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To cite this article: Gowhar Farooq Wani *et al* 2026 *Environ. Res. Commun.* **8** 105025

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REVISED
15 September 2026

ACCEPTED FOR PUBLICATION
8 October 2026

PUBLISHED
29 October 2026

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PAPER

Household relocation intentions in riverine flood-prone urban areas: evidence from Srinagar, India

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Keywords: household relocation intentions, flood risk mitigation, environmental mobility, voluntary immobility, urban resilience, Srinagar

Abstract

Riverine flooding poses a significant challenge for rapidly urbanizing cities, where residential expansion into vulnerable waterways has increased exposure to environmental risk. In this context, relocation is widely discussed as a long-term flood mitigation strategy, yet little is known about how residents evaluate such options in the absence of formal programmes. This study examines household relocation intentions in flood-prone areas of Srinagar, India, focusing on the sociodemographic, economic, and psychological factors shaping willingness to relocate. A sequential mixed-methods design was used, combining semi-structured interviews with a structured household survey ($n = 400$), to integrate lived experiences with population-level patterns. The findings reveal an age-related pattern across the study-defined age groups: willingness to relocate is highest among middle-aged residents (24%) and moderate among younger adults (15%), but declines sharply among older residents, who exhibit the strongest reluctance (23% unwilling). No statistically detectable association between gender and relocation intention was observed in the survey. Qualitative insights indicate that relocation decisions are shaped by expectations of adequate compensation, livelihood security, uncertainty about future outcomes, and strong place attachment. Relocation is therefore not evaluated solely as a risk-reduction strategy but as a trade-off between environmental safety and socioeconomic stability. By framing relocation as a forward-looking adaptation decision, this study contributes to debates on environmental mobility, voluntary immobility, and managed retreat in the Global South. The findings highlight the need for relocation programmes that integrate livelihood continuity, community participation, and the social realities of flood-exposed populations.

1. Introduction

Riverine flooding presents a huge challenge for rapidly urbanizing cities, where residential areas have expanded into vulnerable waterways. Flood risk in urban areas is not determined solely by hydrological processes but is also strongly influenced by land-use patterns, infrastructure development, and governance capacity (Koop and van Leeuwen 2017, Grison *et al* 2023). Rapid urban expansion, combined with

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inadequate planning and environmental degradation, has increased exposure to flooding and intensified vulnerabilities across urban populations.

The impacts of flooding are rarely distributed evenly across urban societies. Low-income and marginalized populations often occupy hazardous locations where land is more accessible or affordable, including floodplains and river corridors. Consequently, these communities experience heightened exposure to flood hazards and face greater barriers to recovery following disasters (Simon 2010, Hamnett 2019, Shah *et al* 2020). Socioeconomic inequality, informal settlements, and uneven access to infrastructure and services further shape patterns of flood vulnerability in cities worldwide (Kaspersen *et al* 2017, Dewi *et al* 2023, Sauer *et al* 2023, Kephart *et al* 2025). These dynamics are central to debates on urbanisation, environmental risk, and inequality in rapidly growing cities of the Global South, where governance constraints and institutional capacity shape how risks are distributed and managed across populations (Pieterse 2008). In this context, relocation has emerged as a contested yet increasingly discussed strategy for reducing long-term exposure to flood hazards.

These global dynamics are reflected in Srinagar, the largest urban centre in the Kashmir Valley, located in the northwestern Himalayan region of India. The city lies within a complex riverine landscape shaped by the Jhelum River and associated wetlands and floodplains, making it historically susceptible to flooding. In recent decades, unregulated urban expansion, encroachment into flood-prone areas, governance constraints, and the region's complex socio-political context have further increased the city's vulnerability (Ballesteros-Cánovas *et al* 2020, Malik and Najmul Islam Hashmi 2022, Wani *et al* 2024a). Moreover, the region's history of political instability and governance challenges may influence how residents perceive environmental risk, institutional support, and the feasibility of relocation, thereby shaping their willingness to participate in relocation initiatives. The catastrophic floods of September 2014 exposed weaknesses in flood risk management and urban planning, highlighting the urgent need for effective long-term mitigation strategies (Malik 2022, Wani *et al* 2022).

Among the strategies proposed to reduce flood risk, the relocation of populations from high-risk areas to safer locations has gained increasing attention as a potential long-term adaptation measure. Often described in the literature as relocation, resettlement, or managed retreat, this strategy aims to reduce exposure by permanently moving people and assets away from hazard-prone environments (Pinter and Rees 2021, Seong *et al* 2021). When carefully planned and implemented, relocation can support proactive spatial planning, reduce long-term economic losses from recurrent disasters, and alleviate the psychological stress associated with repeated flood exposure (Kick *et al* 2011). However, relocation remains one of the most complex and contested disaster risk reduction strategies as it involves significant social, economic, and cultural adjustments for affected communities. Relocation may take multiple forms depending on the institutional and socio-political context, including state-led resettlement programmes, post-disaster relocation initiatives, or voluntary household-level mobility decisions. Understanding how residents perceive relocation in the absence of a formal programme is therefore critical for informing future policy and planning interventions.

Empirical evidence from different regions shows that relocation initiatives frequently encounter substantial challenges. Programmes implemented through top-down approaches or without meaningful community engagement often face resistance, low acceptance rates, or return migration to original settlements (Tubridy and Lennon 2021, Bergmann 2023). Experiences from countries such as Sri Lanka, the Philippines, and Zimbabwe illustrate how livelihood disruptions, inadequate infrastructure at resettlement sites, and weak institutional support can undermine relocation initiatives (Mavhura *et al* 2017, Fernando 2018, Bodine *et al* 2022). Similar challenges have been observed in small island contexts and riverine communities, where cultural attachment to place, economic dependence on local environments, and social networks influence relocation decisions (Ha'apio *et al* 2018, Akbar *et al* 2024). These findings indicate that relocation is not merely a technical intervention but a socially embedded process influenced by livelihoods, community relationships, and place attachment. Building on insights from residential mobility literature, relocation decisions are increasingly understood as shaped by household dynamics, social relationships, and structural constraints rather than purely individual choices (Coulter *et al* 2011, Coulter and Scott 2015). This perspective avoids simplistic assumptions about relocation as either fully individual or inherently collective, and instead highlights the complex negotiation of resources, aspirations, and constraints within households.

