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Exploring the influence of socio-demographic factors on the adoption of alternative feeds by backyard poultry farmers

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Abstract

Rising feed costs continue to threaten the viability of backyard poultry farming in the Philippines, prompting increased interest in sustainable and locally available feed alternatives. Although various indigenous feed resources have been identified, their adoption among smallholder farmers remains inconsistent. This study examined the influence of socio-demographic factors on the adoption of indigenous feed alternatives among backyard poultry farmers in Zamboanga del Sur. A total of 185 respondents were analyzed using descriptive statistics, Mann-Whitney U test, Kruskal-Wallis H test, Spearman's rank correlation, and multiple linear regression. Findings revealed that socio-demographic factors had limited influence on the adoption of indigenous feed alternatives, explaining only 8.8% of the variation in adoption. Farmers with larger flocks and those raising native chickens were more likely to use local feed alternatives, while older farmers also showed a higher tendency to adopt these feeds. The results suggest that practical farm conditions such as breed suitability and flock size influence feed adoption more than personal characteristics. Extension programs should focus on breed-appropriate strategies, hands-on training, and improving access to local feed resources to encourage wider adoption.

Keywords: Native chickens, technology adoption, smallholder farmers, sustainable production

Introduction

The high and rising cost of commercial poultry feeds remains a major challenge for smallholder farmers in the Philippines. Feed expenses can make up 65-70% of total production costs, reducing profits and making poultry farming less viable for low-income rural households (Devendra, 2015; Marape, 2022)^[12, 27]. As a result, many farmers reduce their flock sizes, experience lower productivity, or even stop raising poultry altogether (Oluwasegun, 2023; Falcuán, 2023)^[1, 16]. This problem is made worse by global price changes in key ingredients like corn and soybean often imported which create market instability and supply issues for local producers (Mathiu, 2021; Lagasca & Duria, 2023)^[28, 25]. To address these challenges, farmers and agricultural stakeholders are increasingly turning to affordable, locally available alternatives to commercial feeds (Enario, 2025; Chia *et al.*, 2020)^[13, 11]. This shift supports broader goals of food security, rural development, and resilience among poor farming households (Torres *et al.*, 2013; Ordanel *et al.*, 2023)^[46, 33]. Indigenous feed ingredients such as rice bran, banana peels, copra meal, cassava, sweet potato vines, *Azolla pinnata*, and *Trichanthera gigantea* are abundant and, when properly processed, can meet poultry nutritional needs (Chia *et al.*, 2020; FAO, 1993; Heuzé *et al.*, 2017; Mbugua *et al.*, 2024; Montagnac *et al.*, 2009)^[11, 17, 21, 29, 30]. Research has shown that these feeds can support poultry growth and improve feed efficiency when well-formulated (Chia *et al.*, 2020; Devendra, 2015)^[11, 12].

However, adoption of these alternatives remains low among backyard and smallholder poultry farmers (Marape, 2022; Falcuán, 2021)^[27, 15]. Common barriers include lack of awareness, limited technical knowledge, and the absence of tools or equipment for on-farm feed processing (Enario, 2025)^[13]. Farmers' perceptions about the benefits and risks of non-commercial feeds also influence their decisions (Chia *et al.*, 2020).^[11] Studies show that knowledge and perception

alone can explain nearly 45% of the variation in adoption behavior (Enario, 2025) ^[13]. This shows the need for not just technical training, but also awareness and behavioral change strategies. Despite this, most studies have focused on the biological effectiveness of indigenous feeds, often overlooking the social factors that influence adoption (Rosario *et al.*, 2022). Socio-demographic factors such as age, gender, education, marital status, and farming experience play an important role in how farmers learn about, assess, and apply new practices (Chia *et al.*, 2020) ^[11]. These traits can shape risk-taking, openness to new ideas, access to training and extension services, and ability to join support programs (Tijjani *et al.*, 2016; Falculan, 2023) ^[16]. For example, younger or more educated farmers may adopt new technologies more quickly, while older or more experienced farmers may prefer traditional methods unless outreach is well designed (Pannell *et al.*, 2006; Aquino, 2022) ^[35, 6]. To build effective extension programs and promote inclusive adoption, it is crucial to understand how these socio-demographic factors influence decisions. Therefore, this study explores how farmer characteristics affect the adoption of indigenous feed alternatives in backyard poultry farming in the Philippines.

