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# ASSESSING TAGAL COMMUNITY DEPENDENCY ON ECOTOURISM-BASED TAGAL: A CASE STUDY FROM THE WEST COAST DIVISION OF SABAH, MALAYSIA

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**Abstract:** The present study investigates the dependency level demographic factors that affect the rural community on the ecotourism-based *Tagal* that has been widely applied throughout the West Coast division of Sabah. As the Department of Fisheries (DoF) Sabah indicated, fifteen *Tagal* involving ecotourism were selected around Sabah, and 400 respondents were picked using proportional random sampling. A standardised questionnaire was used to conduct in-depth interviews with household heads. The ratio of their monthly Tagal income to their total monthly income from other sources was calculated to calculate the household's dependency. A descriptive statistical research revealed that 87.3% of Tagal community families depend little on ecotourism-based *Tagal*. The link between reliance and the socioeconomic characteristics of respondents was investigated using ordinal regression analysis. In conclusion, the data revealed that a considerable percentage of the population demonstrated a low reliance on ecotourism-based *Tagal*, indicating that it has not yet become a substantial source of revenue for the community. In addition, the study underlined the impact of gender and family size on the degree of dependency.

Keywords: Sustainability, community-based, ecotourism, dependency, *Tagal.*
*Abbreviations:* Community-based fisheries management (CBFM), Community-based ecotourism (CBET), Department of Fisheries (DoF).

## Introduction

Riverine fisheries have long provided subsistence for inland tribes in Sabah's interior (Kadfak, 2019). Freshwater fish are an essential protein source, and riverine fisheries have historically been the primary source of income for rural populations. The State Government of Sabah and the Department of Fisheries (DoF) of Malaysia adopted both freshwater aquaculture and the concept of community-based fisheries management (CBFM) to revitalise Sabah's freshwater fisheries resources (Wong *et al.,* 2009). CBFM concept involves communities in decisions related to fishing practices, resource allocation, and conservation measures to ensure the long-term viability of fish stocks and aquatic ecosystems (Hossain & Rabby, 2019).

The *Tagal* system, a "smart partnership" between local communities and the Sabah State Government, was adopted to protect and recover Sabah's depleted freshwater fisheries resources. The *tagal* system, which was designed as a traditional technique of preservation and conservation, was amended so that it could be used for legal protection, recovery, preservation of natural resources, and administration of the nation's freshwater fisheries and aquaculture, particularly in Sabah (Wong *et al.,* 2009).

The Kadazan-Dusun word "Tagal" means "do not" or "prohibit"; it is also known as "Bombon" (Chung & Mojiol, 2020). Additionally, Sarawak employs the term "Tagang" (Ansley *et al.,* 2017). Consequently, *Tagal* is the name used by indigenous communities in Sabah to identify the type of water conservation practice they employ. According to the *Tagal* system, however, affected people are still permitted to harvest river resources, but only sustainably. Sabah

was the first state to incorporate indigenous resource management methods into state-led conservation practices (Sansalu, 2008). It has been a long-standing tradition for indigenous people in the state of Sabah, who have long been recognised and considered indigenous (Sansalu, 2008), to practise environmental preservation (Vaz & Agama, 2013).

The concepts of "dependency" and "community" regarding community-based ecotourism (CBET) are, in fact, highly connected. CBET requires the participation and engagement of local communities in planning, developing, and managing tourism activities in their area (Mazengiya, 2022). Most of the world's rural population relies heavily on natural resources and services given by the natural environment to maintain their way of living (Johnson *et al.,* 2013; Kamwi *et al.,* 2015; Ali *et al.,* 2020).

The *Tagal* system has been recognised for its advantages in prior research. Local communities act to manage their resources for sustainable livelihood through tourism (*tagal* system) as one of the initiatives (Musa *et al.,* 2020). Foo (2019) stated that the effectiveness of this tagal system is highly beneficial to the community as the community willingly gives full commitment to obeying all the rules regarding this system, which affects the well-being of the *tagal* as the river water is clean, indicating increased fish abundance. Co-management by the involvement of the local community has made environmental conservation work together with the community (Er, 2012). Understanding the unique characteristics, challenges, and opportunities of the ecotourism-based *Tagal* system is essential for promoting sustainable tourism development and community empowerment (Jonut & Bagul, 2020).

Therefore, the present study investigates the dependency and demographic factors that affect the local communities towards the ecotourism-based *Tagal*. This study is essential for comprehending the efficacy of ecotourism-based *Tagal* in supporting the local community and preserving the ecosystem. Exploring the differences in dependency levels, the factors that influence them, and their consequences for community resilience and resource management can provide useful insights for developing context-specific strategies and policies.