In the context of Srinagar, previous research conducted by the first author has examined patterns of flood exposure and the factors influencing why residents continue to live in flood-prone locations (Wani *et al* 2022, 2024b). These studies highlight the importance of place attachment, livelihood dependence, and risk perception in shaping residential persistence in flood hazard-exposed areas. However, limited

attention has been paid to how residents evaluate relocation as a flood mitigation strategy and the factors shaping their willingness to relocate. While earlier studies focused primarily on explaining why residents remain in flood-prone areas, the present study instead examines how households assess relocation as a potential mitigation strategy. To address this, a mixed-methods approach is adopted to capture both quantitative patterns in relocation intentions and qualitative insights into lived experiences, perceptions, and emotional dimensions shaping decision-making.

Recent scholarship on environmental mobility highlights the importance of understanding why people remain in hazard-prone environments despite recognized risks. Within this literature, concepts such as 'voluntary immobility,' 'reluctant stayers,' and 'trapped populations' have been used to explain why individuals and households do not relocate even when environmental risks increase (Carling 2002, Black *et al* 2011, Zickgraf 2011). Voluntary immobility refers to situations where individuals consciously choose to remain in place due to strong social, cultural, or economic ties, while trapped populations refer to those who may wish to relocate but lack the resources or opportunities to do so. These concepts provide a useful lens for interpreting relocation intentions in flood-prone urban contexts.

This study therefore focuses specifically on household relocation intentions in response to future flood risk, rather than on reactions to an existing government relocation programme. Respondents were asked to evaluate relocation as a hypothetical flood mitigation strategy, enabling an assessment of how residents perceive and negotiate such decisions under conditions of environmental uncertainty. Accordingly, the study addresses the following research question: How do residents in flood-prone urban areas perceive relocation as a mitigation strategy, and which sociodemographic, economic, and psychological factors shape their willingness to relocate? To answer this question, it examines household relocation intentions in flood-prone areas of Srinagar using a mixed-methods approach that combines qualitative interviews with a structured household survey.

By foregrounding community perspectives, this research contributes to scholarly debates on climate adaptation, urban resilience, and managed retreat in the Global South. It further engages with ongoing discussions on the limitations of top–down relocation approaches by highlighting the importance of livelihood security, place attachment, and community participation in shaping relocation outcomes. The findings offer insights for policymakers and urban planners seeking to design relocation strategies that are socially acceptable, context-sensitive, and aligned with the needs and priorities of flood-affected communities. The study also extends prior work by examining relocation as a forward-looking adaptation decision rather than explaining residential persistence.

2. Study area

This study focuses on Srinagar (figure 1), a major urban centre in the northwestern Himalayan region and the summer capital of the Union Territory of Jammu and Kashmir, India. Located at approximately 34.08° N latitude and 74.79° E longitude, the city lies in the Kashmir Valley along the banks of the Jhelum River, at an average elevation of approximately 1585–1600 m above sea level. The city is situated within a low-lying fluvial basin characterized by an intricate network of water bodies, which influences its hydrological behaviour and flood susceptibility.

Srinagar covers an area of about 278 km^2 and had a population of around 1.26 million people according to the Census of India (2011), with a population density of about 4330 persons per km^2 and a housing density of around 660 houses per km^2. A significant proportion of the population—around 343 125 people—live in economically vulnerable conditions (Census of India 2011). These socioeconomically vulnerable populations are disproportionately concentrated in low-lying areas and along water bodies, including settlements around Dal Lake, Nigeen Lake, and along the banks of the Jhelum River, where exposure to riverine flooding is highest. Many of these settlements are inhabited by water-dependent communities such as fishermen, whose livelihoods are closely linked to lake and river ecosystems. These spatial concentrations of vulnerable populations in hazard-prone areas make Srinagar a compelling case for analysing household-level relocation intentions in response to riverine flooding.

Srinagar has experienced repeated flooding due to its riverine setting and low-lying topography. The 2014 Kashmir flood exposed the city's vulnerability to hydro-meteorological hazards, with widespread inundation affecting large parts of the urban area (Wani *et al* 2022; see also figure 2). The 2014 event, driven by extreme rainfall and river overflow, resulted in prolonged inundation of residential areas, disruption of services and livelihoods, and significant damage to infrastructure, highlighting the scale of flood risk in the city. The flood inundation patterns also highlighted the concentration of residential settlements in areas exposed to flood risk. These areas formed the primary focus of the household survey

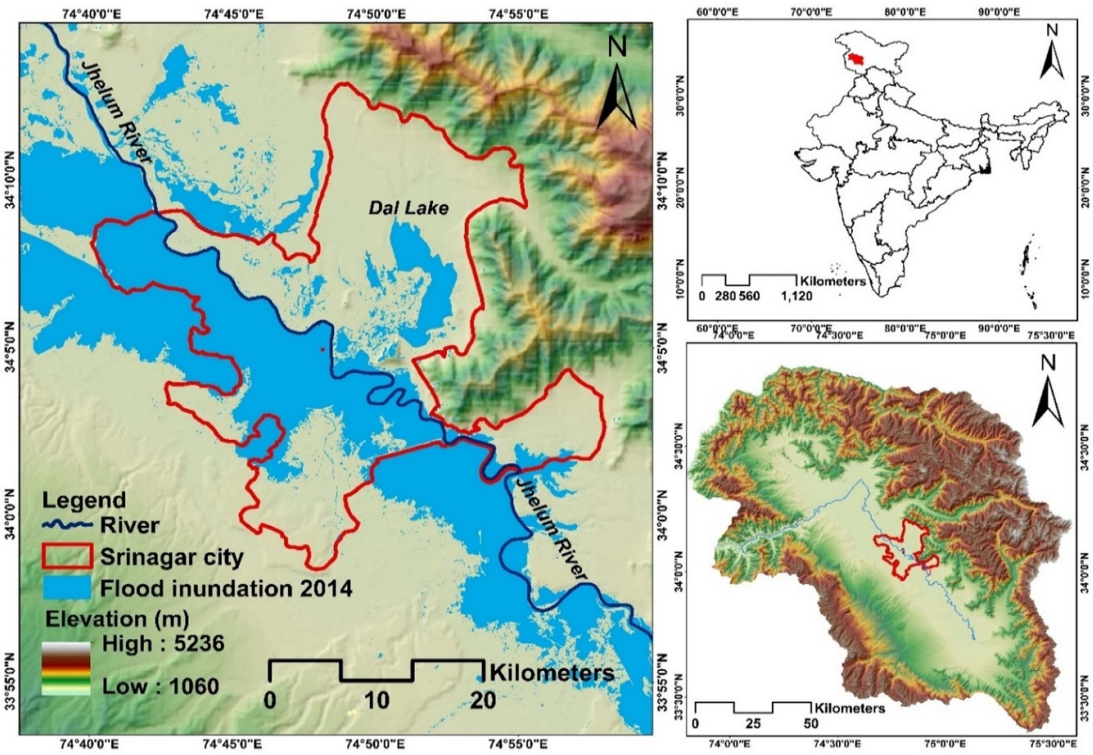


Figure 1. Location of Srinagar city in the Kashmir Valley, India.

conducted in this study. Accordingly, the study targeted communities located within or adjacent to the 2014 flood inundation zones, ensuring that all surveyed households had direct flood experience.

