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General Characteristics of Eastern Indonesian Household Dietary Diversity Score

Maretalinia[1*], Dyah Suryani[2], Yayu Angriani[3]

[1] Ph.D. in Demography, Institute for Population and Social Research, Mahidol University, Salaya, Thailand.
[2] Nutrition Program, Faculty of Public Health, Ahmad Dahlan University, Yogyakarta, Indonesia.
[3] Occupational Health and Safety Program, Politeknik Medica Farma Husada Mataram, Mataram, Indonesia.

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Correspondence:
Maretalinia
Mareta.linia.21@gmail.com

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Abstract: Household dietary diversity score (HDDS) is a crucial indicator of food security and nutritional outcomes. The data collection was done from 2017 to 2018 in Eastern Indonesia. This study aimed to capture the characteristics of HDDS based on district, province, religion, and head of household age. This study used secondary data from the Coastal Community Development Project (CCDP), IFAD Impact Assessment Survey 2018. The total sample of this study was 2,884 households. The HDDS was calculated based on the score of 12 food groups and presented in a bar graph using STATA version 17. The result revealed that the lowest HDDS was found in the Kupang district, East Nusa Tenggara Province, Confucianism or Konghucu Religion, and 15 to 25 years of head of household age. Household dietary diversity score is a critical measure of food security and nutritional status, reflecting a household's access to a variety of foods. Understanding and addressing these determinants are essential for improving household dietary diversity and ultimately enhancing nutrition outcomes.

Keywords: Eastern Indonesia; Household dietary diversity score (HDDS); Nutrition

Introduction

Household dietary diversity is influenced by various agricultural factors, and several studies have explored this relationship. It was found that agricultural biodiversity positively impacted household diet diversity. Similarly, Saaka et al., (2017) highlighted the substantial influence of agricultural production conditions on household dietary diversity. Furthermore, Kissoly et al., (2020) emphasized the interaction between socioeconomic status and agricultural biodiversity on the dietary diversity of children in rural areas.

Moreover, the impact of agricultural interventions on dietary diversity has been investigated. Margolies et al., (2022) conducted a review and meta-analysis, concluding that nutrition-sensitive agricultural interventions significantly increased the diet diversity scores of children.

Furthermore, the importance of considering context-specific production and market-related aspects of smallholder agriculture for enhancing household dietary diversity was highlighted by (Dillon et al., 2015). This suggests that policies related to food and nutrition security should be tailored to specific agricultural contexts.

The relationship between agricultural factors and household dietary diversity in Indonesia has been a subject of interest in recent research. Sibhatu et al., (2015) addressed this issue with household-level data from Indonesia, Kenya, Ethiopia, and Malawi, highlighting the larger magnitude of the relationship between agricultural biodiversity and diet diversity observed among farmers in Indonesia compared to farmers from sub-Saharan Africa. Furthermore Bonuedi et al., (2021) found that household dietary diversity in Indonesia improves with a reduction in market distance, indicating the influence of market access on dietary diversity.

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Additionally. Mehraban & Ickowitz, (2021) observed a decline in dietary diversity of rural Indonesian households over time with agricultural production diversity, even as incomes rise, suggesting a complex interplay between agricultural production and dietary diversity in Indonesia.

Moreover, the influence of crop production and socioeconomic factors on seasonal household dietary diversity in Burkina Faso, as studied by Somé and Jones (2018), provides insights into the seasonal variations in household dietary diversity, which may also be relevant to the Indonesian context. Furthermore, the study by Gupta et al., (2019) on nutritional outcomes of empowerment and market integration for women in rural India. Household dietary diversity is closely linked to nutrition outcomes, as a more diverse diet is likely to provide adequate nutrients. Agricultural factors can influence household dietary diversity through various pathways Sibhatu et al., (2015) found that agricultural biodiversity, measured by crop and livestock diversity, positively impacts household dietary diversity in Indonesia, Kenya, Ethiopia, and Malawi Passarelli et al., (2018a) also observed that small-scale irrigation improves household dietary diversity in Ethiopia and Tanzania.

Socioeconomic factors also play a role Ochieng et al., (2017) showed that the education level of the household head contributes to higher dietary diversity in Tanzania. Nutrition education interventions can also improve dietary diversity, as demonstrated by a study in Western Kenya (Keding et al., 2021). Agricultural production characteristics are important as well Luo et al., (2021) found that rubber farming increases household dietary diversity in Southwest China. Women's empowerment in agricultural decisions can enhance dietary diversity (Padmaja et al., 2019). Highlighted that women's increased engagement in agriculture can improve household nutrition outcomes. This was also observed in rural India by S. K. Singh et al., (2020), where empowered women had higher dietary diversity scores. This study aimed to capture the characteristics of HDDS based on district, province, religion, and head of household age in Eastern Indonesia.

Method

This study used secondary data from the Coastal Community Development Project (CCDP), IFAD Impact Assessment Survey 2018. The data collection was done from May 2018 to April 2019. (World Bank). The unit of analysis of this survey is the household level. The geographic coverage of this survey included 181 villages within 12 districts throughout eastern Indonesia. The primary investigators of the survey are the International Fund for Agricultural Development (IFAD) and, the United Nations. The producers were from the Ministry of Marine Affairs and Fisheries, Government of Indonesia as project executing agencies. The sampling procedure consisted of households that directly participated in the CCDP as a treatment group and a spillover group that indirectly benefited from the CCDP. The final number of the sample was 2,884 households.

This current study focused on household dietary diversity score (HDDS) as a proxy of nutrition outcomes. This score reflects a quality diet from 12 food groups at the household level. The food groups consist of cereals; root and tubers; vegetables; fruits; meat, poultry, and offal; eggs; fish and seafood; pulses or legumes or nuts; milk and milk products; oil or fats; sugar or honey; and miscellaneous FOA. The HDDS score is calculated by cumulative scores which is 1 for HH consumed each food group in last 7 days of survey time and 0 for not. This study used the univariate analysis to see the characteristics of HDDS based on some variables including, province, district, religion, and head of household age. The analysis was done using STATA version 17. The ethical clearance of raw data was obtained by IFAD. The raw data is open access after registration and can be accessed through the website https://microdata.worldbank.org/index.php/catalog/5738#metadata-metadata_production

Result and Discussion

The results of this study are presented in a bar graph. There are four bar graphs that provide information about mean HDDS by province, district, religion, and age of head household. Figure 1 describes the mean HDDS in 10 districts. It shows Kabupaten Kupang or Kupang District has the lowest mean HDDS and Tidore has the lowest mean HDDS. Comparing Kupang District and Kupang City which are located in the same province, shows a very large gap. There is a need for intervention that is controlled by the provincial government. Lower mean HDDS means the households in that district tend to consume homogeneous food groups.

Figure 2 describes the mean HDDS based on province. It revealed that Nusa Tenggara Timur Province has the lowest mean HDDS and Maluku Province has the highest one. The second high was North Maluku, following with West Kalimantan, and Gorontalo.

Due to the diversity of religions in Eastern Indonesia, it was interesting to explore mean HDDS by religion. It was shown in Figure 3 that the lowest mean HDDS was Confucianism/Konghucu. Following by Christian, Buddhism, and Islam.

Figure 4 describes the mean HDDS based on head of household age. It revealed that households with age more than 75 years old had more diverse foods. The youngest age group which is 15 to 25 years old had the lowest mean HDDS.

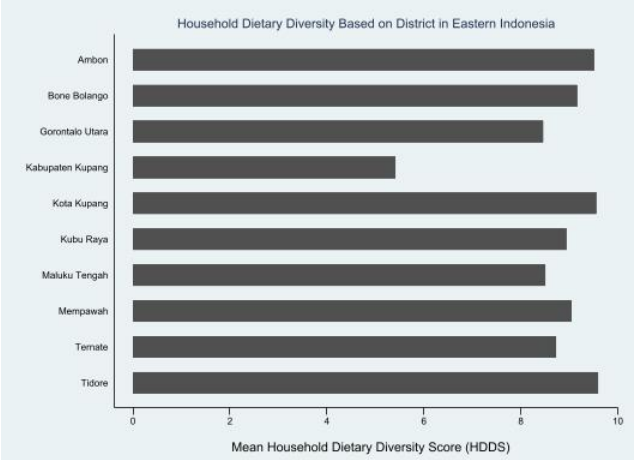

Figure 1. Characteristics of HDDS by district

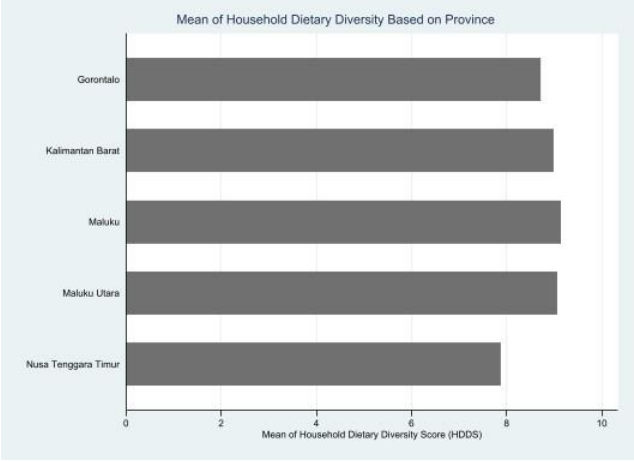

Figure 2. Characteristics of HDDS by province

Household dietary diversity score (HDDS) is a crucial indicator of food security and nutritional outcomes. It is constructed using food consumption data and reflects a household's economic ability to access a variety of foods (Bukania et al., 2014; O. V Cordero-Ahiman et al., 2021; Passarelli et al., 2018b). Higher HDDS values are correlated with caloric and protein adequacy, making it an important measure of food security (Dembedza et al., 2023). Studies have shown that individual dietary diversity scores are associated with adequate nutrient intake, highlighting the significance of HDDS in assessing nutrient adequacy (Hailemariam et al., 2018). Moreover, HDDS has been linked to nutrient adequacy among women and children, as well as child growth, emphasizing its role in determining nutrition outcomes (Assefa et al., 2021; Malapit et al., 2015). Men's dietary knowledge has also been positively associated with households' dietary diversity scores, further underlining the importance of knowledge and awareness in improving dietary diversity (Ambikapathi et al., 2020).

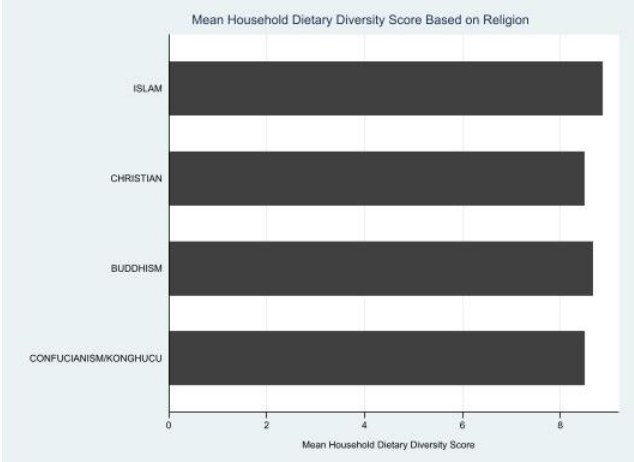

Figure 3. Characteristics of HDDS by religion

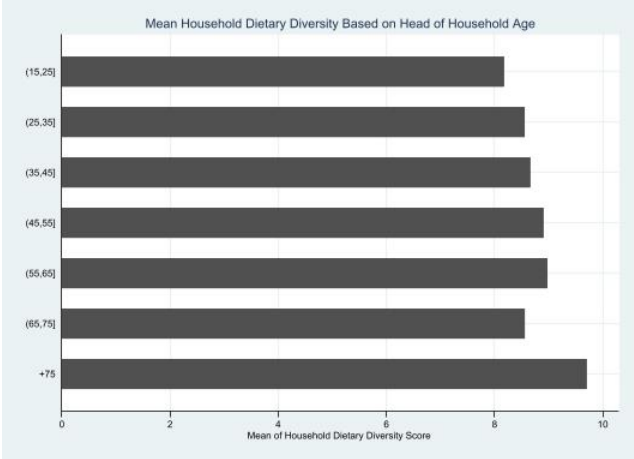

Figure 4. Characteristics of HDDS by head HH age

Furthermore, factors such as farm production, market access, non-farm income, and crop diversity have been identified as determinants of household dietary diversity (Edriss & Mehare, 2021; Kavitha et al., 2016; Koppmair et al., 2016; Rahman & Mishra, 2019). Additionally, nutrition education, farm production diversity, and commercialization have been found to increase household, women, and child dietary diversity, indicating the potential impact of interventions on improving dietary diversity (Murendo et al., 2018). It has also been observed that households with higher income and those who adopted compost and agroforestry had higher HDDS, highlighting the influence of economic factors and agricultural practices on dietary diversity (Teklu et al., 2021).

In general, previous studies showed that Household dietary diversity is influenced by a variety of factors, as evidenced by several studies conducted in

different regions. For instance, a study in rural households in the Paute River Basin of Azuay Province, Ecuador, aimed to analyze the factors determining the Household Dietary Diversity Score (HDDS) (O. V. Cordero-Ahiman et al., 2021). Similarly, research in the Eastern Cape Province, South Africa, explored household food dietary diversity and food security in a rural area (Cheteni et al., 2020). These studies highlight the importance of understanding dietary diversity in different geographical and cultural contexts. Furthermore, a study in India emphasized the complex and heterogeneous nature of drivers of household dietary diversity across rural areas, suggesting the need for tailored policies and programs to improve farmer household nutrition based on regional differences (S. Singh et al., 2020). Similarly, a study in Bangladesh used a probit regression model to estimate the determinants of household dietary diversity, emphasizing the role of household income and diversity (Laskar & Rakib, 2019).

Moreover, research in South Africa measured household food consumption patterns using the HDDS, indicating the significance of economic and agricultural factors in influencing dietary diversity (Nengovhela et al., 2022). Additionally, a study in India found that socioeconomic factors such as caste, family type, and agricultural land are significantly associated with the dietary diversity pattern of rural households (S. K. Singh et al., 2020).

The influence of religion on household dietary diversity has been a subject of interest in various studies. While the references provided offer valuable insights into dietary diversity and religious beliefs, only a few directly address the relationship between religion and dietary diversity. For instance, Reference (Qian et al., 2022) investigates the association between religious beliefs and food waste in Chinese rural households, providing a unique perspective on the influence of religion on food-related behaviors. Additionally, Reference (Imtiyaz et al., 2021) suggests a positive association between religious beliefs and healthy food consumption, indicating a potential link between religion and dietary choices. However, the majority of the references focus on broader topics such as food security, agricultural production, and socioeconomic determinants of dietary diversity, without specifically addressing the influence of religion on household dietary diversity. Therefore, while these studies provide valuable information on dietary diversity, they do not directly contribute to understanding the relationship between religion and dietary diversity.

Based on the available references, the age of the household head appears to be a significant determinant of household dietary diversity. (Jebessa et al., 2019) highlight that the age of the household head has a positive and significant effect on dietary diversity, indicating that as the age of the household head increases, dietary diversity also increases (Jebessa et al., 2019). This finding is further supported by (Andani, 2020), which suggests that the age of the household head has a positive effect on household dietary diversity (Andani, 2020). Additionally, (Mutiah & Istiqomah, 2017) indicates a positive relationship between the age of the household head and food insecurity, suggesting that younger household heads may be more vulnerable to food insecurity (Mutiah & Istiqomah, 2017). Moreover, (Garmame et al., 2020) emphasizes the significance of the age of the household head in determining household food security, further underlining the influence of age on food-related outcomes (Garmame et al., 2020). Furthermore, (2022) provides insights into the distribution of household heads across different age groups, indicating that a large number of household heads fall within the age group of 41-50 years, which may have implications for dietary diversity (Okelola & Babalola, 2022).

According to nutrition aspects, consuming as much as many varieties of food is good for the health. It was revealed from the study about food taboos in Indonesia that limiting types of food because of taboos can be risky, especially for women of reproductive age (Suyitno et al., 2023). Moreover, the study in Eastern Indonesia found the risk of being anemic is influenced by the type of food that is consumed (Maretalinia Maretalinia et al., 2019). So, household dietary diversity is crucial to improving nutrition outcomes.

Conclusion

Household dietary diversity score is one of nutrition outcomes. The lowest HDDS was shown in Kupang District. At the provincial level, the lowest HDDS was from East Nusa Tenggara. The lowest mean HDDS was Confucianism or Konghucu and head of household aged 15 to 25 years old. In conclusion, the household dietary diversity score is a critical measure of food security and nutritional status, reflecting a household's access to a variety of foods. It is influenced by district, province, head of household religion, and age. Understanding and addressing these determinants are essential for improving household dietary diversity and ultimately enhancing nutrition outcomes.

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Author Contributions
All authors had significant contributions in completing this manuscript

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Conflicts of Interest
The authors declare no conflict of interest.

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