## Methods

### *Study Area and Sampling*

The research was conducted in different *Tagal* villages along the West Coast of Sabah. DoF evaluated and authorised the selection of *Tagal*-based. As stated in Table 1, the DoF recommended 15 *Tagal* engaged in the ecotourism industry up to 2022. Figure 1 depicts the *Tagal* region, which is dispersed across the Sabah map and includes five districts: Ranau, Papar, Penampang, Beaufort, Tuaran, and Kota Belud.

Due to the various population sizes in each of the selected *Tagal*, proportional random sampling was utilised in this study to establish the sample size for each *Tagal*. Proportional random sampling guarantees that each community segment is adequately represented within the total sample population of a research study (Hayes, 2022). A total of 15 *Tagal* comprised 1,224 registered *Tagal* committees; however, only 400 respondents were randomly selected for this study. Table 1 presents the sample size or total number of responses from each tagal in bold figures.

### *Data Collection*

From March 2021 to July 2022, primary data were collected from 15 *Tagal* participating in the ecotourism industry. Before developing the questionnaire as the research instrument for this study, a preliminary inquiry was undertaken to obtain vital information regarding ecotourism-based *Tagal* and the residents. The data collection in this study was based on interviews using a questionnaire pre-tested on a representative community sample. The preliminary evaluation of the questionnaire was undertaken at three *Tagal* with 30 randomly selected samples to identify any potential issues with the survey

Table 1: List of *Tagal* by DoF as the study area and the sample size taken in each area with different population sizes

| No. | Ecotourism-based *Tagal* | District | Sample Size/Population Size |
|---|---|---|---|
| 1 | Luanti Baru village | Ranau | 24/75 |
| 2 | Marakau village | Ranau | 16/50 |
| 3 | Kilimu village | Ranau | 55/170 |
| 4 | Sekolah Rendah Mandalipau | Papar | 32/100 |
| 5 | Kinolosodon village | Papar | 42/130 |
| 6 | Toboon Minansar village | Papar | 16/50 |
| 7 | Tinopikon Babagon village | Penampang | 10/30 |
| 8 | Kibunut Atas village | Penampang | 26/80 |
| 9 | Karangan village | Beaufort | 15/40 |
| 10 | Moingob Murug Turug Ecotourism village | Tuaran | 30/92 |
| 11 | Poturidong Kiulu village | Tuaran | 13/40 |
| 12 | Nawoi Kiulu village | Tuaran | 10/30 |
| 13 | Melangkap Tiong village | Kota Belud | 41/127 |
| 14 | Tambatuon village | Kota Belud | 32/98 |
| 15 | Talungan village | Kota Belud | 36/112 |

*Note*. The data of the latest ecotourism based on *Tagal* was provided by the DoF. Bold numbers are the number of respondents taken in each *Tagal*.

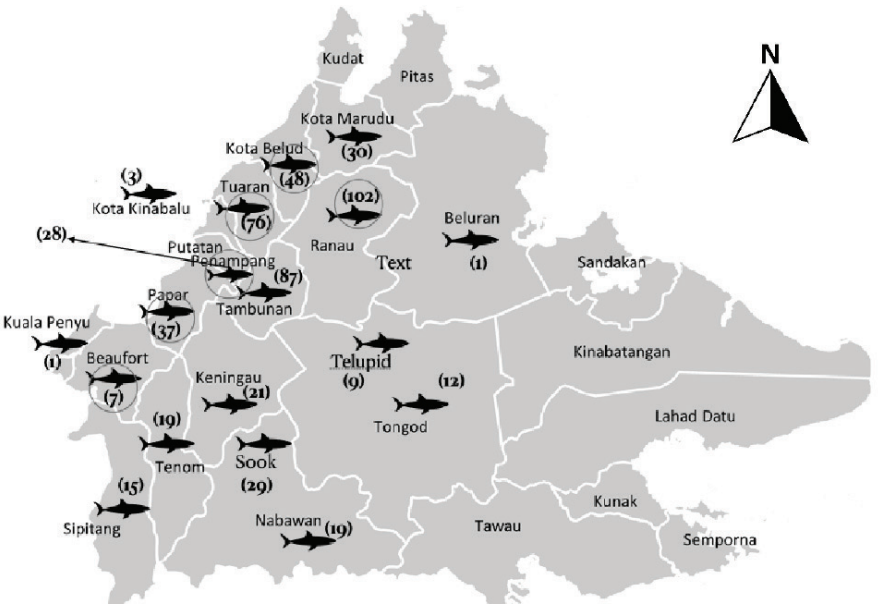


Figure 1: Distribution of *Tagal* by district in Sabah, Malaysia. Numbers in the bracket indicate the total number of *Tagal* in the respective area by DoF up to 2022. The circle marks indicate the selected *Tagal* as the study area in this study

procedure or questions. Given that the research was conducted in a rural location with an indigenous population, the survey questionnaires were verbally translated into the native language to improve comprehension and feedback.