Rapid urbanisation in recent decades has led to horizontal expansion of the city, with surrounding rural settlements increasingly being absorbed into the urban landscape. Historically, inadequate urban planning has contributed to the conversion of agricultural land, wetlands, and marshlands into built-up areas, thereby increasing exposure to flood hazards (Ahmed *et al* 2022). The loss of natural drainage systems and wetland buffers has further reduced the city's capacity to absorb excess water during extreme rainfall events.

The Zabarwan Hills, stretching approximately 32 km along the eastern edge of the city, constrain expansion in that direction and intensify pressure on the remaining developable land. Consequently, while Srinagar continues to experience urban growth, enhancing disaster resilience remains a major challenge for the city. These geographic, socioeconomic, and environmental characteristics make Srinagar an appropriate case for analysing how residents in riverine flood-prone urban areas perceive relocation as a potential mitigation strategy.

3. Methodology

3.1. Research design

This study adopts a sequential mixed-methods design, integrating qualitative and quantitative approaches to examine household relocation intentions in flood-prone urban areas. The research was conducted in two stages. First, semi-structured interviews were used to explore residents' experiences, perceptions, and reasoning related to relocation decisions. Insights from this qualitative phase informed the development of a structured household survey. This approach links narrative insights with statistically observable patterns, enabling a comprehensive understanding of relocation decision-making across population and experiential dimensions.

3.2. Qualitative phase

3.2.1. Sampling and participants

Households located in flood-prone areas were identified using a combination of the 2014 flood-inundation maps, municipal ward boundaries, and field verification. These sources were used to

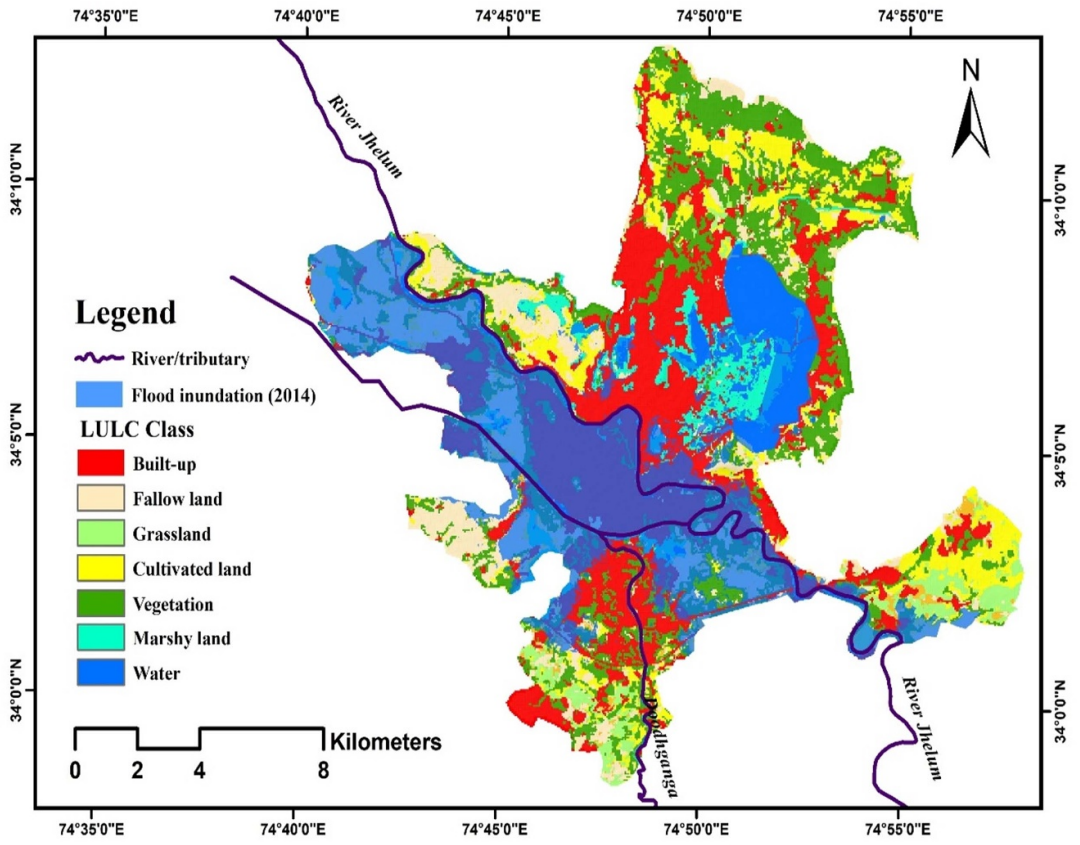


Figure 2. Land use and land cover (LULC) map of Srinagar city with 2014 flood inundation.

delineate low-lying areas that experienced significant inundation during the 2014 flood event. The sampling frame comprised households located within or adjacent to these flood-affected zones, particularly along the Jhelum River, Doodhganga River, Dal Lake, and Nigeen Lake. Eligible participants were household heads or adult household members ($\geqslant$18 years) with direct experience of flooding.

Participants for the qualitative phase were selected using purposive sampling to capture diverse experiences of flood exposure and relocation decision-making. A total of 20 semi-structured interviews were conducted, with one respondent from each household. The qualitative phase intentionally recruited long-term residents who had lived in the study area for more than 15 years. This criterion ensured that participants had substantial lived experience of flood events and the evolving social and environmental context of the study area, allowing them to provide rich, experience-based accounts of relocation decision-making. This purposive sampling strategy prioritized depth of understanding rather than statistical representativeness. Efforts were also made to include female respondents where possible to ensure representation of gendered perspectives.

The qualitative sample comprised 20 participants (13 male and 7 female), aged between 25 and 72 years. All participants had resided in the study area for more than 15 years, ensuring familiarity with local flood dynamics and the community context.

