



Essential livelihood recovery interventions (LRIs) for urban development-induced rural displacement and resettlement in India: a Delphi technique

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Abstract

Livelihood recovery, a well-researched issue while a natural disaster, has often been overlooked in the case of other man-made disasters, such as displacement and resettlement caused by urban development projects. Although government institutions/organizations initiated various interventions to combat the externalities of such projects and make the affected people more resilient, a holistic approach is lacking. This study attempts to identify livelihood recovery interventions (LRIs) based on different mechanisms of livelihood resilience for the people affected by urban development projects. Following a literature review and field visit, an initial list of seventy-three LRIs under fifteen mechanisms was prepared. Then, a panel of experts from India was invited to participate in a Delphi technique to check the interventions' applicability and determine additional context-specific interventions to attain livelihood resilience in the Indian context. The results show that maximum interventions related to (i) empowering the people in rural areas, especially for their active participation in the implementation of the development project; (ii) additional facilities to reduce outmigration; (iii) long-term strategies by the government to achieve sustainability are the most relevant, as gained the consensus with aggregate preference 90%, in three rounds of Delphi. These results highlight the directions for policy-makers and planners in designing and managing livelihood recovering activities to achieve livelihood resilience.

Keywords Urban development · Resettlement · Rural households · Livelihood resilience · Experts' opinion · Delphi technique

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1 Introduction

Globally, 250–300 million people have been displaced during the last 20 years due to development and related issues (Kaida & Miah, 2015). In India, an estimated 60 million people were displaced or affected by development projects in the last 70 years after independence (Srinivasan & Nuthalapati, 2020). By 2030, while urban expansion across the world is expected to increase by 1.2 million km² (World Bank, 2023), in developing countries like India, the rate of urban expansion is estimated at approximately 31.8% (Shahfahad et al., 2021). This urban expansion necessitates the transformation of agricultural land into non-agricultural land use (Kumar et al., 2021; Tan et al., 2009); in India, 25 million hectares of arable land have been acquired so far (Mathur, 2013). Such expansion will put additional pressure on land and natural resources, transforming rural/agricultural land into urban and leading to displacement, land loss, and loss of livelihood for farmers (Huang et al., 2017).

Further, displacement and resettlement caused by development projects is a critical issue in today's pace of development (Bennett & McDowell, 2012; De Wet, 2009; McDowell, 1996; Neef & Singer, 2015; Vandergeest et al., 2007). The displaced population in India prompted significant social, economic, cultural, and political instability identified by a few researchers (Sengupta & Bandhopadhyay, 2016). Moreover, Cernea (2000) identified eight impoverishment risks and also suggested an impoverishment Risks and Reconstruction (IRR) model, where 'loss of livelihood' is the most emphasized issue found by the researchers (Al Atahar, 2014; Awazi & Quandt, 2021; Degert et al., 2020; Diwakar & Peter, 2016; Fujikura et al., 2009; Hattori & Fujikura, 2009; Ogwang & Vanclay, 2019) in the field of development-induced displacement and resettlement; yet, none of the studies focused on the urban development projects.

While livelihood is 'capabilities, assets (including physical and social resources) and activities required for a living' (Erenstein et al., 2010; Quandt, 2018; Scoones, 1998), livelihood recovery interventions (LRIs) are a variety of focused initiatives and programs executed to restore, strengthen, and enhance the livelihood of the affected people. The concept of LRIs is majorly used in post-natural-disaster (Gyawali et al., 2020; Islam & Walkerden, 2022; Lawther, 2016; Pu et al., 2021; Raut, 2021) post-conflict among the countries (Majidi & Hennion, 2014), poverty alleviation (Dai et al., 2022), ecological factors/climate change (Liu et al., 2020b; Nasrnia & Ashktorab, 2021), and other development (Dam construction) projects (Tran, 2017). Yet, none of the studies focused on livelihood recovery interventions while considering the urban development project (Adam et al., 2015) affecting rural households. Most of the studies focused on the livelihood strategies followed by the affected households (Islam & Walkerden, 2022; Raut, 2021) to recover their livelihoods. Some authors, Tafti and Tomlinson (2015), identified the best policy in practice based on the primary and secondary data.

In this connection, Huang et al. (2018) indicated that government institutions play an essential role in determining policy preferences for restoring livelihood. De Wet (2006) further identified the requirement for more studies explaining the dynamics of the resettlement process to formulate strategic planning and management. Additional evaluation and improvement of the intervention and recovery framework are required (Lawther, 2016), especially for developing countries. A lack of studies has been focused on the livelihood recovery interventions (LRIs) manifested by the institution for the affected people (Joakim & Wismer, 2015; Pu & Chang-Richards, 2022).

In the development context, livelihood recovery refers to how well displaced people can adjust to their new living spaces. Whereas livelihood resilience is the mechanism through which households and communities respond to, recover, learn from changes and disturbances, and transform their livelihood patterns to adapt to changes and challenges (Nyamwanza, 2012; Sina et al., 2019). The livelihood resilience mechanism following the shock, like an urban development project, is more complex than the natural process of growth and development (UNISDR, 2009; Zhang et al., 2018). Early livelihood recovery enables affected people to continue their prior social and economic activities and promotes long-term reconstruction and growth (Régnier et al., 2008; Sina et al., 2019). Because an adequately designed recovery intervention can restore livelihood resilience (Gyawali et al., 2020). Previous studies have focused on providing livelihood resources rather than the interventions relevant to livelihood recovery (Tran, 2017). Only a few researchers (Nikuze et al., 2019; Tran, 2017) have emphasized the mechanism for livelihood resilience in the context of development-induced displacement and resettlement (DIDR). However, none of the studies was found to focus on the urban development projects affecting rural households for livelihood recovery and resilience.