Materials and Methods

Study Area

This study was conducted in Zamboanga del Sur, a province located in the Zamboanga Peninsula region of Mindanao, Philippines.

Research Design and Sampling

A quantitative, descriptive-correlational research design was employed, utilizing secondary data from a previously published study by Enario (2025) ^[13]. While the original study focused on farmers' knowledge, adoption levels, and challenges related to indigenous feed use, the present study specifically investigated whether socio-demographic factors influence adoption behavior. The dataset consisted of responses from 185 backyard poultry farmers, selected through purposive sampling. Participants were chosen based on their active involvement in poultry production and their experience using various feeding strategies, including alternative and indigenous feed resources.

Research Instrument

Data were collected using a structured questionnaire developed and validated by Enario (2025) ^[13]. The tool was reviewed by three experts and pre-tested to ensure reliability and content validity. It included sections on socio-demographic profile, poultry production practices, and the adoption of indigenous feed alternatives. Adoption was measured using a 5-point Likert scale (1.00-1.79 = Very Low, 1.80-2.59 = Low, 2.60-3.39 = Neutral, 3.40-4.19 = High, 4.20-5.00 = Very High). The scale showed strong internal consistency, with a Cronbach's alpha of 0.861, confirming that the instrument was reliable and suitable for assessing feed adoption among backyard poultry farmers.

Data Collection

The data were gathered through face-to-face interviews conducted by trained enumerators under the supervision of the author. All respondents provided verbal informed consent prior to participation, and ethical considerations were observed throughout the data collection process. The responses were encoded and processed to ensure accuracy, consistency, and confidentiality prior to analysis.

Data Analysis

The data extracted from the original study were reanalyzed using

a combination of descriptive and inferential statistical techniques to examine how socio-demographic characteristics influence the adoption of indigenous feed alternatives among backyard poultry farmers. Descriptive statistics, including frequency and percentage distributions, were used to summarize the respondents' profiles in terms of age, gender, education, marital status, farming experience, land area, number of chickens raised, and breed of chicken. To assess whether adoption levels varied significantly across different socio-demographic groups, non-parametric tests were applied due to the ordinal nature of the adoption data. The Mann-Whitney U test was used to compare adoption scores between male and female respondents, while the Kruskal-Wallis H test was employed to detect significant differences in adoption levels across categories such as age group, educational attainment, marital status, farming experience, landholding size, number of chickens raised, and breed of chicken. To evaluate associations between continuous or ordinal socio-demographic variables and adoption behavior, Spearman's rank-order correlation was performed. Finally, multiple linear regression analysis was conducted to determine which socio-demographic variables significantly predicted adoption levels, allowing for the identification of factors with the greatest influence on feed adoption behavior. All statistical analyses were carried out using SPSS software, with the level of significance set at $p < 0.05$.

Results and Discussion

As shown in Figure 1, most backyard poultry farmers in Zamboanga del Sur were aged 26 to 45 (42.2%), showing that the activity is mainly managed by people in their most active and productive years. This supports Soviadan *et al.* (2023) ^[41], who noted that farmers in this age range are more open to new technologies. Women made up a slightly higher share of respondents (51.9%) than men (48.1%), confirming the important role of women in small-scale poultry farming. Mathiu (2021) ^[28] and Khan *et al.* (2022) ^[23] also emphasized the central role of women in managing indigenous chickens, calling for gender-sensitive training and support. In terms of education, 43.8% had only finished elementary school, 23.8% reached high school, and 20% had no formal education. This suggests that limited schooling may hinder the adoption of technical practices like feed formulation. Soviadan, Kubik, and Enete (2022) ^[42] recommended using practical, visual, and hands-on training methods for low-literacy farmers. About 36.7% were married, indicating that poultry raising is often a family activity. Wang and Tao (2020) ^[49] pointed out that marital status affects how farm work is shared and decisions are made, which can influence productivity and innovation. Most had 1 to 5 years of poultry farming experience (42.1%), showing limited experience but also potential for learning. Chaiban *et al.* (2020) ^[10] observed that newer farmers are often more open to training and change. A majority (64.6%) owned less than one hectare of land, which is typical of smallholder farmers. Wilson *et al.* (2022) ^[50] noted that small-scale poultry systems are important in areas with limited resources. Regarding flock size, 49.2% raised 11-50 chickens, and 45.9% kept fewer than 10, suggesting that most farmers were not yet operating commercially. Anyona *et al.* (2023) ^[5] reported similar trends in rural areas, where households often raise small flocks. Nearly all respondents (94.4%) raised native chickens, supporting findings by Adoligbe and Fernandes (2020) ^[2], who highlighted their hardiness, disease resistance, and ability to survive on local feeds making them ideal for backyard systems.

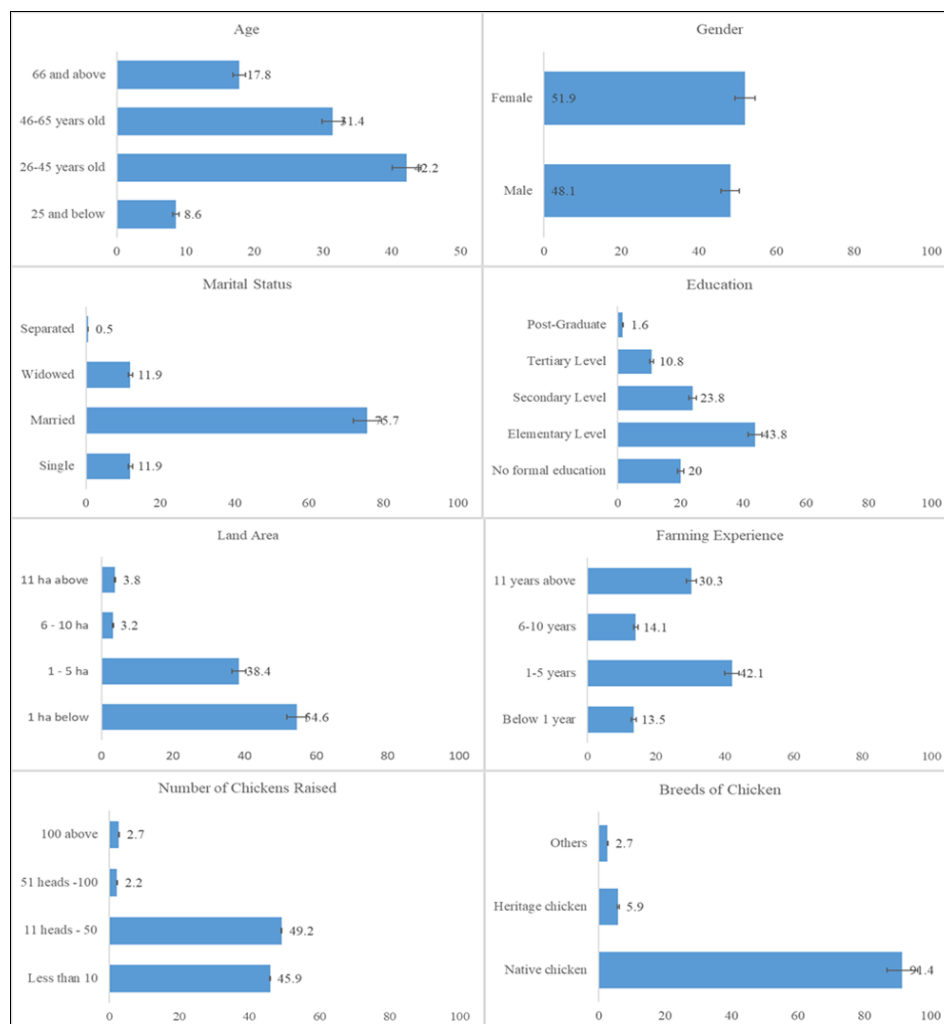


Fig 1: Socio-Demographic Profile of Backyard Poultry Farmers in Zamboanga del Sur: Age, SSGender, Education, Marital Status, Farming Experience, Land Area, Number of Chickens Raised, Breeds of Chicken (Enario, 2025) ^[13].

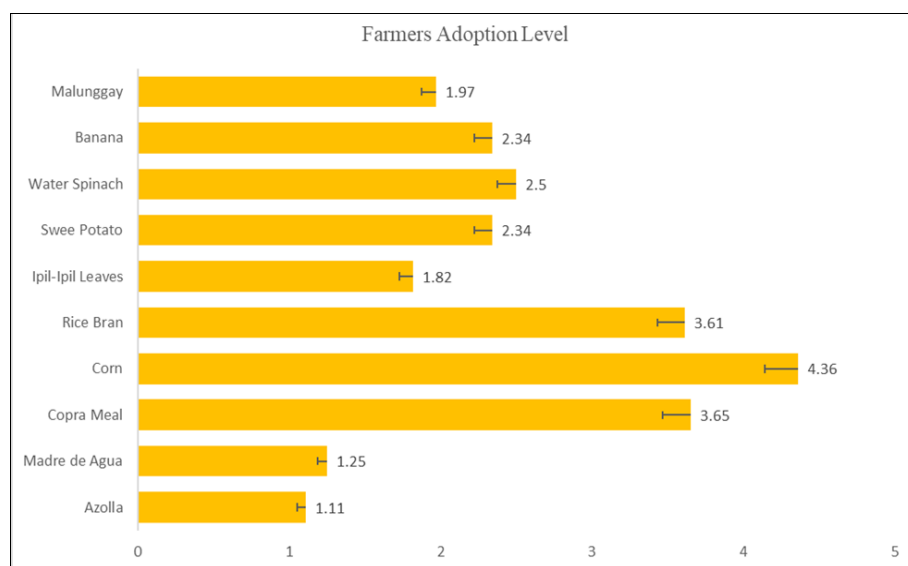


Fig 2: Mostly Adopted Indigenous Feed Alternatives by Backyard Poultry Farmers. Scale: 1.00 - 1.79 = Very low, 1.80 - 2.59 = Low, 2.60 - 3.39 = Neutral, 3.40 - 4.19 = High, 4.20 - 5.00 = Very High (Enario, 2025) ^[13].

Figure 2 shows how backyard poultry farmers adopted different indigenous feed alternatives. Corn had the highest adoption level (mean = 4.36), followed by copra meal (3.65) and rice bran (3.61). These are commonly used because they are easy to find and rich in energy or protein corn provides energy, while rice bran and copra meal offer good protein content (Garcia, 2023;

Ayasan, 2016) ^[18, 7]. In contrast, Azolla (1.11) and Madre de Agua (1.25) had the lowest adoption levels. Although these feeds are rich in protein and considered sustainable (Alagawany *et al.*, 2023; Libatique, 2021) ^[3, 26], they are not widely used, likely due to limited knowledge on how to grow or prepare them and lack of support from agricultural services. Other feeds like

Malunggay (1.97), Ipil-ipil (1.82), banana (2.34), sweet potato (2.34), and water spinach (2.5) also had low adoption. While these are generally available in the surroundings and are high in nutrients (Abde El-Hack *et al.*, 2022; Sugiharto *et al.*, 2018) [1, 43], farmers may only use them occasionally due to uncertainty about how much or how often to feed them. Without clear guidance, many remain hesitant to rely on these alternatives regularly.

Table 1: Mann-Whitney U Test for Gender and Adoption Level of Indigenous Feed Alternatives

Group	Mean Rank	Test Statistic (U)	Z	p-value
Female	98.78	3757.50	-1.416	0.157 ^{ns}
Male	87.64			

Note. p-values: ** = highly significant at 1% level ($p < 0.01$); * = significant at 5% level ($p < 0.05$); ns = not significant ($p \geq 0.05$).

Female small-scale backyard chicken farmers (98.78) exhibited a marginally higher level of adoption of locally available feed alternatives compared to male farmers (87.64), but the difference was not significant as shown in Table 1 ($U = 3757.50$, $Z = -1.416$, $p = 0.157$). This suggests that gender is not the most significant predictor of adoption behavior when the two are equally well-informed, with similar input access, and equally participatory in decision-taking. Recent reviews confirm that despite being predominantly liable for day-to-day management of chickens, women's adoption of feed innovations is not significantly different from males (Musyoka *et al.*, 2025) [31]. Gender disparity seen in keeping chickens is more likely a result of resource access than a motivation for adopting technology (Garsow *et al.*, 2022) [19].

Table 2: Kruskal-Wallis H Test on Adoption Level Across Age, Education, Marital Status, Farming Experience, Land Area, No. of Chickens Raised, Breeds of Chicken.

Variable	H Statistics	DF	p-value
Age	8.325	5	0.139 ^{ns}
Educational Attainment	9.857	5	0.079 ^{ns}
Marital Status	10.556	3	0.014*
Farming Experience	4.250	4	0.373 ^{ns}
Land Area	3.658	4	0.454 ^{ns}
Number of Chickens Raised	6.893	4	0.142 ^{ns}
Breeds of Chicken	9.023	2	0.011*

Note. p-values: ** = highly significant at 1% level ($p < 0.01$); * = significant at 5% level ($p < 0.05$); ns = not significant ($p \geq 0.05$).

Table 2 presents the Kruskal-Wallis H test results for socio-demographic factors, including age, education level, marital status, farming experience, land size, number of chickens raised, and breed of chicken. A statistically significant difference in adoption levels was found based on marital status ($H = 10.556$, $df = 3$, $p = 0.014$), suggesting that marital status influences feed adoption. This may be due to differences in household roles, decision-making, or financial responsibilities. Married farmers may benefit from shared support and responsibilities, encouraging them to try new feeding practices. Obayelu *et al.* (2009) [32] also noted that marital status affects adoption decisions in smallholder farming due to family structure and access to resources. Another significant difference was observed for the breed of chicken raised ($H = 9.023$, $df = 2$, $p = 0.011$). Farmers who raised native chickens were more likely to use indigenous feeds, likely because these chickens are well adapted to local, plant-based diets. Rodriguez *et al.* (2023) [38] support this, highlighting that native chickens perform well on low-input feeding systems. No significant differences were found for age ($p = 0.139$), education level ($p = 0.079$), farming experience ($p = 0.373$), land area ($p = 0.454$), or number of chickens raised ($p =$

0.142). Education was close to significance but did not meet the threshold. These results suggest that most socio-demographic traits may not strongly predict the adoption of indigenous feeds on their own.

Table 3: Spearman's Correlation Between Socio-Demographic Variables and Adoption Level of Indigenous Feed Alternatives (FLA)

Variable	Spearman's ρ	p-value
Age	0.106	0.152 ^{ns}
Gender	-0.104	0.157 ^{ns}
Educational Attainment	0.052	0.478 ^{ns}
Marital Status	0.023	0.758 ^{ns}
Farm Size (Land Area)	0.087	0.239 ^{ns}
Experience in Farming	-0.035	0.640 ^{ns}
No. of Chickens Raised	0.160	0.029*
Types of Chicken Raised	-0.015	0.834 ^{ns}
Breed of Chicken	-0.193	0.009**

Note: Cell contains r (above) and p-values (below); ** correlation is significant at the 0.01 level, * correlation is significant at the 0.05 level; r is interpreted using Cohen's Scale: -0.3 to +0.3 = weak, -0.5 to -0.3 or +0.3 to +0.5 = moderate relationship, -0.9 to -0.5 or +0.5 to +0.9 = strong relationship, -1.0 to -0.9 or +0.9 to +1.0 = very Strong relationship.

Table 3 shows that there was a weak but significant positive correlation between the number of chickens raised and the adoption of indigenous feed alternatives ($\rho = 0.160$, $p = 0.029$). This suggests that farmers with larger flocks may be more likely to use local feeds as a way to lower costs (Evans *et al.*, 2021) [14]. A weak but significant negative correlation was also found between the breed of chicken raised and feed adoption ($\rho = -0.193$, $p = 0.009$). Farmers raising native chickens were more likely to adopt indigenous feeds, while those raising commercial or hybrid breeds were less likely to do so. This may be because native chickens can survive on scavenged or plant-based diets, unlike other breeds that often require formulated feeds to meet their nutritional needs (Khandait *et al.*, 2020; Kalangi *et al.*, 2020) [24, 22]. This implies the importance of matching feed strategies with the type of chicken being raised. However, all other variables age, gender, education, marital status, land area, farming experience, and chicken type showed no significant correlation with feed adoption ($p > 0.05$), suggesting that these factors alone do not strongly influence farmers' feeding decisions.

In Table 4, a multiple linear regression was conducted to determine if the socio-demographic variables predict the adoption of indigenous feed alternatives. The result showed that the overall model was not statistically significant, $F(9, 175) = 1.869$, $p > 0.05$, and explained only 8.8% of the variation in adoption levels ($R^2 = 0.088$; Adjusted $R^2 = 0.041$). This means the variables included in the model had limited power in predicting adoption behavior. However, two variables emerged as significant. Age had a positive and significant effect on adoption ($\beta = 0.185$, $p = 0.046$), showing that middle-aged farmers were slightly more likely to adopt indigenous feeds.

Table 4: Multiple Linear Regression Coefficients: Predictors of Indigenous Feed Adoption (FLA)

Predictor Variable	B	SE	β (Beta)	t-value	p-value
Age	0.104	0.052	0.185	2.013	0.046*
Gender	-0.189	0.128	-0.109	-1.476	0.142 ^{ns}
Education Level	0.062	0.060	0.078	1.032	0.304 ^{ns}
Marital Status	-0.139	0.151	-0.082	-0.922	0.358 ^{ns}
Farm Size	0.068	0.065	0.078	1.038	0.301 ^{ns}
Experience in Farming	-0.072	0.046	-0.120	-1.563	0.120 ^{ns}
No. of Chickens Raised	0.094	0.070	0.099	1.330	0.185 ^{ns}
Types of Chicken Raised	-0.041	0.062	-0.050	-0.659	0.511 ^{ns}
Breeds of Chicken Raised	-0.321	0.162	-0.145	-1.974	0.050*

Model Summary: $R = 0.296$, $R^2 = 0.088$, Adjusted $R^2 = 0.041$, $F(9, 175) = 1.869$, $p > 0.05$
 Note: ** = highly significant at 1% level ($p < 0.01$); * = significant at 5% level ($p < 0.05$); ns = not significant ($p \geq 0.05$);

This may be due to their greater farming experience, stronger ties to traditional practices, and higher willingness to take risks

with local or non-conventional inputs (Brown *et al.*, 2019; Trujillo-Barrera & Pennings, 2016; Ullah *et al.*, 2015; Swiderska *et al.*, 2011; Patil & Veetil, 2024; Rivera-Ferre *et al.*, 2012)^[9, 47, 48, 44, 36, 37]. The second significant predictor was the breed of chicken raised ($\beta = -0.145$, $p = 0.050$). Farmers raising native chickens were more likely to adopt local feed alternatives, while those raising other breeds were less inclined. This supports earlier findings and reflects the practical fit between native chickens and low-input, indigenous feeding systems. Native breeds are naturally suited to scavenging and can thrive on local, plant-based feeds (Gebremariam & Mazengia, 2017; Padhi, 2016; Singh *et al.*, 2023)^[20, 34, 40]. Other variables such as gender, education, marital status, land size, farming experience, number of chickens, and chicken type were not significant predictors. While some had weak relationships, they did not contribute meaningfully to the model. This suggests that practical factors, like the breed of chicken and farmer's age, may play in influencing feed adoption than basic demographic characteristics.

Conclusion

The study found that socio-demographic factors had little influence on the adoption of indigenous feed alternatives, explaining only 8.8% of the variation in adoption. Farmers with larger flocks and those raising native chickens were more likely to use local feed alternatives. Older farmers also showed a higher tendency to adopt these feeds. This suggests that practical farm conditions, such as flock size and breed, have a stronger impact on adoption than personal characteristics. To improve adoption, extension programs should focus on breed-appropriate feeding, hands-on training, and better access to local feed resources.

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