3.2.2. Data collection

Semi-structured interviews were conducted in participants' homes to explore their experiences of flooding, perceptions of flood risk, and views on residential relocation. The interview guide comprised five open-ended questions designed to encourage participants to reflect on their lived experiences and decision-making processes. Interviews centred on the question: 'Can you describe your experience during the 2014 flood and your willingness to stay or leave your current location?' Follow-up questions explored flood impacts, household responses, social relationships, and future relocation considerations. Interviews lasted approximately 30 min and were audio-recorded with participants' consent. Field notes were also taken to document contextual observations and supplement the interview data.

Table 1. Analytical procedure adopted for thematic narrative analysis.

Step	Description	Example
1. Preparing the data	Gathering, characterizing, and systematically organizing meaningful information into narrative blocks serving as foundation for subsequent analysis and interpretation.	Transcribing the spoken narrations into written text and structuring field notes to analyse the perspectives/ responses of urban residents about relocation in anticipation of future floods.
2. Coding narrative segments	Identifying, categorizing, and labelling the emergent themes and patterns following an inductive or deductive approach, depending on the researcher's expertise or research objectives.	Processing the narrative blocks by identifying recurring patterns or themes and then coding them. 'willingness,' 'unwillingness,' 'hesitancy,' 'compensation,' 'livelihood,' 'uncertainty,' etc.
3. Organizing preliminary thematic structures	Grouping related codes into preliminary thematic structures while preserving the narrative context of individual participants' accounts.	Grouping similar themes guides the narrative. For example, the theme 'relocation consideration with adequate compensation' combines the sub-themes, such as 'willingness' & 'compensation.'
4. Comparing themes across narratives	Comparing themes to identify similarities and differences and interpreting their implications across the dataset.	Examining the relationships between the themes of 'adequate compensation' and 'secured livelihoods' indicated a strong dependence on financial stability.
5. Synthesizing the findings	Synthesizing refined themes into an interpretation of the factors influencing household relocation intentions.	Producing a rich interpretation that weaves together four themes. Each one is explored separately based on residents' perspectives on relocation, while maintaining richness & coherence throughout presentation process.

3.2.3. Data analysis

The qualitative data were analysed using thematic narrative analysis informed by the approaches of Polkinghorne (1995) and Riessman (2008). Consistent with a naturalistic epistemological perspective (Mishler 1991), the analysis emphasized what participants narrated rather than how their narratives were constructed. The study adopted an iterative analytical procedure informed by the principles of thematic narrative analysis. The procedure comprised five stages: (1) preparing the data, (2) coding narrative segments, (3) organizing thematic structures, (4) comparing themes across narratives, and (5) synthesizing the findings. The analytical procedure is summarized in table 1. During comparison and synthesis, attention was also given to differences in how the emerging themes were expressed across participants of different ages.

Interview recordings were transcribed verbatim and analysed inductively to identify recurring themes related to household relocation decision-making. Coding focused on identifying recurring narrative patterns in how participants interpreted flood risk, evaluated relocation, and articulated the constraints and motivations influencing their decisions. Themes were iteratively refined through constant comparison across narratives to enhance consistency and ensure that the thematic structure accurately reflected participants' accounts. Four dominant themes emerged: (1) relocation consideration with adequate compensation, (2) relocation contingent on secured livelihood, (3) relocation deferred to future consideration, and (4) relocation hesitancy and complex emotions.

3.3. Quantitative phase

3.3.1. Sampling and participants

The household survey was conducted using a systematic random sampling approach within the same flood-prone areas identified for the qualitative phase. The target sample size was determined using Cochran's (1977) sample size formula for large populations, assuming a 95% confidence level, a 5% margin of error, and maximum variability ($p = 0.5$), which yielded a minimum required sample size of 384 households. To enhance the representativeness of the survey and to accommodate the possibility of non-response or incomplete questionnaires, the target sample size was increased to 400 households. Systematic random sampling was then employed, with every fifth household selected until the predetermined target of 400 completed questionnaires was achieved.

The final sample comprised 400 households, enabling spatial coverage and comparison across demographic groups. This sample size was consistent with established practices in household survey research (Groves *et al* 2009). Unlike the qualitative phase, which intentionally focused on long-term residents to obtain in-depth experiential narratives, the household survey aimed to capture general population-level patterns. Therefore, respondents were required to have resided in the study area for at least eight years, ensuring sufficient familiarity with local flood conditions while allowing wider representation of affected communities. All eligible respondents were household heads or adult household members ($\geqslant$18 years) and reported direct experience of flooding within the study area. All respondents had experienced the

Table 2. Sociodemographic characteristics of the survey respondents ($n = 400$).

Variable	Group	Number	Percentage
Age (years)	18–33	88	22
	34–57	180	45
	58+	132	33
Gender	Male	212	53
	Female	188	47
Religion	Muslim	348	87
	Sikh	36	9
	Hindu	16	4
Education (years of schooling)	Less than 10	208	52
	10 or more	192	48
Occupation	Employee	60	15
	Business owner	84	21
	Student	32	8
	Labourer	100	25
	Homemaker	124	31
House ownership	Owner	400	100
Monthly household income (₹)	Less than 10 000	196	49
	10 000 or more	204	51
Length of residence (years)	Less than 15	216	54
	15 or more	184	46
Distance from river/waterbody (m)	Less than 1000	344	86
	1000 or more	56	14
Flood experience	Yes	400	100

2014 Kashmir flood, and some had also experienced additional localized residential flooding in subsequent years.

The quantitative sample comprised 400 respondents (53% male and 47% female). Respondents were grouped into three age categories: young adults (18–33 years), middle-aged adults (34–57 years), and older adults (58+ years). These categories reflect different life stages associated with variation in economic responsibilities, household structure, and long-term planning. Participants represented diverse socioeconomic backgrounds in terms of education, occupation, and income. Their socio-demographic characteristics are summarized in table 2. These are study-specific analytical categories and are not intended as universal chronological definitions of life stages.

3.3.2. Questionnaire development and data collection

Findings from the qualitative phase informed the development of a structured questionnaire for the household survey. The questionnaire was designed to examine whether the themes identified from the interviews were reflected at the population level. It comprised 19 items, primarily closed-ended, with a small number of open-ended prompts, and included sections on sociodemographic characteristics, flood experience, relocation intentions, and factors influencing relocation decisions.

