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Socio-Economic Drivers of Herpetofauna Resource Utilization Around Hadejia Wetlands National Park, Jigawa State Nigeria

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ABSTRACT
Herpetofauna are among the most endangered vertebrate taxa globally, however ethnobiological data and the socioeconomic drivers influencing its utilization around sub-Saharan regions remain undocumented especially Hadejia Wetlands National Park. This study explored the socio economic inducing factors towards the traditional usage of the Herpetofauna in the study area. Cross sectional survey method was employed for the information was through the aid of structured questionnaires and key-informant interviews in communities neighboring to the park, three hundred (300) copies of questionnaires were administered across the seven (7) sampled communities and the effects of socioeconomic variables on herpetofauna utilization were evaluated using Nominal, and binary logistics regressiona. Ethnozoological findings demonstrated that herpetofauna are extensively utilized for medicinal, nutritional, cultural, and spiritual purposes. The nominal regression results indicated that farmland size was the only variable that significantly influenced herpetofauna utilization at the 5% level of significance ($p < 0.05$). Specifically, farmland size recorded a positive regression coefficient ($B = 0.299$) with a statistically significant Wald value (Wald = 9.596, $p = 0.002$). Utilization patterns were significantly associated with respondents' education level, occupation, age, and cultural beliefs. The result also depicts that religion (Wald = 10.353, $p = 0.001$); legal restriction (Wald = 9.243, $p = 0.002$) and weak marketing potentials (Wald = 7.253, $p = 0.007$) were statistically significant as constraints in utilization of the Herpetofauna in the study area. This study contributes original baseline data critical for biodiversity conservation, demonstrates the value of herpetofauna as indicators of wetland ecosystem health, and highlights the necessity of incorporating indigenous knowledge and socioeconomic factors into conservation and management frameworks for sustainable wetland biodiversity in northern Nigeria.

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INTRODUCTION

Reptiles and amphibians are important component of biodiversity in many ecosystems and paly critical ecological and economic roles (Alves & Rosa, 2013). In a Sahelian region where climatic conditions are harsh and livelihoods are strongly dependent on natural resources, Herpetofauna resources are increasingly utilized for food, traditional medicine, trade, culture and income generation (Bennett, 2002). The continue surge in human population and tenacious poverty across many Sahelian communities have increased pressure on wildlife resources, including Herpetofauna. Species such as snakes, lizards, tortoise, crocodiles and frogs are harvested for various purposes ranging from bush meat consumption to medicinal application and commercial trade (Nasir *et al.,* 2025). In many African climes, reptilian species are believed to have spiritual or therapeutic properties and therefore used in ethnomedicinal practices (Alves & Rosa, 2013). This form of utilization is influenced by local traditions, indigenous knowledge systems and socioeconomic realities.

Socioeconomic factors influencing the exploitation and utilizing Herpetofauna resources are multifaceted and mostly interconnected (Niger & Walters, 2019). Socioeconomic factors reported to have influence in the level and form wildlife utilization across African countries. People from different socio-economic backgrounds exhibited varying attitudes towards herpetofauna (Rabbe *et al*., 2021). A study reported that households with lower income often rely on herpetofauna as a primary protein source, as seen in rural communities where bush meat is a staple (Setlalekgomo, 2013; Ali *et al*., 2023), as stressed by (Setlalekgomo, 2013) who also opined that households with lower income often rely on herpetofauna as a primary protein source, as seen in rural communities where bush meat is a staple on the other hand, another study also stressed that students with lower income level were more frequently agreed that animals are harmful, potentially due to the greater economic impact of wildlife attacks on their livelihoods (Mota *et al.*, 2023). Cultural practices and beliefs play a crucial role in wildlife conservation, as traditional taboos can limit hunting and promote sustainable practices (Singh & Prakash, 2021). A correlation exists between education levels and awareness of wildlife conservation, with higher awareness leading to better conservation outcomes (Audu & Ayuba, 2016).

Study confirmed that killing of frogs was influenced by landholding status and pre-existing beliefs, while killing of reptiles was associated with educational status and perceptions of them being poisonous, sharing habitat, and general preconceptions (Alvin & Souto 2015; Rabbe *et al*., 2021) as lower land-holding status correlated with a greater inclination to kill amphibians, often due to a perception of limited space to share (Audu & Ayuba, 2016; Rabbe *et al.,* 2021). It was mythologically expressed that misconceptions like killing frogs and toads bring nightmares and considering them dirty animals due to feces were prevalent (Rabbe *et al*., 2021).