Further, none of the studies focused on the institutional/government perspective for LRIs. Hence, with the help of the knowledge and experience of the experts, this research aims to identify appropriate LRIs that can be adapted for livelihood resilience for the people affected by urban development-induced rural displacement and resettlement (UDIRDR) projects in India. The consecutive section introduces the material and methods used in this study, followed by the result and discussion, and thereafter, the last section elaborates on the conclusions.

2 Material and methods

2.1 Identification of LRIs and livelihood resilience mechanism

The lack of focus on the LRIs and livelihood resilience in the case of urban development projects takes this study to the fragile theoretical background for acquiring the appropriate list of interventions. Hence, this study has identified a set of LRIs based on the precedent studies related to livelihood recovery for the people of the rural area from the literature and other relevant context-specific LRI from focus group discussion (FGD), in-depth interviews with the officials, and observation on the field in Nava Raipur Atal Nagar (NRAN), designed as a new upcoming city in Chhattisgarh, India.

2.1.1 Selection of LRIs and mechanisms through precedent studies

By using the keywords 'urban development', 'resettlement', 'displacement', 'rural development', 'livelihood', 'livelihood recovery', 'interventions', and 'livelihood resilience', this study investigated literature from 2000 to 2023 and searched for various interventions and mechanism employed in the previous studies. The study aims to examine the livelihood affected by urban development projects and identify recovery interventions. Nevertheless, there is a lack of studies that specifically address this issue. The selection and identification of the LRIs in the study were fully receptive. Fifteen primary mechanisms for livelihood resilience and sixty-one recovery interventions have been identified from the literature.

2.1.2 Observation, focus group discussion (FGD), and interview with the officials

Nava Raipur Atal Nagar Vikas Pradhikaran (NRANVP) was approached to collect information about the displaced and resettled villages. The development of NRAN started in 2006, and for this purpose, sixty-one villages were identified for displacement and resettlement (NRANVP, 2006). The project's first phase was completed for those fourteen villages displaced completely, and eighteen villages were partially displaced. A non-random sampling was used to choose the villages from the list of villages provided by the NRANVP.

Firstly, in-depth interviews with the officials of NRANVP were managed, and preliminary observations of the field were carried out to understand the scenario. A semi-structured questionnaire was prepared for the in-depth interview with the officials. It included questions related to the project planning, management, implementation, various impact assessments, amenities provided for the resettlers, restoration of livelihood, grievances redressal technique, and appropriate suggestions from their side. During this period, two officers shared their views. Thereafter, focus group discussions (FGDs) were conducted with the affected people.

FGD is an in-depth interview on a specific issue in which the members are well-versed in the subject and at ease discussing with each other and the moderator (Muhuri & Basu, 2018). FGD is considered an appropriate instrument for gathering in-depth information to understand user perspectives and identify certain context-specific statements (Muhuri & Basu, 2018). Figure 1 represents the participants of one FGD group of Nawagaon (Khapri) who were displaced and resettled in the Government-designated residences, and the FGD was conducted under a tree (Fig. 1b).

The questionnaire for FGD was prepared in a combination of structured and open-ended questions. The structured portion contained socio-demographic and open-ended questions designed to attain in-depth qualitative information regarding the impacts of development projects on their livelihood. Participants for the FGD were selected either because of their involvement in the development project or their availability during the survey. The moderator asked the questions in the local dialect/language for better understanding and comfort for positive responses from the HHs. To avoid any misguiding/offending/biases, the FGDs



Fig. 1 Example picture of FGD participants (a) and choupal as venue of FGD (b), Nawagaon (Khapri) village

were conducted on the same day of introduction, without prior information given to the villagers but with the consent of the *Sarpanch* (Village leader). Each FGD continued for 90–120 min, and the discussions were audio-recorded. Table 1 illustrates the statements of the participants and the LRI derived from the FGDs. Eleven LRIs were obtained from the field observations, in-depth interviews, and FGDs.

2.1.3 Coalesced of LRIs under the livelihood resilience mechanism

In the absence of adequate studies on urban development-induced displacement and resettlement, studies on the livelihood resilience for resettlement caused by poverty alleviation (Li et al., 2022; Liu et al., 2020b), ecological factors/climate change (Liu et al., 2020b; Nasrnia & Ashktorab, 2021), and other development projects (Tran, 2017) are considered. This research also considered the theoretical background (Van der Ploeg & Vanclay, 2017, 2018) and other frameworks for measuring livelihood resilience (Quandt, 2018; Speranza et al., 2014) that can be relevant to urban development. From the recommendation and suggestion of these studies, seventy-three LRIs (from literature review and field visits) have coalesced into fifteen identified livelihood resilience mechanisms (Table 2).

Table 1 Illustration of the identified LRIs from the FGDs

Responses from the focus group discussions (FGDs)	Derived livelihood recovery interventions (LRIs)
<p><i>“No space has been provided for any functions, like marriages, meetings, religious ceremonies, etc.”</i> One respondent, Age—45, Gender—Male; