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Construction of Perception Scale to Measure the Agriculture–Human–Wildlife Conflict among Farming Communities

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HIGHLIGHTS

- A final Perception scale of 22 items was developed using CVR, CITC and reliability screening.
- EFA extracted four factors with initial eigenvalues greater than 1.0 and explaining 53.474% of the total variance
- Perceived conflict severity and risk were the dominant factors explaining the variation of 28.92%.

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ABSTRACT

Agriculture–Human–Wildlife Conflict (AHWC) in buffer zones of protected areas poses recurring economic and psychological burdens on farming households. Yet few context-specific multidimensional instruments have been reported to measure how farmers understand and evaluate this conflict. The study developed and validated a Farmers' Perception Scale towards AHWC (FPS-AHWC) among farming households residing in buffer zone villages. An initial pool of 52 statements was generated through literature review, expert consultation, and field-based enquiry. After the evaluation from nine experts, 43 statements were retained for field testing. The 43-item instrument was used to collect data from 200 farming households. Item-level screening using corrected item–total correlation (CITC) and alpha-if-item-deleted criteria reduced the scale to 22 items, with the overall Cronbach's α improving from 0.687 (43 items) to 0.886 (22 items; CITC range: 0.431–0.536). Exploratory Factor Analysis resulted in four interpretable factors, namely Perceived Conflict Severity and Risk (6 items, 28.91% variance), Perceived Effectiveness of Conflict-Mitigation Measures (7 items, 9.945%), Conservation and Coexistence Orientation (6 items, 7.99%), and Contextual Appraisal of Wildlife Presence (3 items, 6.61%), together explaining 53.47% of the total variance. The FPS-AHWC provides a validated diagnostic tool for assessing farmers' perceptions in buffer zones of protected areas.

INTRODUCTION

Agriculture–Human–Wildlife Conflict (AHWC) is one of the most consistent challenges faced by farming communities in the buffer zones of protected areas across India. The increase in the population of large wild animals under Project Tiger and the expansion of protected area networks have intensified interactions between wildlife and agricultural households, resulting in recurrent

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crop raiding, livestock depredation, property damage and in extreme cases, personal injury (Jhala et al., 2021). Households living in buffer zones of tiger reserves such as Ranipur Tiger Reserve (RTR), Chitrakoot, Uttar Pradesh, routinely encounter such losses, and these experiences affect attitudes toward conservation and livelihoods (Subedi et al., 2020). While the economic dimensions of AHWC have received considerable research attention, the perceptual dimension of AHWC, like how farmers understand, evaluate, and contextualise the conflict, is an important but under-measured construct. Perception encompasses a broader set of cognitive and evaluative orientations than tolerance. A farmer may tolerate limited livestock loss while perceiving carnivore presence as a serious and urgent threat. Another may hold conservation values but regard mitigation measures as ineffective. These distinctions matter for extension planning: programmes targeting mitigation uptake must address perceived effectiveness, whereas those aimed at reducing retaliatory behaviour must engage with perceived severity. An instrument that captures only tolerance collapses these dimensions. Agricultural extension contributes to human–wildlife coexistence by facilitating behavioural change, disseminating conflict-mitigation technologies, and building community capacity (Barua et al., 2013). Extension workers require a diagnostic tool that captures multiple perceptual dimensions rather than a single attitudinal summary (Verma et al., 2026b). Few context-specific multidimensional instruments have been reported for farming households in Indian protected-area buffer zones, and existing tools developed in Western or African contexts do not adequately capture the socio-ecological character of smallholder communities here (Kansky et al., 2016).

Existing measurement tools in the human–wildlife conflict literature have concentrated primarily on wildlife tolerance, broadly defined as a farmer's willingness to accept the presence of wildlife and bear associated costs without resorting to retaliatory or exclusionary behaviour (Slagle et al., 2013; Kansky et al., 2016; Verma et al., 2026a). While tolerance is an important construct, it does not capture the full range of perceptions that determine how farmers engage with, respond to, and communicate about AHWC. The present study treats perception as distinct from tolerance: perception refers to farmers' cognitive evaluation of conflict severity, perceived risk, and beliefs about mitigation effectiveness, conservation orientation, and contextual understanding of wildlife presence. Against this background, the present study developed and validated a Farmers' Perception Scale towards Agriculture–Human–Wildlife Conflict (FPS-AHWC) for use among farming households in buffer zones of protected areas, following a systematic four-stage psychometric protocol involving expert-based content validation, field-based item screening, reliability analysis, and Exploratory Factor Analysis.

METHODOLOGY

The study was conducted in the buffer zone villages of Ranipur Tiger Reserve, Uttar Pradesh. The buffer area comprises seven ranges: Manikpur I, Manikpur II, Markundi I, Markundi II, Karvi, Raipura, and Bargarh. Four ranges were selected purposively based on their proximity to the core area. Four villages were selected from each of Manikpur I and Markundi I, and six villages from each of Manikpur II and Markundi II, because of differences in area coverage, resulting in a total of 20 villages. From each village, 10 farming households were randomly selected, resulting in a final sample of 200 households. A cross-sectional household survey was conducted, and data were collected through personal interviews from March to April 2026. The FPS-AHWC was developed following a four-stage psychometric protocol. In Stage I, an initial pool of 52 statements was generated through systematic literature review, expert consultation, and field-based understanding of AHWC in buffer zone landscapes (Maurya et al., 2024). Statements were framed to capture perceived conflict severity and risk, beliefs about mitigation effectiveness, conservation orientation, coexistence attitudes, and contextual understanding of wildlife presence. In Stage II, the 52-item pool was submitted to a panel of nine experts comprising agricultural extension specialists, wildlife scientists, and forestry officers. Each expert rated each statement as 'Essential', 'Useful but not essential', or 'Not necessary'. Content Validity Ratio (CVR) was computed for each item using Lawshe's (1975) formula:

$$CVR = \frac{(ne - \frac{N}{2})}{\frac{N}{2}}$$

Where, ne = number of experts rating an item as essential and
N = total number of experts

For a panel of nine, the minimum acceptable CVR threshold is 0.78 (Lawshe, 1975). Nine statements fell below this threshold and were removed, yielding 43 statements for field testing. The 43-item instrument was administered to all 200 farming households using a five-point Likert response: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree. In Stage III, the 43 retained items were considered for item-level reliability screening. Corrected item–total correlation (CITC) and Cronbach's alpha-if-item-deleted were computed for all items. Items with CITC below 0.30 or with alpha-if-deleted exceeding the overall scale alpha were removed. This process reduced the item pool from 43 to 22 items, with overall Cronbach's alpha improving from 0.687 to 0.886. In Stage IV, Exploratory Factor Analysis (EFA) was conducted on the 22-item scale using Principal Axis Factoring (PAF) with Direct Oblimin rotation in IBM SPSS. Factorability was assessed using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity. Factors were retained based on an eigenvalue greater than 1.0 and substantive interpretability. A pattern-matrix loading threshold of $\geq$0.50 was applied for item interpretation. Oblique rotation was selected because moderate inter-factor correlations were anticipated, given that the perceptual dimensions of AHWC are theoretically related.

RESULTS

Content validation and item reduction

The nine-expert panel reviewed all 52 statements. CVR values ranged from 0.33 to 1.00. Nine statements failed to meet the minimum acceptable CVR threshold of 0.78 for a panel of nine experts and were removed (Table 1). The removed statements included items relating to wildlife rights, risk perceptions of non-livestock owners, legal adequacy, fuelwood use, personal economic valuation of wildlife, activity restrictions, local conservation laws,

Table 1. Expert validation score for initial perception statements (n = 9)

S. No.	Original Item Code	Field-test Code	ne	CVR	Decision
1	O1	P1	9	1.00	Retained
2	O2	P2	9	1.00	Retained
3	O3	P3	8	0.78	Retained
4	O4	P4	9	1.00	Retained
5	O5	P5	9	1.00	Retained
6	O6	—	7	0.56	Removed
7	O7	P6	8	0.78	Retained
8	O8	—	6	0.33	Removed
9	O9	—	7	0.56	Removed
10	O10	—	6	0.33	Removed
11	O11	P7	8	0.78	Retained
12	O12	P8	8	0.78	Retained
13	O13	P9	8	0.78	Retained
14	O14	P10	8	0.78	Retained
15	O15	P11	9	1.00	Retained
16	O16	—	7	0.56	Removed
17	O17	—	6	0.33	Removed
18	O18	—	7	0.56	Removed
19	O19	—	6	0.33	Removed
20	O20	—	7	0.56	Removed
21	O21	P12	9	1.00	Retained
22	O22	P13	8	0.78	Retained
23	O23	P14	9	1.00	Retained
24	O24	P15	9	1.00	Retained
25	O25	P16	8	0.78	Retained
26	O26	P17	8	0.78	Retained
27	O27	P18	8	0.78	Retained
28	O28	P19	8	0.78	Retained
29	O29	P20	8	0.78	Retained
30	O30	P21	8	0.78	Retained
31	O31	P22	8	0.78	Retained
32	O32	P23	9	1.00	Retained
33	O33	P24	8	0.78	Retained
34	O34	P25	9	1.00	Retained
35	O35	P26	8	0.78	Retained
36	O36	P27	9	1.00	Retained
37	O37	P28	9	1.00	Retained
38	O38	P29	8	0.78	Retained
39	O39	P30	9	1.00	Retained
40	O40	P31	8	0.78	Retained
41	O41	P32	9	1.00	Retained
42	O42	P33	9	1.00	Retained
43	O43	P34	9	1.00	Retained
44	O44	P35	9	1.00	Retained
45	O45	P36	9	1.00	Retained
46	O46	P37	8	0.78	Retained
47	O47	P38	9	1.00	Retained
48	O48	P39	8	0.78	Retained
49	O49	P40	8	0.78	Retained
50	O50	P41	9	1.00	Retained
51	O51	P42	9	1.00	Retained
52	O52	P43	9	1.00	Retained

Shaded rows indicate removed statements; Statements having CVR ≥ 0.78 were retained.

probability of wildlife interaction, and hunting prohibition. These items were judged by experts as insufficiently specific to the perceptual domains targeted by the scale or as measuring general conservation knowledge rather than context-specific AHWC perception. The remaining 43 statements were renumbered P1–P43 for field testing. Table 2 summarises the item-reduction sequence across all stages.

Reliability and item screening

The initial Cronbach's alpha for the 43-item pool was 0.687, indicating marginal internal consistency. In the second stage, each Item was screened using CITC and alpha-if-deleted criteria, resulting in 21 items with CITC values below 0.30 or with alpha-if-deleted exceeding the overall pool alpha. Removal of these items resulted in the final 22-item scale having Cronbach's alpha of 0.886. All retained items had CITC values between 0.431 (P14) and 0.536 (P27), and further deletion of any item also reduced alpha between 0.880 and 0.883, confirming that each item contributed meaningfully to scale reliability. Item-level reliability statistics for the final 22-item scale are presented in Table 3.

EFA adequacy and factor extraction

The KMO measure of sampling adequacy was 0.880, exceeding the recommended threshold of 0.70 and indicating that inter-item correlation patterns were suitable for factor analysis. Bartlett's test of sphericity was statistically significant ($\chi^2 = 2032.524$, df = 231, $p < 0.001$), confirming that the correlation matrix was not an identity matrix. Four factors with initial eigenvalues greater than 1.0 were extracted, explaining 53.474% of the total variance (Table 4). The inter-factor correlation matrix showed moderate positive associations among all four factors (range: 0.222–0.425), confirming the appropriateness of oblique rotation.

Factor interpretation

The rotated pattern matrix yielded a clean four-factor structure with no problematic cross-loadings (Table 5). Factor 1 (Perceived Conflict Severity and Risk) comprised six items (P4, P27, P32, P41, P1, P2; pattern loadings: 0.568–0.812). These items reflect farmers' fear of working near the reserve, the emotional distress associated with carnivore presence, the urgency of livestock depredation as a problem demanding institutional action, the perceived threat of carnivores to both livestock and people, and — through the reverse-coded P41 — the perceived balance between wildlife-related costs and benefits within a conflict-severity frame.

Factor 2 (Perceived Effectiveness of Conflict-Mitigation Measures) comprised seven items (P35, P34, P36, P38, P11, P12, P30; loadings: 0.604–0.727), capturing farmers' beliefs in compensation schemes, management responses to habituated wildlife, non-lethal protective tools, awareness-raising efforts, livestock insurance, perimeter fencing, and community involvement as conflict-reduction mechanisms. Factor 3 (Conservation and Coexistence Orientation) comprised six items (P33, P25, P14, P28, P15, P42; loadings: 0.578–0.785), reflecting support towards conservation efforts, acceptance of wildlife despite occasional conflict, personal responsibility for conservation, importance of biodiversity and rejection of adversarial attitudes toward wildlife.

Table 2. Item-reduction sequence across scale development stages

Stage	Initial Pool	Removed	Retained	Decision Criterion
Item generation (Stage I)	52	—	52	Literature, expert consultation, and field observation
Content validation through CVR (Stage II)	52	9	43	CVR < 0.78 for N = 9 experts (Lawshe, 1975)
Item screening through CITC (Stage III)	43	21	22	CITC < 0.30 or alpha-if-deleted > overall alpha
Final scale (Stages IV)	22	—	22	CITC: 0.431–0.536; á = 0.886

CVR = Content Validity Ratio; CITC = Corrected Item–Total Correlation.

Table 3. Reliability statistics before and after screening items (n = 200)

Item	CITC	α if Item Deleted	Decision
Before Item Screening: Overall Cronbach's α = 0.687; N of items = 43			
P1	0.478	0.671	Retained
P2	0.465	0.671	Retained
P3	-0.129	0.702	Removed
P4	0.478	0.671	Retained
P5	0.437	0.672	Retained
P6	-0.058	0.698	Removed
P7	0.154	0.684	Removed
P8	-0.057	0.698	Removed
P9	0.011	0.693	Removed
P10	-0.052	0.698	Removed
P11	0.410	0.669	Retained
P12	0.446	0.666	Retained
P13	0.025	0.693	Removed
P14	0.338	0.673	Retained
P15	0.417	0.668	Retained
P16	0.059	0.691	Removed
P17	0.102	0.688	Removed
P18	-0.012	0.695	Removed
P19	0.089	0.689	Removed
P20	-0.062	0.699	Removed
P21	-0.050	0.698	Removed
P22	-0.025	0.696	Removed
P23	0.418	0.673	Retained
P24	0.061	0.690	Removed
P25	0.400	0.670	Retained
P26	0.076	0.689	Removed
P27	0.485	0.671	Retained
P28	0.447	0.667	Retained
P29	-0.130	0.703	Removed
P30	0.421	0.667	Retained
P31	-0.004	0.695	Removed
P32	0.475	0.671	Retained
P33	0.437	0.667	Retained
P34	0.466	0.665	Retained
P35	0.456	0.665	Retained
P36	0.443	0.666	Retained
P37	0.070	0.690	Removed
P38	0.355	0.672	Retained
P39	-0.182	0.704	Removed
P40	-0.063	0.699	Removed
P41	0.470	0.671	Retained
P42	0.388	0.670	Retained
P43	0.448	0.672	Retained
After item screening: Overall Cronbach's α = 0.886; N of items = 22			
P1	.506	.881	Retained
P2	.508	.881	Retained
P4	.488	.882	Retained
P5	.482	.882	Retained
P11	.520	.880	Retained
P12	.495	.881	Retained
P14	.431	.883	Retained
P15	.467	.882	Retained
P23	.452	.882	Retained
P25	.498	.881	Retained
P27	.536	.880	Retained
P28	.524	.880	Retained
P30	.469	.882	Retained
P32	.530	.881	Retained
P33	.495	.881	Retained
P34	.533	.880	Retained
P35	.497	.881	Retained
P36	.476	.882	Retained
P38	.453	.882	Retained
P41	.518	.881	Retained
P42	.436	.883	Retained
P43	.471	.882	Retained

Table 3 contd...

CITC = Corrected Item–Total Correlation; α if deleted = Cronbach's alpha if the item is removed.

Table 4. KMO, Bartlett's test, and variance explained by the four-factor solution (n = 200)

Factor	Initial Eigenvalue	% Variance Explained	Cumulative %
KMO = 0.880; Bartlett's χ^2 = 2032.524, df = 231, p < 0.001			
Factor 1: Perceived Conflict Severity and Risk	6.362	28.916	28.916
Factor 2: Perceived Effectiveness of Conflict-Mitigation Measures	2.188	9.945	38.861
Factor 3: Conservation and Coexistence Orientation	1.760	7.999	46.860
Factor 4: Contextual Appraisal of Wildlife Presence	1.455	6.614	53.474

Extraction method: Principal Axis Factoring; Rotation method: Direct Oblimin; Eigenvalues are extraction sums of squared loadings.

Table 5. Rotated pattern matrix for the final 22-item scale (Principal Axis Factoring, Direct Oblimin rotation; n = 200)

Item	Factor	F1	F2	F3	F4	Extraction communality (h^2)
P4	Perceived Conflict Severity and Risk	.812				.613
P27		.765				.604
P32		.724				.588
P41		.687				.520
P1		.602				.439
P2		.568				.473
P35	F2: Perceived Effectiveness of Conflict-Mitigation Measures		.727			.508
P34			.711			.520
P36			.690			.470
P38			.653			.430
P11			.631			.441
P12			.626			.416
P30			.604			.427
P33	F3:Conservation and Coexistence Orientation			.785		.613
P25				.743		.552
P14				.706		.494
P28				.676		.525
P15				.613		.433
P42				.578		.367
P23	F4: Contextual Appraisal of Wildlife Presence				.875	.801
P43					.858	.803
P5					.811	.727

Only primary loadings ≥0.50 are shown.

Factor 4 (Contextual Appraisal of Wildlife Presence) comprised three items (P23, P43, P5; loadings: 0.811–0.875). This preliminary three-item dimension reflects farmers' broader appraisal of ecological drivers, perceived health implications, and locally perceived economic opportunities associated with wildlife presence. Although the items loaded strongly, the dimension should be interpreted cautiously and validated in larger and geographically diverse samples before definitive conclusions are drawn.

Final scale and scoring

The final FPS-AHWC comprises 22 items distributed across four factors: Factor 1 (6 items), explaining farmers' perceptions of fear, threat, emotional distress, and the perceived balance of wildlife costs and benefits within a conflict-severity frame**.** Factor 2 (7 items) explains farmers' beliefs in compensation, fencing, insurance, non-lethal tools, awareness, and community involvement as conflict-reduction mechanisms. Factor 3 (6 items) explains conservation support, coexistence acceptance, personal responsibility, and rejection of punitive attitudes toward wildlife**.** Factor 4 (3 items) explains farmers' appraisal of ecological drivers, perceived health implications, and locally perceived economic opportunities associated with wildlife presence. Because the FPS-AHWC captures distinct dimensions of AHWC perception, factor-wise mean scores are recommended for interpretation because factors are correlated but conceptually distinct. Higher scores on Factor 1 indicate greater perceived conflict severity and risk; higher scores on Factor 2 indicate stronger perceived effectiveness of conflict-mitigation measures; higher scores on Factor 3 indicate stronger conservation and coexistence orientation; and higher scores on Factor 4 indicate stronger contextual appraisal of wildlife presence. An overall composite score may be used cautiously for descriptive purposes, but factor-wise interpretation is recommended. All 22 items, factor assignments, and scoring directions are presented in Table 6.

DISCUSSION

The FPS-AHWC recognise the measurement gap in Indian agriculture-human–wildlife conflict research. Perception is a broad construct which include cognitive evaluation of severity of conflict, effectiveness of mitigation strategies, conservation orientation, and contextual understanding of wildlife presence. These dimensions are empirically distinct and independent of the four factors, showing that farmers can simultaneously perceive conflict as severe and support conservation, or appreciate mitigation options while regarding wildlife presence as contextually complex. Merging these dimensions into a single perception score decreases the diagnostic specificity needed to design targeted interventions. The systematic content validation was done using Lawshe's CVR with nine experts, who established face and content validity before field testing. The initial reliability of the 43-item pool (α = 0.687) reflects the comprehensiveness of the initial items, whereas the increase in Cronbach alpha to 0.886 following item screening is consistent with scale-construction studies in similar domains (Gupta et al., 2022; Prabex et al., 2025; Patra et al., 2026). An alpha of 0.886 substantially exceeds the 0.80 threshold generally considered acceptable for social science instruments (Kalkbrenner, 2021), and the narrow CITC range (0.431–0.536) confirms that all retained items contribute homogeneously. Factor 1 (Perceived Conflict Severity and Risk) represents the dominant component, resulting

Table 6. Final Farmers' Perception Scale towards AHWC (FPS-AHWC)

S.No.	Code	Statement
Factor 1: Perceived Conflict Severity and Risk (6 items)		
1	P4	In the vicinity of the protected area, farmers fear working in their fields during odd hours because of wild animals.
2	P27	Livestock depredation by wildlife is a serious problem that requires immediate action from authorities.
3	P32	The presence of carnivores causes emotional distress beyond economic losses to livestock.
4	P41	Wildlife causes more damage to livestock and property than the benefits it provides to the community.
5	P1	Crop raiding, livestock depredation, and property damage by wildlife contribute to conflicts between livestock owners and wildlife.
6	P2	Carnivore animals are a threat to livestock and people near the protected area.
Factor 2: Perceived Effectiveness of Conflict-Mitigation Measures (7 items)		
7	P35	Compensation for livestock losses from wildlife increases positive attitudes toward conservation.
8	P34	Problematic wildlife behaviours, such as becoming accustomed to humans, justify stronger conflict management.
9	P36	Non-lethal tools, such as guard dogs or lights, are effective for protecting livestock from predators.
10	P38	Educating livestock owners about preventing human–wildlife conflict would improve tolerance for wildlife.
11	P11	Promotion of livestock insurance schemes may reduce livestock owner–wildlife conflict.
12	P12	Proper fencing around the National Park may reduce livestock owner–wildlife conflict.
13	P30	Community involvement in conservation decisions improves tolerance for wildlife near parks.
Factor 3: Conservation and Coexistence Orientation (6 items)		
14	P33	Livestock owners should tolerate a small percentage of losses to wildlife as part of coexistence.
15	P25	I like having wildlife in nearby forests despite occasional conflicts.
16	P14	Wild animals that cause damage are pests and should be killed.
17	P28	Conserving wildlife is extremely important for maintaining biodiversity and ecosystem health.
18	P15	I am responsible for conserving wildlife around the park interface.
19	P42	The risk of livestock being injured or killed by wildlife is acceptable as part of living near protected areas.
Factor 4: Contextual Appraisal of Wildlife Presence (3 items)		
20	P23	Encroachment for settlement and agricultural production may provoke wild animals to raid crops or prey on livestock.
21	P43	Wildlife in nearby forests contributes positively to the local economy through ecotourism or other opportunities.
22	P5	There may be a chance of spreading zoonotic diseases due to wild animals.

in 28.916% of variance. High loadings on items related to fear (P4), emotional distress (P32), carnivore threat (P2), and the perceived cost–benefit. For many farming households, it is a significant psychological hazard and not merely an economic inconvenience. Many Extension efforts ignore the affective dimension of perceived severity of risk and design interventions that address only economic losses while leaving fear-related barriers to coexistence unaddressed (Hobson et al., 2024; Velamuri et al., 2024; Kademani et al., 2025; Verma et al., 2026a). Factor 2 (Perceived Effectiveness of Conflict-Mitigation Measures) captures beliefs about both technical and community-based mitigation strategies. The loading of community involvement (P30) alongside compensation, fencing, and non-lethal tools suggests that farmers in RTR buffer zones regard participatory governance as integral to effective mitigation. Extension efforts should therefore address both technical and institutional dimensions of conflict reduction (Barua et al., 2013).

Factor 3 (Conservation and Coexistence Orientation) reflects value-laden dimensions of AHWC perception. Its clean separation from Factor 1 confirms that perceived conflict severity and conservation orientation are empirically distinct. Farmers may simultaneously hold negative conflict perceptions and conservation-positive attitudes, a pattern that has practical implications for extension messaging: community norms and institutional engagement can reinforce conservation values even when conflict experiences are negative. Factor 4 (Contextual Appraisal of Wildlife Presence) is a preliminary three-item dimension covering encroachment as a conflict driver, economic benefits through ecotourism, and zoonotic disease risk. High pattern loadings (0.811–0.875) indicate strong inter-item coherence within this cluster, but its conceptual heterogeneity warrants caution in interpretation. Future studies with larger samples should examine whether this dimension holds consistently across different protected-area contexts. The inter-factor correlations (0.222–0.425) confirmed that the four dimensions are related but empirically distinct, justifying oblique rotation and supporting interpretation of the factors as correlated but non-redundant facets of AHWC perception. The scale was developed and validated in a single buffer zone context with a cross-sectional sample of 200 households, which constitutes the primary limitation. Generalisation of the factor structure to other protected areas, species assemblages, or ecological zones in India should not be assumed without further validation.

CONCLUSION

Developed through expert-based content validation (CVR with nine experts; 9 of 52 items removed), field-based item screening (Cronbach's β = 0.886 post-refinement), and Exploratory Factor Analysis on 200 farming households of Ranipur Tiger Reserve, Uttar Pradesh, the scale provides a validated diagnostic tool for extension workers and conservation planners. The four-factor structure reveals that perceived severity and beliefs about mitigation effectiveness are empirically separate constructs, with direct implications for extension programme design: interventions targeting mitigation uptake must address perceived effectiveness, while those aimed at reducing retaliatory behaviour must engage with the emotional and risk-related dimensions of conflict perception. Factor-wise scores allow practitioners to identify which perceptual

dimensions are most salient in a given community and to monitor attitude change following extension activities. Validation in other protected-area contexts across India is recommended to assess the generalisability of the factor structure and scoring norms.

DECLARATIONS

Ethics statement and consent to participate: The study was conducted in accordance with principals laid out in Helinski Declaration 1964 and its modifications. As the research was part of the project titled 'Assessment and Mitigation of Agriculture-Human-Wildlife Conflict in the Vicinity of National Park and Wildlife Sanctuaries of Uttar Pradesh' funded by the Uttar Pradesh Council of Agricultural Research (UPCAR), Lucknow the ethical issues were taken care by Departmental Advisory Board of Department of Agricultural Extension, BUAT, Banda from planning of the research to implementation. Participation was voluntary, and informed consent was obtained from all respondents. The confidentiality and anonymity of participants were strictly maintained throughout the research process.

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