Religious views (such as Hindus being less eager to kill snakes due to veneration, compared to Muslims and Christians) also influenced attitudes (Rabbe *et al.,* 2021). According to Mota *et al*., (2023) education can reduce misconceptions about herpetofauna linked to folkloric aspects as the traditional knowledge is predominantly held by the elderly, derived from lifelong observation and inheritance (Hassan *et al*., 2023).

MATERIALS AND METHODS

Study Area

Hadeijia Wetlands National Park (HWNP)

Hadejia Wetlands national Park popularly known as Baturiya Wetlands Game Reserve (BWGR) before it was recently upgraded to National Park. It is natural wetlands located within the Sudano-Sahelian biogeography region of Nigeria, in Jigawa State. It is situated between latitudes $12^0$30' and $12^0$40' N and longitudes $10^0$05' and $10^0$35' E. It is located at West to East directions of Hadejia River, sharing boundaries with Auyo, Kirikasama and Guri Local Government areas of Jigawa State as depicted in figure 1 (Babagana *et al.,* 2028).

The wetland is internationally known as a hotspot for the conservation of flora and fauna species (Ramsar, 2009). The area of the Reserve including the buffer zone is about 320km^2 and it is characterized by the presence of ponds and flooded lands that are seasonally replenished by the annual flooding of Kafin Hausa and Katagum Rivers, which in fact supports great variety of wildlife resources, particularly water birds that are of both migratory and resident origins. The wetlands game reserve derived its name from the neighboring community of Baturiya, meaning a lady from Europe or white lady. These dates back to three – four hundred years ago visited and camped at the site (Sanusi, 2021).

The wetlands experience a semi-arid tropical climate characterized by a short rainy season from May to September and a long dry season from October to April. Mean annual rainfall ranges between 400 and 600 mm, with high inter-annual variability. Temperatures are generally high throughout the year, often exceeding 35 °C during the dry season. Evapotranspiration rates are high, making seasonal flooding a critical ecological process (Dugan, 2001).

The Hadejia–Nguru Wetlands support a dense rural population estimated at between 1 and 1.5 million people living within and around the floodplain. Settlements are mainly small villages and market towns located along river channels and floodplain margins where access to water and fertile soils is greatest (Sabo *et al* 2021; FAO, 2001). The dominant ethnic groups include Hausa, Fulani, Kanuri, and Bade. Fulani pastoralists are often semi-nomadic,

moving seasonally into the wetlands during the dry season in search of pasture and water for livestock (IUCN, 1999). Livelihoods in the Hadejia–Nguru Wetlands are closely linked to the seasonal flood regime. The main economic activities include: Agriculture: Flood-recession farming and wet-season rice cultivation dominate agricultural practices. Farmers also engage in irrigated dry-season vegetable farming using residual moisture and shallow groundwater; Fishing: Artisanal fisheries are widespread, with fishing intensity increasing during the recession of floodwaters (Bukar *et al*., 2021). Fish provides a major source of protein and income for local communities; Livestock Rearing: The wetlands serve as an important dry-season grazing reserve for cattle, sheep, and goats, particularly for Fulani pastoralists; Harvesting of Wetland Resources: Local communities exploit reeds, grasses, and fuelwood for thatching, fodder, crafts, and domestic energy (FAO, 2001; Dugan, 2001).

