pattern counseling.

With the focus on Polewali Mandar Regency
as a case study, this research offers concrete solutions for overcoming food resilience problems. Through an integrative and participative approach, this research develops strategies that not only increase the output of agricultural production but also ensure that the distribution and consumption of food is sustainable at the household level. Finally, this research contributes to the improvement of food resilience and societal well-being in Polewali Mandar Regency and other regions with similar circumstances. By integrating technology, local wisdom, and community participation, the resulting strategy is expected to function as a model for other regions with similar challenges.

2 Materials and Methods

2.1 Method for Determining the Location and Time of the Research

The research was conducted in Wonomulyo, Polewali Mandar, West Sulawesi Province. This region was formerly a colonial Dutch-Indies transmigration area in the 1930s, known as Afdeling Mandar. As a hub for rice production, the community boasts a rich tapestry of multicultural individuals from various racial, religious, and ethnic backgrounds, including those of Javanese, Mandar, Bugis, and Toraja descent. The research was conducted in May, June, and July 2023.

2.2 Method for Determining Samples and Informants

The research sample comprised 34 farming households made up of a father, mother, and children.

2.3 Method of Collecting Data

The research methodology encompassed both primary and secondary data collection methods. The study of food consumption patterns in farmers’ households was conducted using the 7 x 24 h food recall method and in-depth interviews with agricultural counselors, public figures, and group leaders. Secondary data were collected from the internet, Agricultural Hall, subdistrict office, local health centers, and other relevant institutions. Analytical tools utilized in this study included descriptive analysis, Spearman’s rank correlation, energy and protein sufficiency figure analysis, desired food pattern (DFP) analysis, and linear regression.

3 Results and Discussion

3.1 Location Description

Wonomulyo is a region in Polewali Mandar Regency, West Sulawesi, with an area of 76.40 km². Wonomulyo is a transmigration region that was established by the Dutch-Indies Government in 1930, initially known as District Coloni. This transmigration initiative involved the relocation of individuals from various regions in Java, such as Kediri, Lamongan, Sidodadi, Solo, Jogja, Semarang, Sumedang, Kuningan, and others. The primary objective of this program was to develop agricultural fields, gardens, and fisheries for food production. This region serves as a prominent hub for rice production in West Sulawesi, bordered by the Tapango regency to the north, the Mapili regency to the west, the Makassar strait to the south, and the Matakali regency to the east. The estimated population of this area is approximately 52,420 residents [8].

3.2 Elements of Food Groups Consumed

This research shows that cereals are still the dominant food group as a source of carbohydrates and still have the highest consumption. Rice plays a significant role in the daily diet, accounting for 39.53% of total consumption or approximately 150 grams per capita per day. Legumes sit in second place as the main food group consumed. The average consumption of the bean food group is 75.183 g per capita per day with a percentage of 19.70%. Some of the main forms of food from the bean food group consumed are tempeh and tofu.

Consumption patterns in Indonesia emphasize the importance of staple foods such as rice and legumes, especially beans, in one’s daily diet. Rice serves as a primary source of carbohydrates, making a significant contribution to daily dietary intake. Legumes also play a crucial role in providing essential nutrients [9]. Legumes, which include tempeh and tofu, are part of the bean food group and essential in the Indonesian diet for their nutritional value and diversity [10]. Tempeh, a popular soy product from Indonesia, is rich in protein and other essential nutrients [11]. In addition, legumes are recognized for their potential health benefits, including promoting gastrointestinal health through bioactive peptides [10].

Diversity in diet is critical in overcoming nutritional challenges such as stunting in infants and children. Research has shown a strong relationship between the lack of diversity in one’s diet and stunting, highlighting the importance of a diverse diet for optimal growth and development [12]. Additionally, studies have delved into the correlation between a varied diet...
and agricultural diversity, uncovering a positive association between the diversity of women’s diets and the variety of crops grown, farm ownership, and production of various food groups [13].

In Indonesia, there is a trend toward a diet that includes a higher consumption of foods such as rice, chicken, tofu, and tempeh. This shift in food preferences and consumption habits reflects changing dietary patterns in the country [14]. This transition from traditional food to a more diverse option could impact nutritional intake and food safety [14]. Furthermore, the association between plant protein consumption and body mass index among Indonesian women shows the importance of understanding various protein sources in one’s diet [15].

In Indonesia, the consumption of staple foods such as rice and legumes, coupled with an emphasis on dietary diversity and the nutritional benefits of traditional foods like tempeh, highlights the intricate relationship between food consumption patterns, habitual diets, and nutritional outcomes. These factors are essential for developing public health strategies and promoting proper nutrition within a nation.

The food group of fruits and vegetables ranks third in terms of consumption among farmers’ families, with an average intake of 65.283 g, accounting for 17.20% of their diet. This indicates that vegetables are a primary component of the farmers’ families’ diets. This observation is corroborated by a 24-h food recall interview, which revealed that vegetables are frequently consumed by many farmers’ families. Bananas, mangoes, guavas, coconuts, and papayas are the most commonly consumed fruits.

3.3 Energy and Protein Sufficiency Figures

The energy sufficiency figure in the Kebunsari region is 1,852 kcal per capita per day, whereas in the Bumiayu region, it is 1,914 kcal per capita per day (Tab. 1). These figures fall below the norm of 2,150 kcal per capita per day [16]. Consuming a significant amount of energy, primarily derived from carbohydrates, is influenced by the consumption of staple foods such as rice, which contributes to the energy sufficiency figure [16].

<table>
<thead>
<tr>
<th>No.</th>
<th>Actual Energy Sufficiency Figure</th>
<th>Normative Energy Sufficiency Figure</th>
<th>Kebunsari Village</th>
<th>Bumiayu Village</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Energy Figure/Capita</td>
<td>2,150</td>
<td>1,852.14</td>
<td>1,914.41</td>
<td>1,879.61</td>
</tr>
<tr>
<td>2</td>
<td>Energy Sufficiency Level</td>
<td>Kcal/capita/day</td>
<td>86.15***</td>
<td>89.04*</td>
<td>87.42**</td>
</tr>
<tr>
<td>3</td>
<td>Protein Figure/Capita</td>
<td>57</td>
<td>70.04</td>
<td>69.78</td>
<td>69.93</td>
</tr>
<tr>
<td>4</td>
<td>Protein Sufficiency Level</td>
<td>-</td>
<td>122.88***</td>
<td>122.43***</td>
<td>122.68**</td>
</tr>
</tbody>
</table>

Interdisciplinary collaboration holds great importance in improving the nutritional state of a population through policies that involve sectors such as agriculture, trade, industry, transport, education, health, and others [16].

Research on controlling the heating process in vegetable oil hydrogenation reactors for green diesel production highlights the significance of comprehending the heating process characteristics for designing a safe reactor [17]. Additionally, conducting heat transfer analysis within the heating and cooling reservoir, utilizing thermoelectric modules, is crucial for determining heat transfer efficiency. Factors such as reservoir dimensions and surrounding temperatures must be considered in this analysis [18].

Overcoming energy sufficiency and nutritional challenges requires interdisciplinary collaboration, an innovative energy management approach, and a comprehensive understanding of the heating process and heat transfer mechanics in various systems.

The Kebunsari region recorded impressive figures for protein sufficiency, averaging 70.04 grams per capita per day. Additionally, the energy sufficiency level in this region was at a high of 122.88%.

Bumiayu Village’s protein sufficiency figure average obtained was 69.78 grams/capita/day coupled with an energy sufficiency level of 122.43% with a deviation from the normative figure of 57 grams/capita/day, as such can be categorized as quite high, this is caused by the intake of either legumes or animal-based food, apart from that the result of 24 hours food recall interview reveals that the respondents of Bumiayu were more homogenous and tend to consume animal-based protein in the form of fish.

3.4 DFP

The cereal food group sees an annual increase, with its DFP score rising and approaching the optimal maximum point of 25 (Tab. 2). This upward trend is observed in both locations, with Kebunsari scoring 23.62 and Bumiayu scoring...
This rise is caused by the consumption of rice and other carbohydrate-rich food that is increasing coupled with the rise in population. The solution offered is to find alternatives to rice.

The tuber food group experiences fluctuation. In Kebunsari, it obtained a score of 0.68 kcal per capita per day, whereas Bumiayu obtained a score of 0.83 kcal per capita per day. The difference is caused by a tendency of farmers and their families to consume sweet potato and corn in Bumiayu, where their role as alternate food is positive as tubers could be a viable food group to replace rice.

The animal-based food group in Kebunsari obtained a score of 13.04 kcal per capita per day and 15.19 kcal per capita per day in Bumiayu. This deviation is due to Bumiayu consuming a very diverse source of protein. However, both have yet to reach the ideal score.

The fat and oil food group consumption in Kebunsari is 5.00 kcal per capita per day and 5.00 kcal per capita per day in Bumiayu with the ideal standard at 5.0 kcal per capita per day, showing that the consumption of food containing fats and oils is quite ideal.

The oily fruit/grain food group has yet to experience an ideal condition in both locations, with 0.40 g per capita per day in Kebunsari and 0.36 g per capita per day in Bumiayu, while the ideal standard is 1.00 g per capita per day. Meanwhile, the legume food group reached an ideal condition with 10.00 kcal per capita per day in Kebunsari and 10.00 kcal per capita per day in Bumiayu. This can be attributed to the consumption patterns of legumes such as tempeh and tofu in both locations.

The sugar food group did not reach an ideal level, with consumption levels in Kebunsari reaching only 1.10 kcal per capita per day and in Bumiayu only 0.88 kcal per capita per day. This is because the sugar food group is not one of the main food groups and functions only as a complement and flavor additive in food and beverages.

The ideal score for the fruit and vegetable food group was 30.00 kcal per capita per day. However, Kebunsari has a score of only 14.99 kcal per capita per day and Bumiayu obtained a score of just 26.08 kcal per capita per day, which is still very far from ideal.

The variation in food consumption levels across different food groups in both farming locations is often shaped by a combination of social, economic, and cultural factors. Each region is characterized by unique demographics, including distinct races, religions, and ethnicities, which contribute to these differences.

### 3.5 Factors Influencing Food Consumption

To comprehend and analyze the impact of the dependent variable on energy and protein consumption levels, a variable regression analysis test was conducted. The results of this test are presented below:

#### 3.5.1 Analysis of the Independent Variable Impact on Energy Consumption Patterns

Nine factors were expected to influence the food consumption pattern of farmers and their families: farming experience (X1), knowledge of nutrition (X2), food expenditure (X3), income (X4), formal education (X5), age (X6), food consumption diversification (X7), eating frequency (X8), and number of family members (X9). Based on Tab. 3, the result is $R^2 = 0.478$. The energy sufficiency figure is influenced by farming experience (X1), knowledge of nutrition (X2), food expenditure (X3), income (X4), formal education (X5), age (X6), food consumption diversification (X7), eating frequency (X8), and number of family members (X9), which collectively account for 47.8%. The remaining 52.2% is attributed to other factors not accounted for in the model. To meet the energy requirements, it is necessary to involve a larger group in the food consumption program.

The table below shows the DFP levels for the primary data processed in 2023:

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Food</th>
<th>Ideal DFP Score (kcal/capita/day)</th>
<th>The Kebunsari Region (Village)</th>
<th>The Bumiayu Region (Village)</th>
<th>Difference</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cereals</td>
<td>25.0</td>
<td>23.62</td>
<td>24.23</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tubers</td>
<td>2.50</td>
<td>0.68</td>
<td>0.83</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Animal-Based Food</td>
<td>24.0</td>
<td>13.04</td>
<td>15.19</td>
<td>2.15</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fats and Oils</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>5</td>
<td>Oily Fruits/Grains</td>
<td>1.00</td>
<td>0.40</td>
<td>0.36</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Legumes</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>7</td>
<td>Sugar</td>
<td>2.50</td>
<td>1.10</td>
<td>0.88</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Fruits and Vegetables</td>
<td>30.00</td>
<td>14.99</td>
<td>26.08</td>
<td>11.09</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Others</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Nil</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>68.84</td>
<td>82.57</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The regression analysis revealed that two variables significantly influenced the energy consumption level within the society. Specifically, farming experience (X1) demonstrated a regression coefficient of -0.046, a significance level of 0.047, and a significance value of <0.05. Additionally, the number of family members (X9) exhibited a coefficient of 0.743, a significance level of 0.0001, and a significance figure of <0.05.

3.5.2 Protein Consumption Level

The factors expected to influence the protein consumption level of farmers and their families are farming experience (X1), knowledge of nutrition (X2), age (X6), eating frequency (X9), and the number of family members (X9) in Wonomulyo.

Based on Tab. 4, the result is $R^2 = 0.498$; the energy sufficiency level is simultaneously influenced by farming experience (X1), knowledge of nutrition (X2), food expenditure (X3), formal education (X5), age (X6), food consumption diversification (X7), eating frequency (X8), and the number of family members (X9) at 49.8%; the other 50.2% is due to the influence of other factors that are not part of the model; the protein sufficiency level could be influenced by other factors, especially the analyzed independent variable.

The regression coefficient for the number of family members (X9) in each model is 0.852, with a significance level of 0.000, indicating a significant influence on the protein sufficiency level at a significance value of <0.05.

To comprehend and analyze the impact of different factors on food consumption, this study employs variable regression analysis. This research identified nine factors expected to influence energy consumption patterns in farmers’

### Tab. 3 Independent variables’ influence on the energy sufficiency figures (Primary data processed in 2023)

<table>
<thead>
<tr>
<th>No.</th>
<th>Dependent Variable (Y1)</th>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Z-Count</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Energy Sufficiency Figure</td>
<td>Constant</td>
<td>167.803</td>
<td>3.85</td>
<td>0.001</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Farming Experience</td>
<td>-0.40*</td>
<td>-0.29</td>
<td>0.04</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Knowledge of Nutrition</td>
<td>0.20</td>
<td>1.12</td>
<td>0.27</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Food Expenditure</td>
<td>-0.20</td>
<td>-0.86</td>
<td>0.39</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Household Income</td>
<td>0.38</td>
<td>1.49</td>
<td>0.14</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Formal Education</td>
<td>-0.14</td>
<td>-0.89</td>
<td>0.37</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Age</td>
<td>0.31</td>
<td>1.39</td>
<td>0.17</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Food Diversification</td>
<td>-0.26</td>
<td>-1.60</td>
<td>0.12</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Eating Frequency</td>
<td>0.00</td>
<td>0.04</td>
<td>0.96</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Number of Family Members</td>
<td>-0.74</td>
<td>-3.91</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Sig. R Square 0.039 0.478

Notes: * Significant at a level of 1% ($\alpha = 0.01$; $t_{table} = 2.58$); ** - significant at a level of 5% ($\alpha = 0.05$; $t_{table} = 1.96$)

### Tab. 4 Influence of independent variables on the protein sufficiency figures (Primary data analysis in 2023)

<table>
<thead>
<tr>
<th>No.</th>
<th>Dependent Variable (Y1)</th>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Z-Count</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Energy Sufficiency Figure</td>
<td>Constant</td>
<td>146.667</td>
<td>2.16</td>
<td>0.04</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Farming Experience</td>
<td>-0.14</td>
<td>-0.76</td>
<td>0.45</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Knowledge of Nutrition</td>
<td>0.21</td>
<td>1.15</td>
<td>0.25</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Food Expenditure</td>
<td>-0.29</td>
<td>-1.28</td>
<td>0.21</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Household Income</td>
<td>0.24</td>
<td>0.97</td>
<td>0.34</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Formal Education</td>
<td>-0.02</td>
<td>-0.15</td>
<td>0.88</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Age</td>
<td>0.34</td>
<td>1.57</td>
<td>0.12</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Food Diversification</td>
<td>0.05</td>
<td>0.36</td>
<td>0.71</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Eating Frequency</td>
<td>0.03</td>
<td>0.18</td>
<td>0.85</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Number of Family Members</td>
<td>-0.85**</td>
<td>-4.58</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Sig. R Square 0.027 0.498

Notes: * Significant at a level of 1% ($\alpha = 0.01$; $t_{table} = 2.58$); ** - significant at a level of 5% ($\alpha = 0.05$; $t_{table} = 1.96$)

Equations of variable regression of protein sufficiency level (Y2) with farming experience (X1), knowledge of nutrition (X2), food expenditure (X3), income (X4), formal education (X5), age (X6), food consumption diversification (X7), eating frequency (X8), and the number of family members (X9) are obtained through a variable regression model test simultaneously with an F count of 2.443 and the F table value of 2.21 at a significance level of 5%. This shows that independent variables influence dependent variables, either simultaneously or as a whole, so that the best expected model is obtained:

$$Y_1 = 167.883 - 0.406 X1 + 0.208 X2 - 0.200 X3 + 0.388 X4 + 0.148 X5 + 0.315 X6 - 0.264 X7 + 0.009 X8 - 0.743 X9$$
households: farming experience, knowledge of nutrition, food expenditure, income, formal education, age, food consumption diversification, eating frequency, and number of family members.

Following the analysis, two factors emerged that significantly influenced energy consumption levels: farming experience and the number of family members. Farming experience has a negative impact on energy consumption levels, while the number of family members has a positive influence. This indicates that families with more members exhibit higher energy consumption. Studies have indicated that farming experience has a notable positive impact on technical efficiency within the agricultural sector [19]. Additionally, social factors such as farming experience may also contribute to product efficiency in agriculture [20]. Other research indicates that work experience can have a positive impact on employee performance [21], which may enhance managerial capabilities in decision-making. Additionally, there is research that reveals a relationship between energy consumption and pollution level, where the larger the energy consumption, the higher the pollution level [22]. This highlights the significance of comprehending the impacts of energy consumption within the realm of environmental preservation and sustainability. Farming experience, along with factors such as work experience and technical efficiency, can significantly influence understanding energy consumption patterns and their implications for various aspects such as product efficiency and environmental impacts.

The analysis indicates that the variable regression model can account for approximately 47.8% of the variation in household energy consumption levels [23]. This demonstrates that there are additional external factors beyond the model that impact the remaining variations, underscoring the significance of taking into account other factors that affect household energy consumption. Similarly, in the examination of protein consumption levels, it was found that the number of family members has a significant and positive impact. This underscores the crucial role of family dynamics, such as size, in determining protein needs and consumption [23].

Moreover, the regression model for protein consumption indicates that the factors analyzed account for approximately 49.9% of the variation, which is similar to the energy consumption model. This similarity shows that while these factors are important, they do not wholly define the protein consumption pattern, disclosing a larger complexity in deciding household protein consumption [23].

These findings highlight the complicated nature of household energy and protein consumption behavior, showing that while some factors contribute significantly to explain variations, there are uncountable factors that influence consumption patterns as a whole. It is essential to comprehend this complexity to create interventions and policies that encourage sustainable and balanced energy and protein consumption within households.

It was also determined that formal education did not have a significant impact in this model. This suggests that educational interventions should be more targeted and may require a more practical and integrated approach that aligns with the farmers’ way of life.

This research also highlights the significance of food diversification. By increasing the variety in one’s diet, individuals can improve their nutritional status and energy and protein consumption. This underscores the importance of assisting farmers in implementing agricultural practices that promote the cultivation of a diverse range of food products.

As a whole, this research provides valuable insight into factors that impact food consumption in farmers’ families. These findings have the potential to shape policy decisions and guide the development of programs aimed at enhancing food safety and nutritional well-being in rural communities.

4 Implications
This study unveils critical insights into the food consumption patterns of farmers’ families in ex-colonial transmigration regions, highlighting a resilient yet imperfectly balanced diet. The diversity in food consumption across different villages reveals significant variations in dietary resilience, suggesting that while some communities may be adapting well, others are lagging in nutritional adequacy, particularly in the consumption of essential food groups like fruits, animal products, and grains, other than vegetables and legumes, which meet the standard dietary requirements.

The deviations in the DFP scores among different villages indicate that nutritional resilience is not uniform, necessitating targeted interventions. Factors contributing to these variations, such as differences in nutritional knowledge, food expenditures, and the level of food diversification, underscore the need for focused educational and support programs. These interventions are crucial in improving the
understanding and application of nutritional knowledge, which could enhance the quality of diets among these populations.

Due to the crucial nature of these findings, it is essential for policymakers and community leaders to enact interventionist policies and programs that focus on enhancing food diversity and nutritional education within the community. Such efforts should particularly focus on promoting the use of underexploited food sources and diversifying the diet to include a broader range of nutrients. This strategy is designed to not only achieve dietary balance but also enhance the overall food resilience of the community.

Moreover, the research points to the importance of designing community programs that are tailored to the specific needs and circumstances of the different villages. By understanding the local cultural, economic, and environmental factors that influence food consumption decisions, interventions can be more effectively aligned with the community’s unique context. This tailored approach will likely be more effective in achieving sustainable changes in food consumption patterns.

Future research should delve deeper into the factors affecting food consumption decisions in these regions. Understanding the interplay of cultural, economic, and environmental influences is vital for crafting sustainable and effective interventionist strategies. This continued research is essential to form a comprehensive understanding that can guide a more nuanced and impactful policy-making and program development in the future.

5 Conclusions

This study has disclosed important insights about food consumption patterns of farmers’ families in ex-colonial transmigration regions, highlighting the diversity of food consumption that shows certain diet resilience despite not being ideal yet. The DFP score indicates that food consumption does not revolve around only one type of food sources but spreads across various sources, with fruits and vegetables, animal products, and grains as the main contributors. However, consuming only vegetables and legumes meets the established standard, indicating an imbalance in meeting the requirements of other food groups.

Furthermore, the research results revealed deviations in DFP scores in the villages in the region, signaling disparities in food resilience that warrant special attention. Factors such as knowledge of nutrition, food expenditure, and food diversification play a significant role in determining energy and protein consumption levels in farmers’ households. This highlights the significance of interventions that prioritize increasing awareness and education on nutrition and providing support for diversifying food consumption to improve the quality of one’s diet.

Given the significance of this matter, it is advisable to implement interventionist policies and community programs aimed at enhancing food diversity and nutritional education within farmers’ communities. This effort can be directed toward promoting the utilization of food sources that have yet to be maximized, with the end goal of achieving better food resilience. Future research should prioritize gaining a more comprehensive understanding of the factors that impact food consumption decisions in this region. This includes examining the influence of culture, economy, and environment to develop more sustainable and effective interventionist strategies.

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