The primary outcome variable was relocation intention, measured using the question: 'Will you stay in or leave your current location prone to future flooding?' Response categories included willing to leave, unwilling to leave, may leave in the future, and undecided. This question was framed hypothetically because no formal government relocation programme was in place at the time of the survey. Respondents were therefore asked to indicate how they would respond under a potential future flood-risk scenario rather than expressing intentions toward an existing relocation initiative.

The questionnaire also included follow-up questions addressing factors identified during the qualitative phase, including perceived adequacy of compensation, livelihood dependence on location, place attachment, and concerns about future uncertainty. For example, respondents were asked whether relocation would be considered if adequate compensation were provided, whether their livelihood depended on their current location, and whether social and emotional ties influenced their decisions.

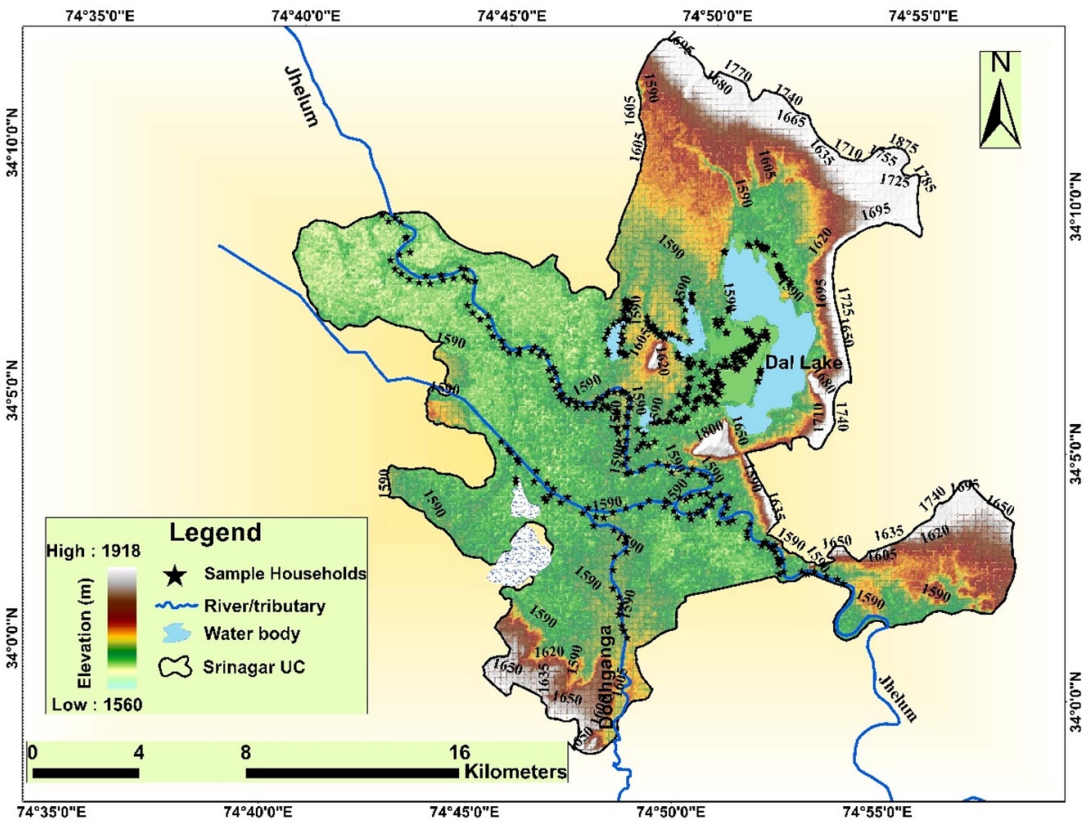


Figure 3. Spatial distribution of sampled households in Srinagar city.

The survey was administered in person to 400 households across flood-prone areas of Srinagar between August and September 2021 (figure 3). Each questionnaire required approximately 20 min to complete. The complete questionnaire, including all survey items and response options, is provided in appendix.

3.3.3. Data analysis

Quantitative data were analysed using descriptive and chi-square tests of independence. Frequencies and percentages were calculated to summarize household relocation intentions across demographic groups. Chi-square tests were used to examine associations between relocation intentions and selected demographic variables (age and gender). Statistical significance was assessed at $p < 0.05$.

3.4. Integration of qualitative and quantitative findings

The qualitative phase was conducted first to explore residents' experiences, perceptions, and reasoning related to household relocation in flood-prone areas. The themes identified through the thematic narrative analysis informed the development of the household questionnaire, ensuring that the survey captured the key dimensions emerging from the participants' lived experiences. Integration of the qualitative and quantitative findings occurred during the interpretation stage of the sequential mixed-methods design, following separate analyses of each dataset. The qualitative themes were subsequently compared with the corresponding survey findings to assess convergence and complementarity between the two datasets.

The qualitative and quantitative datasets were analysed independently using methods appropriate to each research approach. Qualitative interview data were analysed inductively to identify recurring themes, while survey responses were analysed using descriptive statistics and chi-square tests to examine population-level patterns and associations.

Respondents indicating either willingness or unwillingness to relocate were asked follow-up questions addressing factors identified during the qualitative phase, including perceived adequacy of compensation, livelihood dependence on location, place attachment, and concerns about uncertainty. These survey responses were interpreted alongside the qualitative themes to examine whether similar patterns were evident across the broader population. Accordingly, table 4 presents an interpretive synthesis of

the mixed-method findings. The themes originate from the qualitative interviews, while their relevance is examined using the corresponding survey responses. The classification of factors as primary or secondary reflects their prominence and consistency across the qualitative narratives, supported by the survey findings, and does not represent statistical weighting or a pooled analysis of interview and survey participants.

4. Results

4.1. Interview findings

The interviews examined how residents in flood-prone areas perceive relocation in the context of future flood risk. Participants' responses revealed that relocation decisions are shaped by interacting economic, social, and emotional factors. While some residents expressed openness to relocation under specific conditions, others demonstrated strong attachment to their current location and reluctance to move. Differences in perspectives were more evident across age groups, whereas gender differences were limited. Narrative analysis resulted in four main themes describing how residents evaluate relocation options: (1) relocation consideration with adequate compensation, (2) relocation contingent on secured livelihood, (3) relocation deferred to future consideration, and (4) relocation hesitancy and complex emotions.

4.1.1. Relocation consideration with adequate compensation

Several participants indicated that relocation could be pursued if accompanied by adequate financial compensation to support resettlement. This perspective was more frequently observed among younger and some middle-aged residents. Participants emphasized the need for sufficient financial resources to rebuild homes and re-establish livelihoods.