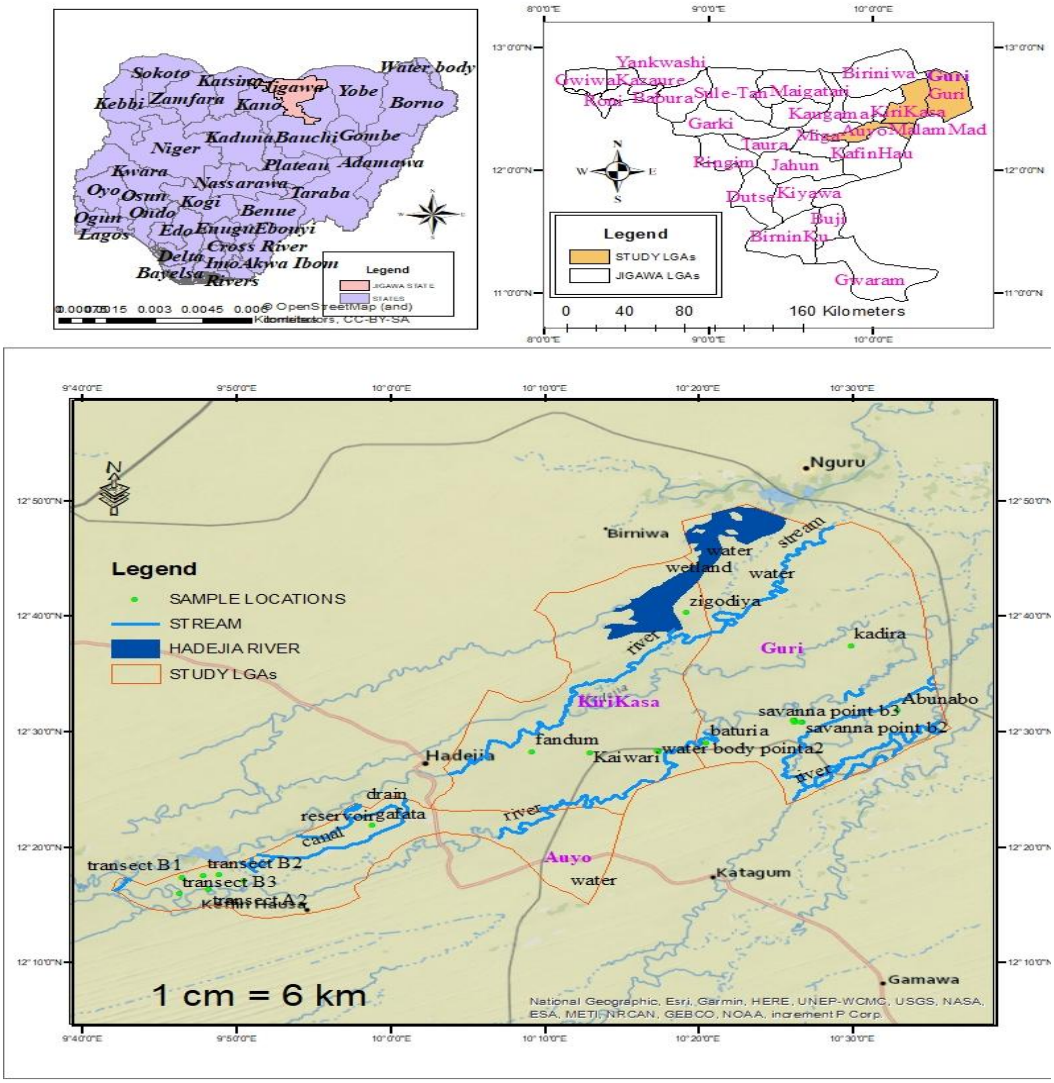

Figure 1: Map of Nigeria showing Hadeijia Wetlands National Park

Research design

Cross-Sectional design method was employed for this study. The socio-economic factors influencing ethnozoological utilization of Herpetofauna resource were obtained once (cross-sectional) in the study lifespan.

Tool for Data Collection and Sample Size

Seven (7) communities were sampled for this study; these include Fandum, Kaiwari, Gafta, Abunabo, Baturiya, Zigobiya and Kadira. Three hundred (300) copies of questionnaires were administered to the respondents and investigated in to the effect of socio-economic factors influencing the utilization assigned to the herpetofaunal resources of the wetland by the inhabitant of the communities around the study area.

The sampling intensity was according to Diaw *et al.* (2002) as reported by Nasir *et al*. (2025) indicated that 10% sampling intensity be used for population below 5000, 5% sampling intensity for population between 500 and 1000, and 2.5% sampling intensity for population above 1000.

Data Analysis

Relationships between the socioeconomic variables were tested using the Kruskal H test as expressed in the following model;

$$H = \frac{12}{N(N+1)} + \sum_{j-1}^{k} \quad \frac{R^2}{nj} - 3(N + 1 \qquad (1)$$

Where K = number of groups; Nj = sample size of group j; Rj = sum of ranks for group j

N = total observations

Nominal logistics regression was used in analyzing the association of the factors hindering the utilization of Herpetofauna resources and its usage as expressed below:

$$\text{Log}\left(\frac{P(y=j)x^2}{P(y=j)}\right) = \beta 0j + \sum \beta ijXi \qquad (2)$$

Where:

P(Y=j) = probability of category *j*; $X_{1,}, X_p$ = predictors; Bij = cooficients for category *j* versus reference

RESULTS AND DISCUSSION

Nominal Logistic on the Influence of Selected Socioeconomic Variables on Herpetofauna Utilization around Hadejia Wetlands National Park

The result in the Table 1 examined the influence of selected socioeconomic variables on herpetofauna utilization around Hadejia Wetlands National Park. The results indicated that farmland size is the only variable that significantly influenced herpetofauna utilization at the 5% level of significance ($p < 0.05$). Specifically, farmland size recorded a positive regression coefficient (B = 0.299) with a statistically significant Wald value (Wald = 9.596, p = 0.002). The odds ratio (eB = 1.348) implies that for every unit increase in farmland size, the likelihood of herpetofauna utilization increases by approximately 34.8%, holding other variables constant. This indicates that households with larger farmlands are more likely to utilize herpetofauna, possibly due to increased exposure during farming activities or greater dependence on natural resources for livelihood.