The major purpose of the questionnaire was to collect information from respondents to expedite and reduce the cost of data collection from a large sample size. The investigation centred on numerous essential variables, such as socioeconomic factors such as age, gender, educational attainment, marital status, and family size, and their impact on the ecotourism-based region of *Tagal*. The survey also investigated the respondents' sources of income as well as their attitudes and awareness of *Tagal's* ecotourism industry.

### *Statistical Analysis*

The analysis of quantitative data was conducted with the aid of descriptive statistics, including means, ranges, and percentages, all of which were computed using SPSS statistics version 27. In the context of this study, the term "income" refers to the entire amount of money earned by each household. Calculating the percentage of a household's total net income that comes from ecotourism-based *Tagal* about the total revenue from all households is the instrument used to assess the degree of reliance of the *Tagal* community on ecotourism-based *Tagal*. Then, the results were used to divide the sample households into three groups based on their share of net income from *Tagal* and thus their dependence on *Tagal*, and these groups were interpreted in terms of livelihood strategies (LS): LS 1, 20% = less dependent; LS 2, 20% – 50% = moderately dependent; and LS 3, > 60% = highly dependent (Xu *et al.,* 2015). Total household net income is categorised into four categories: net agriculture income, net non-farm income, net livestock income, and net *Tagal* income (Table 2).

The revenue was determined using the gross value obtained from the extraction of raw materials or services from *Tagal*, agriculture, livestock, and non-agricultural income. The ratio of *Tagal's* monthly revenue to the total monthly income from all other sources is used to calculate their degree of dependence (agriculture, off-farm employment, and livestock). The methods utilised to derive income from each source are outlined in the subsequent section.

$$\text{Household monthly income} = \Sigma\ (\text{Tagal income} + \text{Agriculture income} + \text{Off-farm income} + \text{Livestock income}) \quad (1)$$

Ordinary logistic regression (OLR) was utilised to assess the association between the demographic state of the *Tagal* population and their reliance on ecotourism-based *Tagal*. Logistic regression has been widely used in the past to examine the dependence of rural livelihoods on natural resources (Masozera & Alavalapati, 2004; Tieguhong & Nkamgnia, 2012; Adam & Tayed, 2014; Jain & Sajjad, 2016; Ali *et al.,* 2020).

Table 2: Type of income in the *Tagal* community

| Type of income | Items |
|---|---|
| Agriculture | Herb cultivation, small-scale cultivation, fruit orchards, rubber tree plantations, rice fields, etc. |
| Livestock | Fish farming (aquaculture), cattle, chickens. |
| Off-farm | Income gained outside of the village such as government servants, working in the public sector, and businesses. |
| Tagal | Ticket selling, Tagal wages, homestay rents and merchandise selling. |

*Note.* The definition of the type of income is obtained and modified from the PEN technical guidelines (Poverty Environment Network, 2007; Fekadu *et al*., 2021). The Forest income was substituted with the *Tagal* income. Each item from the type of income is based on the discussions with the head of *Tagal* and DoF.

## Results

This study examined the reliance of the *Tagal* community on ecotourism-based *Tagal* as its key variable and the demographic factors that determine this reliance. Both descriptive and inferential statistical analyses have been given below with 400 families as respondents.

### *Descriptive Statistics*

In this study, 301 (75.3%) of the 400 homes are headed by men, while 99 (24.8%) are led by women. In addition, 363 (90.8%) were individuals between 20 and 60, while only 37 (9.3%) were seniors aged 61 and older. Youths still in school and do not have a source of income were not included in this study, as the respondents of interest are heads of homes. The household size was more evenly distributed; 111 (27.8%) have two or fewer family members, 170 (42.5% of households) have between three and five family members, and 119 (29.8%) have more than five family members. Only 23 (5.8%) were single, whereas 310 (77.5%) were married and 67 (16.8%) were divorced or widowed. The employment situation of the 400 households was as follows: 33 (8.3%) were unemployed, 27 (6.8%) were government employees, 90 (22.5%) were in the private sector, and a significant number, 250 (62.5%), were self-employed (Table 3).

Low, medium, and high categories were assigned to the extent of dependence of the Tagal community on the ecotourism-based Tagal to classify the three categories into which households may fall. This study found that 349 (87.3%) out of 400 Tagal households have a low reliance on ecotourism. Twenty-four (6%) and twenty-seven (6.8%) individuals, respectively, fell into the medium and high reliance groups (Figure 2).

### Inferential Statistic

This analysis found that just two of the factors, namely gender and household size, were statistically associated with the dependent variable. Table 4 displays these results, which showed that gender and household size may be significant variables when studying the

Table 3: Frequency distribution table of the respondent's profile

| Variables | Categories | Total sample (%) | LOD of households | | | *p-value** |
|---|---|---|---|---|---|---|
| | | | Low | Medium | High | |
| **Gender** | Male | 301 (75.3) | 270 (89.7) | 18 (6.0) | 13 (4.3) | ***0.003** |
| | Female | 99 (24.8) | 79 (79.8) | 6 (6.1) | 14 (14.1) | |
| **Age** | Adult (20 - 60) | 363 (90.8) | 318 (87.6) | 21 (5.8) | 24 (6.6) | 0.791 |
| | Senior (Above 61) | 37 (9.3) | 31 (83.8) | 3 (8.1) | 3 (8.1) | |
| **Household size** | ≤ 2 | 111 (27.8) | 89 (80.2) | 6 (5.4) | 16 (14.4) | ***<.001** |
| | 3 – 5 | 170 (42.5) | 160 (94.1) | 7 (4.1) | 3 (1.8) | |
| | > 5 | 119 (29.8) | 100 (84.0) | 11 (9.2) | 8 (6.7) | |
| **Marital status** | Single | 23 (5.8) | 20 (87.0) | 2 (8.7) | 1 (4.3) | 0.097 |
| | Married | 310 (77.5) | 52 (77.6) | 6 (9.0) | 9 (13.4) | |
| | Divorced/Widowed | 67 (16.8) | 277 (89.4) | 16 (5.2) | 17 (5.5) | |
| **Job** | Unemployed | 33 (8.3) | 29 (87.9) | 0 | 4 (12.1) | 0.102 |
| | Government | 27 (6.8) | 24 (88.9) | 1 (3.7) | 2 (7.4) | |
| | Private | 90 (22.5) | 85 (94.4) | 2 (2.2) | 3 (3.3) | |
| | Self-employed | 250 (62.5) | 211 (84.4) | 21 (8.4) | 18 (7.2) | |
| **Total** | | 400 | 349 (87.3%) | 24 (6.0%) | 27 (6.8%) | |

*Note*. The *p-values* were calculated using the chi-square test. *Significant at α = 0.05.

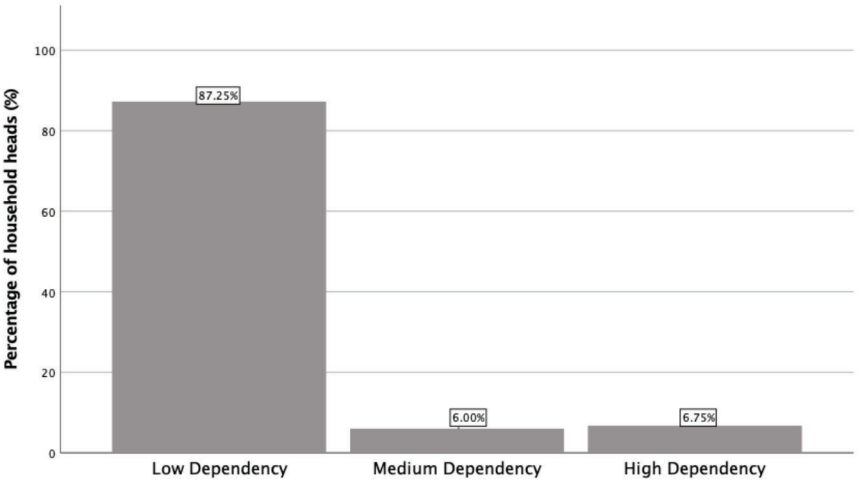


Figure 2: Frequency distribution of dependency among 400 households shown in percentage. (Low; 0 - 20%, Medium; 21 - 50%, High; 51 - 100%)

link between these covariates and the outcome variable.

In particular, Table 4 demonstrates the statistical significance of the link between gender, household size, and the outcome variable, whereas the remaining covariates exhibited no statistically significant association. As indicated by a chi-square value of X2 (2, N = 400) = 11.486, p = 0.003, the results of this study revealed a statistically significant correlation between gender and the degree of *Tagal* dependence. This data implies that gender may play a role in determining the degree of a household's reliance on the *Tagal*. Males displayed a substantially higher degree of reliance on *Tagal* than females, according to the findings of the study, X2 (4, N = 400) = 20.771, p = 0.001, indicates that there is also a significant correlation between the degree of dependence and the size of the household. These results indicate that reliance on *Tagal* tends to decrease as household size increases.

In this study, multicollinearity issues were examined. Thus, collinearity diagnostics and tolerance statistics were employed to identify the probable issue (Sieber & Tolich, 2013). According to the test, there is no evidence of multicollinearity in the data. In addition, robust standard errors were included for constructing the z statistics for this study to prevent the heteroscedasticity of the independent variable from distorting the findings. The model's Pseudo R2 is 0.186. Table 4 presents the findings of the multivariable ordinal logistic regression analysis.

At a significance level of 5%, the gender of household heads was shown to be statistically significant in the statistical analysis. The data imply that males are much more likely than female-headed households to have a high degree of dependency, with an estimated odds ratio of 2.91 (95% CI, 1.23-6.93). The results reveal a gender gap in *Tagal's* dependence on ecotourism, with men demonstrating a greater propensity to gain from it than women.

Moreover, there was a strong relationship between household size and reliance on ecotourism in *Tagal* (OR = 0.364, 95% CI: 0.136-0.977). Less than or equal to two-person households are 0.364% less likely to depend on ecotourism-based *Tagal* than larger households. Consequently, this data shows that bigger household sizes rely on ecotourism-based *Tagal* more than smaller ones. One possible explanation for this association is that larger households have greater subsistence demands

Table 4: Ordinal logistic regression estimates

| Variables | Categories | Estimate | S.E | *p*-value | OR | 95% CI for OR | | Wald |
|---|---|---|---|---|---|---|---|---|
| Gender | Male<br>Female | 0.662 | 0.344 | **0.015*** | 2.919<br>1 | 1.229 | 6.933 | 5.891 |
| Age | Adult (20 - 60)<br>Senior (Above 61) | 0.580 | 0.608 | 0.668 | 0.725<br>1 | 0.166 | 3.163 | 0.184 |
| Household size | ≤2<br>3 - 5<br>≥5 | -0.145 | 0.042 | **0.045***<br>0.062 | 0.364<br>3.748 | 0.136<br>0.933 | 0.977<br>15.052 | 4.026<br>3.470 |
| Marital status | Single<br>Married<br>Divorced/Widowed | -0.333 | 0.05 | 0.579<br>0.333 | 1.842<br>0.614 | 0.213<br>0.228 | 15.936<br>1.649 | 0.308<br>0.937 |
| Job | Unemployed<br>Government<br>Private/Self-employed | -0.185<br>-0.016<br>-1.290 | 0.033 | 0.501<br>0.842<br>0.158 | 0.627<br>0.847<br>2.558 | 0.161<br>0.167<br>0.695 | 2.444<br>4.292<br>9.419 | 0.453<br>0.040<br>1.994 |

*Note.* Parallel line test: 0.986, goodness-of-fit test overall model: deviance, p-value = 1, Nagelkerke's R = .186, S.E: standard error, OR: Odds ratio, CI: 95% confidence interval for coefficients. *Significant at α = 0.05.

(Menard, 1995; Gunatilake, 1998), resulting in greater reliance on all types of revenue, including the Tagal's income.

## Discussion

According to the findings of this study, 87.3% of respondents have a low reliance on ecotourism-based *Tagal*. Consequently, the results of this study showed that ecotourism-based *Tagal* has not yet matured to the point where the *Tagal* community can rely on it as a source of revenue. It demonstrates that the ecotourism industry in *Tagal* is in its infancy. This can be attributed to several factors.

The low dependency on ecotourism-based Tagal may be due to limited awareness and promotion of the Tagal system as a tourist attraction. The lack of marketing and promotion efforts may result in limited tourist interest and visitation to the Tagal community, leading to low revenue generation (Smith, 2003).