A 28-year-old male participant explained:

> 'There is no denying that floods pose a persistent threat in our area. However, we have built our lives here, and relocating would mean risking everything. Starting afresh elsewhere would require considerable time and effort, with no guarantee of success. The prospect of moving becomes worthwhile if there is sufficient compensation.'

Participants also noted concerns about potential exposure to new environmental or economic risks in relocation sites.

4.1.2. Relocation contingent on secured livelihood

Many participants emphasized livelihood security as a key factor, often prioritizing it over one-time financial compensation. Residents whose occupations depend entirely on water-based resources, such as fishing or floating agriculture, expressed serious concern about losing income opportunities if relocated away from water bodies.

A middle-aged female resident explained:

> 'I am the sole breadwinner of my family, and the waters provide us with the opportunity to earn a living. If we were relocated away from the waters, we would lose this source of income. Even if we were compensated financially, would that be enough?'

These responses suggest that livelihood considerations were frequently cited alongside, or in preference to, financial compensation.

4.1.3. Relocation deferred to future consideration

Some participants did not reject relocation but preferred to defer such decisions. For these individuals, relocation was viewed as complex and uncertain, and not immediately actionable due to competing priorities such as education, employment, or family responsibilities.

A female university student noted:

> 'I am currently preparing for my university exams and job applications. Given these immediate concerns, relocating is not something I can think about right now.'

These responses suggest a postponement of relocation decisions rather than clear willingness or unwillingness. Place familiarity and existing commitments were also mentioned as reasons for deferring relocation.

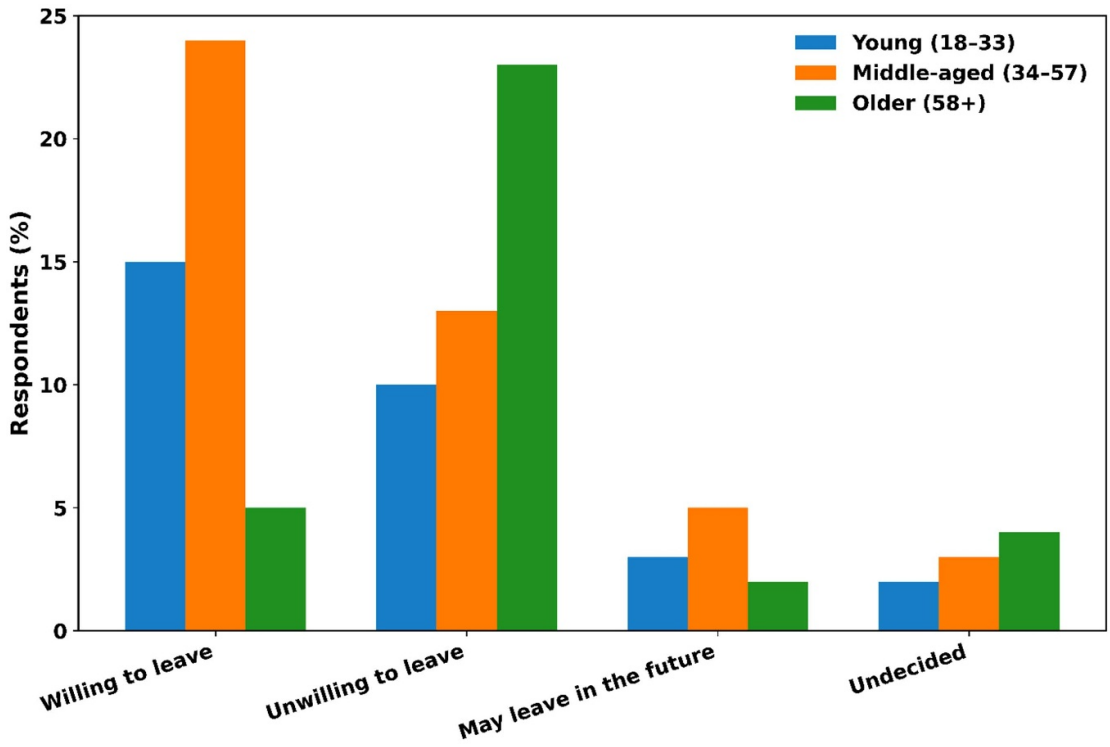


Figure 4. Distribution of relocation intention categories (willing to leave, unwilling to leave, may leave in the future, and undecided) across age groups ($n = 400$).

4.1.4. Relocation hesitancy and complex emotions

Many participants expressed strong emotional attachment to their homes and communities, contributing to reluctance to relocate. This was particularly evident among older residents, who referred to long-term residence and family history in their accounts.

A male participant in his seventies stated:

> 'If you were to ask me to leave my home, where I have lived for many decades, the thought alone is painful. Moving somewhere else would be far more difficult than dealing with the challenges we face here.'

These accounts suggest the role of emotional attachment and social ties in shaping reluctance to relocate.

4.2. Survey findings

A household survey of 400 respondents in flood-prone areas of Srinagar was conducted to assess whether patterns identified in interviews were reflected at the population level. Respondents were categorized into three age groups: young adults (18–33 years), middle-aged adults (34–57 years), and older adults (58+). Relocation intention, the primary dependent variable, was measured using four response categories consistent with the survey instrument: willing to leave, unwilling to leave, may leave in the future, and undecided. These categories were applied consistently across all analyses. The distribution of relocation intentions across age groups is depicted in figure 4, and percentages reported are calculated as proportions of the total sample ($n = 400$).

Overall, 44% of respondents indicated willingness to leave under certain conditions, whereas 38% reported unwillingness to leave. A smaller proportion of respondents indicated potential future relocation (10%), while 8% were undecided. Figure 4 further illustrates variation in relocation intentions across age groups, revealing an age-related pattern with higher levels of unwillingness among older respondents.

4.2.1. Age differences

Relocation intentions varied across age groups, revealing a clear life-stage pattern (table 3). Younger respondents demonstrated moderate openness to relocation under certain conditions, such as financial compensation or livelihood security. This openness increased among middle-aged respondents, who

Table 3. Distribution of relocation intentions by age group (% of respondents).

Age group	Willing to leave (%)	Unwilling to leave (%)	May leave in the future (%)	Undecided (%)	Total (%)
Young Adults (18–33)	15	2	3	2	22
Middle-Aged Adults (34–57)	24	13	5	3	45
Older Adults (58+)	5	23	2	3	33

Table 4. Key factors influencing relocation decisions by age group.

Age Group	Nature	Decision	Factor	Remarks
Young and Middle-Aged Adults (18–57)	Primary	Stay	Sense of place	Individuals experience a strong sense of belonging, ownership, and nostalgia toward their current place of residence.
		Leave	Adequate compensation	Financial compensation and livelihood security influence willingness to consider relocation.
	Secondary	Stay	Personal commitment	Individuals often prioritize existing obligations and responsibilities over relocation decisions.
		Leave	Uncertainty	Concerns about future prospects and socio-economic uncertainty influence relocation intentions.
Older Adults (58+)	Primary	Stay	Emotional resilience	Individuals demonstrate the ability to cope with environmental challenges and adapt to everyday adversities.
		Leave	Children's prospects	Relocation may be considered to secure better opportunities and safety for the next generation.
	Secondary	Stay	Old-age perspective	Older residents prioritize comfort, familiarity, and personal satisfaction in later life.
		Leave	Family welfare	Concerns about the safety and well-being of family members may influence relocation decisions.

Note: Table 4 presents an interpretive synthesis of qualitative themes and corresponding survey findings. The categories 'primary' and 'secondary' reflect the relative prominence of factors identified in interview narratives and supported by survey responses; they are not based on statistical weighting.

showed the highest willingness to relocate, particularly when economic stability could be maintained. In contrast, older residents were significantly less willing to relocate and exhibited stronger reluctance.

Specifically, willingness to leave increased from 15% among young adults to 24% among middle-aged respondents, before declining sharply to 5% among older residents. Conversely, unwillingness to leave was lowest among younger respondents (2%) and highest among older residents (23%). This pattern indicates a variation in relocation intentions across the study-defined age groups, with middle-aged respondents reporting the highest proportion of willingness to relocate.

A chi-square test indicated a statistically significant association between age group and relocation intention (χ^2 (6, $N = 400$) = 120.5, $p < 0.001$), confirming that relocation preferences differ significantly across age groups.

4.2.2. Gender differences

Gender-based differences in relocation intentions were minimal. Male respondents reported slightly higher willingness to leave (24%) compared to female respondents (20%), while unwillingness to leave was similar across groups (20% for males and 18% for females). The proportions of respondents indicating that they may leave in the future (5%) or were undecided (4%) were identical for both groups.

A chi-square test confirmed no statistically significant association between gender and relocation intention (χ^2 (3, $N = 400$) = 0.49, $p = 0.92$), indicating that no statistically detectable association was observed between gender and relocation intentions in this sample.

4.3. Factors influencing relocation decision-making

The integrated interpretation of the qualitative and quantitative findings identified key factors shaping relocation decisions. These factors were **classified as primary and secondary** based on their prominence in participants' narratives and their correspondence with survey findings. For analytical clarity, young and middle-aged groups are combined in table 4 due to similar response patterns. This classification reflects the relative importance of factors as expressed by respondents rather than statistical weighting.

Table 4 summarizes the integrated interpretation of the mixed-method findings. The themes originate from the qualitative interviews, while their relevance was examined using the corresponding survey responses. The table is intended to synthesize complementary evidence from both phases and does not represent pooled frequencies or a merged dataset. Rather, it provides an interpretive synthesis in which qualitative themes are presented alongside the corresponding survey evidence to illustrate how the two datasets complement one another.

Among young and middle-aged respondents, relocation decisions were primarily influenced by economic factors. Adequate compensation and livelihood security emerged as primary factors supporting willingness to leave, indicating that relocation is considered viable when financial stability can be maintained. In contrast, decisions to remain were more closely associated with place attachment and existing personal commitments, which act as stabilizing forces that limit mobility.

For older respondents, relocation preferences were shaped more strongly by social and emotional factors. Primary factors supporting continued residence included attachment to place, familiarity with the environment, and satisfaction with existing living conditions. When relocation was considered, it was typically linked to concerns about family welfare or improving future opportunities for younger household members, rather than personal economic gain.

Overall, the findings indicate that relocation decision-making is structured differently across age groups. While younger and middle-aged respondents emphasize economic security and future opportunities, older residents prioritize emotional attachment and stability. This variation highlights that relocation is not driven by a single dominant factor but by a dynamic balance of economic, social, and emotional considerations across life stages.

5. Discussion

This study examined how residents in flood-prone areas of Srinagar perceive relocation as a potential flood mitigation strategy, with a focus on the socio-demographic and contextual factors shaping relocation intentions. The findings indicate that relocation decisions are not driven by flood risk alone but emerge from the interaction of economic constraints, livelihood dependence, and emotional attachment to place. The results further extend existing work by demonstrating that relocation preferences in flood-prone urban contexts are structured not only by risk perception but also by life-stage-specific trade-offs between economic security and socio-emotional stability.

Consistent with research on residential mobility and environmental decision-making (Coulter *et al* 2011), respondents evaluated relocation as a trade-off between reducing flood risk and maintaining economic and social stability. In particular, livelihood security and expectations of adequate compensation emerged as key conditions under which relocation would be considered. This aligns with evidence from relocation programmes in Sri Lanka and the Philippines, where insufficient livelihood support has undermined long-term resettlement outcomes (Fernando 2018, Bodine *et al* 2022).

Age-based differences highlight how relocation intentions vary across life stages. Younger and middle-aged adults were more willing to relocate when economic opportunities could be preserved, indicating a forward-looking orientation toward risk reduction and livelihood stability. In contrast, older adults demonstrated stronger reluctance to relocate, reflecting deeper place attachment, established social networks, and concerns about adapting to new environments. These patterns align with the concept of voluntary immobility (Black *et al* 2011, Zickgraf 2011), where individuals remain in hazard-prone environments for social, cultural, and emotional ties rather than a lack of awareness of risk. At the same time, some older respondents expressed conditional willingness to relocate when linked to the safety and future prospects of younger household members, suggesting that relocation decisions are embedded within intergenerational considerations.

The present findings also help clarify an important distinction in the relocation literature. Much of the existing evidence cited in this study concerns households responding to, or experiencing, implemented relocation or resettlement programmes, whereas the present study examines relocation intentions before any formal programme is introduced. In studies of implemented relocation, livelihood disruption, inadequate support, and weak institutional arrangements have been identified as factors that can undermine relocation outcomes (Mavhura *et al* 2017, Fernando 2018, Bodine *et al* 2022). The present findings extend this perspective by indicating that similar concerns are already reflected in households' stated relocation intentions before relocation takes place: respondents considered compensation and livelihood continuity as conditions for willingness to move, while uncertainty and place attachment contributed

to hesitation or continued residence. Thus, the findings suggest that constraints documented after relocation may also operate prospectively in shaping whether households are willing to relocate in the first place. This distinction is important because relocation intention is not equivalent to realized mobility; rather, it provides insight into how households evaluate the anticipated costs, benefits, and uncertainties of relocation.