Other variables including age, marital status, education level, occupation, land acquisition, and sex did not show statistically significant effects on herpetofauna utilization ($p > 0.05$). Although age (0.048), occupation (0.111), and land acquisition (0.134) had positive coefficients, their effects were weak and statistically insignificant. Education (-0.091) showed negative but insignificant relationship with herpetofauna utilization, indicating no meaningful influence. The result indicates that farmland size is the key socioeconomic determinant of herpetofauna utilization in the study area, highlighting the importance of land-use patterns in shaping human and herpetofauna interactions around Hadejia Wetlands National Park.

Table 1: The Nominal Logistic Regression on the Socioeconomic Determinants of Herpetofauna Utilization around Hadejia Wetlands National Park

Variables	B	S.E	Wald	Df	P-value	eB
Age	0.048	0.136	0.126	1	0.722	1.050
Marital status	0.002	0.381	0.000	1	0.995	1.002
Education	-0.091	0.106	0.740	1	0.390	0.913
Occupation	0.111	0.202	0.300	1	0.584	1.117
Land acquisition	0.134	0.196	0.467	1	0.494	1.144
Farmland size	0.299	0.096	9.596	1	0.002	1.348
Sex	0.309	0.177	9.669	1	0.003	1.393

At 5% Significant Level

Source: Field Survey, (2025)

Relationships Between the Socioeconomic Factors of the Respondents and the Nutritional Utilization of Herpetofauna Resources around Hadejia Wetlands National Park

The results (Table 2) indicate that none of the socioeconomic variables examined was statistically significant on nutritional utilization of herpetofauna at the 5% level of significance. Age recorded a Wald value of 3.577 (df = 4, p = 0.328), with an odds ratio of 0.325 (95% CI: 0.102–1.042), suggesting a weak, non-significant tendency for older respondents to report lower odds of nutritional utilization relative to younger respondents. Sex was similarly non-significant (Wald = 0.364, df = 1, p = 0.342; Exp(B) = 0.331, 95% CI: 0.100–1.031), with the coefficient direction indicating that female respondents had marginally lower odds of nutritional utilization than male respondents, although this did not reach conventional significance. Marital status (Wald = 0.365, df = 1, p = 0.545; Exp(B) = 1.678) and educational level (Wald = 0.281, df = 3, p = 0.596; Exp(B) = 0.624) likewise showed no significant association with the outcome. Occupation (Wald = 0.65, df = 3, p = 0.510; Exp(B) = 0.766), farmland acquisition method (Wald = 0.005, df = 4, p = 0.942; Exp(B) = 1.079), and farmland size (Wald = 0.062, df = 4, p = 0.803; Exp(B) = 1.118) also failed to attain statistical significance, with odds ratios clustering close to unity, indicating negligible directional effect in either direction.

This finding showed that the 95% confidence intervals for the odds ratios of all seven predictors span across 1.0, which is the formal statistical criterion confirming non-

significance; an odds ratio whose interval excludes 1.0 would indicate a reliable directional effect, and none of the variables in this model meet that threshold. Futhermore, these findings indicated that nutritional utilization of herpetofauna in the communities surrounding Hadejia Wetlands National Park was not meaningfully differentiated by respondents' socioeconomic profile. Respondents were basically equally likely to consume herpetofauna as a food source irrespective of how old they were, their sex, marital status, level of formal education, occupation, mode of land acquisition, or the size of land they cultivated. This is a considerably important finding because it suggests that the driver of nutritional utilization in this population is not stratified access or capacity but more likely a shared cultural or subsistence practice that cuts uniformly across social categories.

Table 2: Relationships Between the Socioeconomic Factors of the Respondents and the Nutritional Utilization of Herpetofauna Resources Around Hadejia Wetlands National Park

Variables	B	S.E	Wald	Df	P-value	eB	95% C1	
							Lower	Upper
Age	-1.123	0.594	3.577	4	0.328	0.325	0.102	1.042
Marital status	0.518	0.856	0.365	1	0.545	1.678	0.313	8.993
Education	-0.472	0.891	0.281	3	0.596	0.624	0.109	3.572
Occupation	-0.267	1.049	0.65	3	0.510	0.766	0.098	5.985
Land acquisition	0.76	1.038	0.005	4	0.942	1.079	0.141	8.253
Farmland size	0.112	0.50	0.062	4	0.803	1.118	0.463	2.702
Sex	0.532	0.841	0.364	1	0.342	0.331	0.100	1.031

At 5% significant level

Source: Field Survey, (2025)

B-Regression coefficient (Log odds); S.E- Standard Error; Wald- Wald Chi-square statistics; df-Degree of freedom; P-Value (Sig.)-Probability Value and Exp(B)-exponential coefficient

Relationship between socioeconomic factors and economic utilization of herpetofauna

The result in Table 3 revealed that unlike the nutritional and medicinal utilization models, this analysis reveals a variable that approaches, though does not reach, statistical significance. Age recorded a Wald value of 2.759 ($p = 0.097$), with an odds ratio of 0.429 (95% CI: 0.158–1.164). Although this falls short of the statistical significant level (0.05%), it is significant at the 10% level and represents the strongest signal among all seven predictors in this model. The negative coefficient (B = -0.845) indicates that increasing age is associated with reduced odds of economic utilization, consistent with the interpretation that younger, more physically active respondents are more likely to engage in the labor-intensive activities (hunting, trapping, processing of skins and other products) that underpin economic exploitation of herpetofauna. All remaining variables were clearly non-significant: marital status (Wald = 0.007, $p = 0.933$; Exp(B) = 1.077), education (Wald = 0.171, $p = 0.679$; Exp(B) = 0.765), occupation (Wald = 0.050, $p = 0.822$; Exp(B) = 0.827), land acquisition (Wald = 0.763, $p = 0.382$; Exp(B) = 2.960), farmland size (Wald = 0.694, $p = 0.405$; Exp(B) = 1.316), and sex (Wald = 0.037, $p = 0.941$; Exp(B) = 0.671).

Table 3: Relationships between the Socioeconomic Factors of the Respondents and the Economic Utilization of Herpetofauna Resources around Hadejia Wetlands National Park

Variables	B	S.E	Wald	Df	P-value	eB	95%CI	
							Lower	Upper
Age	-0.845	0.509	2.759	5	0.097	0.429	0.158	1.164
Marital status	0.074	0.877	0.007	4	0.933	1.077	0.193	6.009
Education	-0.268	0.647	0.171	4	0.679	0.765	0.215	2.721
Occupation	-0.190	0.845	0.050	3	0.822	0.827	0.158	4.337
Land acquisition	1.085	1.245	0.763	4	0.382	2.960	0.259	33.798
Farmland size	0.275	0.330	0.694	4	0.405	1.316	0.689	2.515
Sex	-0.42	2.081	0.037	1	0.941	0.671	0.12	28.142

At 5% significant level

B-Regression coefficient (Log odds); S.E- Standard Error; Wald- Wald Chi-square statistics; df-Degree of freedom; P-Value (Sig.)-Probability Value and Exp(B)-exponential coefficient

Source: Field Survey, (2025)

Relationship Between Socioeconomic Factors and Medicinal Utilization of Herpetofauna Around HWNP

The results presented in Table 4 showed that none of the socioeconomic variables examined had statistically significant influence on medicinal utilization of herpetofauna. Age recorded a Wald value of 0.185 (df = 4, p = 0.667), with an odds ratio of 1.239 (95% CI: 0.466–3.293), indicating no meaningful directional tendency between age category and the likelihood of medicinal utilization. Marital status was similarly non-significant (Wald = 0.384, df = 4, p = 0.535; Exp(B) = 1.679, 95% CI: 0.326–8.638), as was educational level (Wald = 0.115, df = 4, p = 0.734; Exp(B) = 1.282, 95% CI: 0.305–5.379). Occupation, while still non-significant, produced the lowest p-value among all seven predictors (Wald = 1.351, df = 3, p = 0.245; Exp(B) = 3.257, 95% CI: 0.445–23.861), with the relatively high odds ratio suggesting a possible, though statistically unconfirmed, tendency for certain occupational categories to be more strongly associated with medicinal utilization than others. Land acquisition method returned an odds ratio below unity (Wald = 0.200, df = 4, p = 0.655; Exp(B) = 0.663, 95% CI: 0.249–9.146), a direction suggesting respondents who acquired land through inheritance may have marginally lower odds of medicinal utilization relative to other acquisition modes, though this did not approach significance. Farmland size (Wald = 2.980, df = 4, p = 0.561; Exp(B) = 1.762, 95% CI: 0.926–3.354) produced the second-lowest p-value in the model and an odds ratio whose lower confidence bound (0.926) sits closest to excluding unity among all seven predictors, hinting at a possible weak, sub-threshold association with medicinal use, though the interval still technically spans 1.0. Sex was also non-significant (Wald = 0.675, df = 1, p = 0.41; Exp(B) = 2.39, 95% CI: 0.653–6.345), with the odds ratio direction suggesting male respondents may have somewhat higher odds of medicinal utilization than females, though again unconfirmed statistically.

As with the nutritional utilization model, a key indicative feature is that the 95% confidence intervals for the odds ratios of all seven predictors span across 1.0, the formal statistical threshold confirming non-significance. Collectively, these findings indicate that medicinal utilization of herpetofauna in the communities surrounding Hadejia Wetlands National Park is not meaningfully differentiated by respondents' demographic or socioeconomic profile.

Table 4: Relationships between the Socioeconomic Factors of the Respondents and the Medicinal Utilization of Herpetofauna Resources around Hadejia Wetlands National Park

Variables	B	S.E	Wald	Df	P-value	eB	95%CI	
							Lower	Upper
Age	0.215	0.499	0.185	4	0.667	1.239	0.466	3.293
Marital status	0.518	0.836	0.384	4	0.535	1.679	0.326	8.638
Education	0.248	0.732	0.115	4	0.734	1.282	0.305	5.379
Occupation	1.181	1.016	1.351	3	0.245	3.257	0.445	23.861
Land acquisition	-0.411	0.920	0.200	4	0.655	1.508	0.249	9.146
Farmland size	0.567	0.328	2.980	4	0.84	1.762	0.926	3.354
Sex	0.871	0.891	0.675	1	0.98	0.212	0.653	6.345

At 5% significant level

B-Regression coefficient (Log odds); S.E- Standard Error; Wald- Wald Chi-square statistics; df-Degree of freedom; P-Value (Sig.)-Probability Value and Exp(B)-exponential coefficient

Source: Field Survey, (2025)

Relationship between Socioeconomic Factors and Cultural Utilization of Herpetofauna

Table 5 presents the relationship between selected socioeconomic characteristics of respondents and the cultural utilization of herpetofauna resources around Hadejia Wetlands National Park. Specific objective (vi) of the study sought to determine how socioeconomic variables affect the utilization of herpetofauna resources in Hadejia Wetlands National Park, and the associated hypothesis (H_A) postulated that utilization of herpetofauna is tied to the socioeconomic characteristics of respondents, against the null (H_0) that no such association exists. None of the seven predictors attained statistical significance at the conventional $\alpha = 0.05$ threshold, since every reported p-value exceeds 0.05. Only farmland size approached significance (Wald = 4.249, p = 0.059), narrowly failing the 5% criterion but comfortably satisfying a 10% criterion, which is conventionally treated as a marginal or borderline effect. Its odds ratio (Exp B = 2.095) indicates that, holding other variables constant, respondents in the higher farmland-size category were approximately twice as likely to report cultural utilization of herpetofauna as those in the reference category, and the 95% confidence interval (1.037–4.233) .

For the remaining six variables, the odds ratios ranged from 0.670 (Sex) to 1.797 (Marital status), and in every case the 95% confidence interval straddled 1.0, the value denoting no effect. This is the decisive statistical signature of non-significance as the interval for each of these predictors contains both odds-reducing (OR < 1) and odds-increasing

(OR > 1) possibilities, the null hypothesis of no association cannot be rejected for Age, Marital status, Education, Occupation, Land acquisition, or Sex., though Sex was the only truly dichotomous (df = 1) predictor, yet it produced the widest confidence interval by a large margin (0.110–40.175), driven by an unusually large standard error (S.E. = 2.089) relative to its coefficient.

Table 5: Relationships between the Socioeconomic Factors of the Respondents and the Cultural Utilization of Herpetofauna Resources around Hadejia Wetlands National Park

Variables	B	S.E	Wald	df	P-value	eB	95%CI	
							Lower	Upper
Age	0.527	0.456	1.337	5	0.248	1.694	0.693	4.137
Marital status	0.586	0.714	0.674	4	0.412	1.797	0.444	7.278
Education	0.110	0.674	0.027	4	0.870	1.116	0.298	4.186
Occupation	0.160	0.876	0.034	3	0.855	1.174	0.211	6.530
Land acquisition	-0.181	0.856	0.045	4	0.832	0.834	0.156	4.462
Farmland size	0.740	0.359	4.249	4	0.059	2.095	1.037	4.233
Sex	-0.41	2.089	0.037	1	0.848	0.670	0.11	40.175

At 5% significant level

B-Regression coefficient (Log odds); S.E- Standard Error; Wald- Wald Chi-square statistics; df-Degree of freedom; P-Value (Sig.)-Probability Value and Exp(B)-exponential coefficient

Source: Field Survey, 2025

Logistic Regression Analysis on Herpetofauna Utilization Status and Its Constraints

Table 6 presents the influence of some constraints on herpetofauna utilization status among users around Hadejia Wetlands National Park. The results show that religion had a statistically significant influence on herpetofauna utilization (B = 0.951, Wald = 10.353, p = 0.001). The odds ratio (EXP(B) = 2.587) indicates that respondents whose religious beliefs permit the use of herpetofauna were about 2.6 times more likely to utilize herpetofauna resources compared to those whose religious beliefs discourage such practices. This highlights the important role of religious values in shaping utilization behavior. Similarly, legal restriction was found to be a significant constraint influencing herpetofauna utilization (B = -1.045, Wald = 9.243, p = 0.002).

The odds ratio (EXP(B) = 0.352) shows that the presence of legal restrictions significantly reduces the likelihood of herpetofauna utilization, indicating that conservation laws and enforcement measures act as strong deterrents to utilization. The result further revealed that weak marketing potential significantly influenced herpetofauna utilization status (B = 2.158, Wald = 7.253, p = 0.007). The odds ratio (EXP(B) = 8.655) implies that respondents perceiving strong market opportunities were over eight times more likely to utilize herpetofauna resources, emphasizing the importance of economic incentives and market demand in driving utilization practices.

Other variables, including culture (p = 0.051), fear of danger (p = 0.093), little indigenous knowledge (p = 0.089), health and food safety concerns (p = 0.475), and population decline (p = 0.450), did not show statistical significant effects at the 5% level. However, culture recorded a p-value close to the significance threshold; though remained statistically insignificant, suggesting a weak influence on herpetofauna utilization. These findings indicate that while such factors may affect individual perceptions, they do not independently determine utilization behavior among respondents. The logistic regression results indicate that herpetofauna utilization among users around Hadejia Wetlands National Park is significantly influenced by religious beliefs, legal restrictions, and market potential.

Table 6: Logistic Regression on the Herpetofauna Utilization status and its Constraints among the Users

Constraints	B	S.E	Wald	df	P-Value	EXP(B)
Culture	- 0.584	0.299	3.812	1	0.051	0.559
Religion	0.951	0.295	10.353	1	0.001	2.587
Fear of danger	-.0484	0.288	2.820	1	0.093	0.617
Little indigenous knowledge	-0.501	0.295	2.887	1	0.089	0.606
Health and food safety	0.254	0.355	0.511	1	0.475	1.289
Legal restriction	-1.045	0.344	9.243	1	0.002	0.352
Population Decline	0.343	0.454	0.570	1	0.450	1.409
Weak marketing potential	2.158	0.801	7.253	1	0.007	8.655
Constant	-0.182	1.266	0.021	1	0.886	0.834

Significant at 5% Level

Discussion

The present study revealed that farmland size significantly influenced herpetofauna utilization around Hadejia Wetlands National Park, with respondents possessing larger farmlands showing a greater likelihood of utilizing herpetofauna resources. This finding corroborates the submission of Rabbe *et al*. (2021), who reported that landholding status significantly shapes human interactions with reptiles and amphibians. Similarly, Kaugama & Ahmed (2014) observed that land-related variables influence attitudes and behavioral responses toward wildlife species. The positive relationship recorded in the present study may be attributed to increased exposure of farmers to herpetofauna during farming activities, particularly in wetland-dependent agricultural systems where reptiles and amphibians commonly occur. Larger farmland holdings may also increase dependence on natural resources, thereby encouraging greater interaction and utilization of available fauna resources. Although Rabbe *et al*. (2021) associated lower landholding status with increased killing of amphibians due to limited coexistence space, the difference in findings may be linked to variations in study objectives and utilization categories, as the present study focused broadly on utilization rather than discrimination.

The study further revealed that educational level did not significantly influence herpetofauna utilization. This finding contradicts the reports of Audu & Ayuba (2016) and Mota *et al*. (2023), who established that higher educational attainment improves wildlife conservation awareness and reduces misconceptions associated with reptiles and amphibians. The lack of significant educational influence in the present study may suggest that herpetofauna utilization practices in the study area are largely rooted in indigenous knowledge systems, cultural traditions, and livelihood realities rather than formal education. In many rural African communities, traditional ecological knowledge is often transmitted across generations independent of formal schooling, thereby reducing the direct effect of educational attainment on wildlife utilization behavior.

The result also showed that none of the socioeconomic variables was significantly influenced the economic utilization of herpetofauna resources. This suggests that socioeconomic factors have no influence in the harvesting, trading, or economic exploitation of herpetofauna resources in the study area. The finding disagreed with the observation of Hassan *et al*. (2023), who noted that traditional ecological knowledge concerning wildlife utilization is predominantly retained among older and more experienced individuals through long-term observation and inheritance. Older individuals may therefore possess better knowledge of species identification, harvesting techniques, market networks, and traditional utilization practices, thereby increasing their involvement in economic utilization activities.