Also, the underdevelopment of infrastructure and facilities in the Tagal community may hinder the growth of the ecotourism industry. Insufficient accommodation options, transportation services, and visitor amenities can deter tourists from visiting and spending time in the area (Suksmawati *et al.,* 2021). The lack of necessary infrastructure may also limit the community's ability to provide quality services and experiences to visitors.

Additionally, the Tagal community may face challenges in capacity building and skills development related to ecotourism management. Community members may require training and support to engage effectively in ecotourism activities, such as guiding, interpretation, and hospitality services (Fennell & Dowling, 2003; Hall, 2010). The lack of expertise and knowledge in these areas may impact the quality of the visitor experience and limit the community's ability to generate revenue from ecotourism.

Furthermore, external factors such as the COVID-19 pandemic may have further hindered the growth of the ecotourism industry in Tagal. Travel restrictions, reduced tourist arrivals, and the overall decline in tourism activities have impacted communities reliant on tourism, including the Tagal community (Gössling *et al*.,

2021). The pandemic has disrupted the tourism industry globally, and the Tagal community may still be recovering from the effects of the crisis.

Even though they have developed ecotourism, it appears that they joined the *Tagal* community and registered to preserve their culture and protect their river (Foo, 2019). This conforms to the departure from the traditional. Even throughout the interviews and discussions with respondents about their responses, many have exhibited a strong desire to safeguard the river and its resources (Foo & Noor, 2012).

Most households in this study were involved in agricultural labour, such as managing rice fields, durian orchards, and rubber tree tapping. The data indicate that the respondents' principal occupation is connected to the agriculture sector, a traditional income source in many rural regions (Mazlan & Juraimi, 2014). Involvement with *Tagal* is one of the empowerment approaches other than agriculture activities, as a community is relatively efficient in managing its finances as it is in close contact with nature and surroundings (Hassan *et al.,* 2018).

The availability of public sector employment is another aspect that contributes to *Tagal's* low dependence. Typically, the public sector offers more secure work prospects and a more consistent income than ecotourism-related enterprises (Kunjuraman, 2021). The perceived job security and accompanying advantages, such as pensions and social security, make employment in the public sector an attractive alternative for many people (Kunjuraman, 2021). Consequently, households may prioritise these stable income sources above the possibly unpredictable returns from ecotourism activities in *Tagal* (Mariapan *et al.,* 2020).

As revealed by the findings of an Ordinal Logistic Regression analysis, the gender of the household head and the size of the household have a strong association with their level of dependency (Xu & Gu, 2018). It was discovered that male family heads depend more on ecotourism-based *Tagal* than female household heads. Consistent with earlier research that has highlighted the difficulties women have in accessing and participating in decision-making processes about natural resource management and conservation, the current finding demonstrates that women continue to confront obstacles in these areas (Agarwal, 1997; Leach *et al.,* 1999). Another argument is that men are more likely to be promoted within an organisation, while women are relegated to support roles. Men have traditionally held positions of authority and decision-making power inside households in many countries (Kabeer, 1999; Mosedale, 2005; Buvinic *et al.,* 2013). In ecotourism, women commonly hold low-status, low-paying professions or engage in unpaid work as an extension of their domestic duties (Schyvens, 2000; Schyvens, 2007).

Moreover, the results of this study indicated that, in addition to gender, household size is the most important factor in predicting the degree to which a Tagal community depends on ecotourism-based *Tagal*. Generally, households with a larger number of members may have greater financial needs, hence increasing their reliance on *Tagal* ecotourism as a source of income. For instance, Kimengsi *et al.* (2019) discovered that household assets, such as the number of family members, were positively correlated with ecotourism engagement. Snyman (2014) discovered that households with greater family sizes were likely to engage in ecotourism activities. In addition, Adhikari *et al.* (2004) discovered that households with bigger family sizes in rural Nepal were more likely to engage in numerous income-generating activities.

Overall, these results indicate that household size is a crucial aspect to consider when creating *Tagal* ecotourism initiatives that aim to promote sustainable livelihoods and conservation. By knowing the requirements and peculiarities of individual households, *Tagal* ecotourism projects can be adjusted to maximise their advantages for local communities and the environment.

## Conclusion

The data revealed that a considerable percentage of the population demonstrated a low reliance on ecotourism-based *Tagal*, indicating that it has not yet become a substantial source of revenue for the community. In addition, the study emphasised the impact of gender and household size on the degree of dependency. It is proposed that additional studies be conducted to enhance our understanding of the *Tagal* community and ecotourism-based *Tagals*, thereby permitting more thorough and focused interventions in the ecotourism industry.

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## Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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