The findings also highlight the importance of distinguishing between primary and secondary factors in relocation decision-making. While economic factors such as compensation and livelihood security often function as primary considerations for relocation, social and emotional factors play a crucial role in shaping resistance or delayed decision-making. This reinforces the view that relocation is not purely a technical intervention but a socially grounded process shaped by multiple, interacting dimensions.

In the context of Srinagar, these dynamics are further shaped by riverine geography, dependence on water-based livelihoods, and governance constraints. Residents living along the Jhelum River and associated water bodies often rely on location-specific economic activities, making relocation complex. In addition, perceptions of institutional capacity and trust in governance structures may influence willingness to engage with relocation initiatives, especially in regions with a history of political instability.

These findings have direct implications for policy and planning. First, relocation strategies in flood-exposed areas need to extend beyond risk reduction objectives and explicitly address livelihood security. Consistent with the empirical findings, relocation programmes should incorporate provisions for income restoration, access to employment opportunities, and support for transitioning location-dependent occupations or activities. Second, compensation schemes should be designed not only to cover housing loss but also to account for long-term economic security, particularly for households dependent on local environmental resources. Third, participatory planning processes that involve affected communities in decision-making can help address concerns related to place attachment and improve the acceptability of relocation initiatives.

Overall, the results indicate that relocation policies are more likely to be effective when they integrate economic, social, and emotional dimensions of decision-making. Approaches that rely entirely on top-down planning or technical risk assessments may fail to account for the lived realities of affected populations, increasing the likelihood of resistance or unsuccessful resettlement. Incorporating community perspectives into planning processes is therefore essential for designing relocation strategies that are both socially acceptable and sustainable.

6. Limitations

This study has several limitations that should be considered when interpreting the findings. First, relocation intentions were assessed using a hypothetical future scenario rather than observing actual relocation behaviour, and respondents' stated intentions may differ from decisions made under real circumstances. Second, the cross-sectional design captured perceptions and intentions at a single point in time, whereas relocation decisions may evolve following subsequent flood events, changes in household circumstances, or policy interventions. Third, although the mixed-methods approach provided complementary insights, the study was conducted in flood-prone urban areas of Srinagar, and the findings may not be directly generalizable to other geographical or socio-environmental contexts. Fourth, the age-group analysis uses study-specific categorical thresholds; alternative specifications, including treating age as a continuous variable, could be examined in future research to assess the robustness of the observed pattern. Finally, both the interview and survey data relied on participants' self-reported experiences and perceptions, which may be subject to recall bias or social desirability bias. Despite these limitations, the integration of qualitative and quantitative evidence provides a comprehensive understanding of the factors shaping household relocation intentions in flood-prone urban areas.

7. Conclusion

This study examined household relocation intentions in flood-prone areas of Srinagar, showing that relocation decisions are not driven by flood risk alone but by a combination of livelihood considerations, financial constraints, and emotional attachment to place. The findings reveal a distinct age-based pattern: middle-aged adults reported the highest proportion of willingness to relocate when economic stability could be maintained, while older adults reported the highest proportion of unwillingness to relocate, with place attachment and concerns about adaptation emerging as important contextual considerations. Across age groups, relocation is most likely to be considered when supported by adequate compensation and secure livelihood opportunities.

These results emphasize that relocation is a socially embedded process rather than a purely technical risk-reduction strategy. The findings suggest that effective relocation planning should extend beyond hazard reduction to incorporate livelihood continuity, long-term economic security, and meaningful community participation, thereby improving the social acceptability and long-term sustainability of relocation initiatives.

Acknowledgment

The authors thank all the participants for their contributions to this study.

Data availability statement

All data that support the findings of this study are included within the article (and any supplementary files).

Conflict of interest

The authors declare no conflict of interest.

Funding

This research received no external funding.

Ethics approval

This study was conducted in accordance with the ethical principles of the 2013 Declaration of Helsinki.

Informed consent statement

Informed consent was obtained from all participants involved in this study. Participation was voluntary, and confidentiality and anonymity were maintained.

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Appendix. Household survey questionnaire used in the study

The questionnaire below reproduces the survey instrument administered to respondents during the quantitative phase of the study. It comprises socio-demographic questions, flood experience, household relocation intention, and follow-up questions examining the factors influencing relocation decisions. Unless otherwise stated, respondents selected one response for each question.

Coordinates:	Elevation:

A1–A9 (Socio-demographic information)

A1. Age (years): _____

A2. Gender

◯ Male ◯ Female

A3. Religion

◯ Muslim ◯ Hindu ◯ Sikh ◯ Other:_____

A4. Years of formal education: _____

A5. Occupation

◯ Employee ◯ Business owner ◯ Student ◯ Labourer ◯ Homemaker ◯ Other------

A6. Monthly household income *(in rupees)*:_____

A7. House ownership

◯ Owner ◯ Tenet

A8. Length of residence in the area (years): _____

A9. Distance of residence from the nearest river or waterbody (m): _____

B1–B3 (Flood experience)

B1. Have you experienced flooding at your current residence?

◯ Yes ◯ No

B2. Did you experience the 2014 Kashmir Flood?

◯ Yes ◯ No

B3. Have you experienced additional flooding after the 2014 event?

◯ Yes ◯ No

C1 (Household relocation intention)

C1. Will you stay in or leave your current location prone to future flooding?

◯ Willing to leave ◯ Unwilling to leave ◯ May leave in the future ◯ Undecided

D1–D6 (Factors influencing relocation decisions)

D1. Would you consider relocation if adequate compensation were provided?

◯ Yes ◯ No ◯ Not sure

D2. Does your livelihood depend on your current location?

◯ Yes ◯ No ◯ Not sure

D3. Would the loss of your current livelihood affect your willingness to relocate?

◯ Yes ◯ No ◯ Not sure

D4. Do social and emotional ties to your current location influence your relocation decision?

◯ Yes ◯ No ◯ Not sure

D5. Does uncertainty about future living conditions influence your relocation decision?

◯ Yes ◯ No ◯ Not sure

D6. If you have any additional comments regarding relocation decision, please describe them below.

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