The findings of this study further indicated that socioeconomic variables such as age, gender, marital status, educational level, occupation, farmland acquisition, and farmland size did not significantly influence the nutritional utilization of herpetofauna resources. This suggests that nutritional consumption of herpetofauna is relatively widespread across different social groups within the study area. The result partially supports the assertion of Setlalekgomo (2013), who reported that wildlife consumption in many rural African communities often constitutes a common livelihood and dietary practice irrespective of social classification. The absence of significant socioeconomic influence may therefore imply that nutritional utilization of herpetofauna around the study area is driven more by availability of species, cultural acceptance, and dietary traditions than by socioeconomic status.

Similarly, medicinal utilization of herpetofauna resources was not significantly influenced by the socioeconomic characteristics examined. This finding corroborates the report of Hassan *et al*. (2023), who emphasized that traditional medicinal knowledge associated with wildlife species is commonly preserved through oral traditions and indigenous belief systems. The absence of significant relationships implies that medicinal utilization practices are deeply embedded within community traditions and are shared across different socioeconomic groups. The finding also suggests that traditional medicinal knowledge concerning herpetofauna is not restricted to specific educational or occupational classes but remains collectively retained within the community.

In the same vein, cultural utilization of herpetofauna resources was not significantly associated with the socioeconomic characteristics of respondents. This observation agrees with the position of Singh & Prakash, (2021) that cultural beliefs and traditional practices strongly shape wildlife utilization patterns in many African societies. The result indicates that cultural practices involving herpetofauna around the study area transcend demographic and socioeconomic boundaries and are maintained through shared community values, customs, and indigenous traditions. The insignificant influence of educational level further reinforces the argument that cultural utilization practices are primarily preserved through informal traditional systems rather than formal educational exposure.

The logistic regression analysis further revealed that religion significantly influenced herpetofauna utilization status among respondents. This finding strongly agrees with the study of Rabbe *et al*. (2021), who observed that religious beliefs significantly shape attitudes toward reptiles and amphibians. According to Rabbe *et al*. (2021), some religious groups exhibit tolerance toward certain

wildlife species due to spiritual or symbolic beliefs, whereas others discourage contact or utilization. The present finding therefore indicates that religious orientation plays an important role in determining the extent to which individuals engage in herpetofauna utilization activities around the study area.

The study additionally established that legal restriction significantly reduced the possibility of herpetofauna utilization among respondents. This suggests that conservation regulations and enforcement mechanisms serve as important deterrents against wildlife exploitation within and around protected areas. The finding highlights the importance of wildlife protection laws and management interventions in regulating resource utilization practices. Effective legal enforcement may therefore contribute significantly toward reducing unsustainable exploitation of Herpetofauna resources around protected wetland ecosystems.

Furthermore, market potential significantly influenced herpetofauna utilization among respondents. The high odds ratio recorded indicates that respondents who perceived stronger economic opportunities were substantially more likely to engage in utilization activities. This finding aligns with the broader wildlife utilization literature in Africa, where market demand and income generation are recognized as major drivers of wildlife exploitation. The result suggests that commercialization and economic incentives may play substantial roles in sustaining herpetofauna utilization practices around the study area. Consequently, conservation interventions aimed at reducing unsustainable utilization may require the incorporation of alternative livelihood opportunities and market-based conservation strategies.

CONCLUSION

In conclusion, socioeconomic determinants showed that most utilization practices were not significantly influenced by respondents' demographic characteristics, indicating that herpetofauna use is deeply embedded in shared cultural knowledge rather than individual socioeconomic status. However, farmland size emerged as a significant predictor of general utilization, while age influenced economic use, highlighting the role of land-use patterns and livelihood activities in shaping human herpetofauna interactions. Essentially, constraints analysis identified religious beliefs, legal restrictions, and market potential as significant drivers of utilization behavior, demonstrating that both normative values and economic incentives strongly reconcile exploitation patterns. Based on the findings of this research the following recommendations were made:

Promote Environmental Education and Community Awareness: Low awareness of conservation status and long-term ecological consequences suggests the need for targeted environmental education programs. These should focus on the ecological roles of herpetofauna, their vulnerability to overexploitation, and their importance as indicators of wetland health.

Incorporating religion leaders into the conservation programs could definitely increase the population of this category of wildlife.

Incorporate Herpetofauna into Wetland Policy Frameworks of Hadejia Wetlands National Park

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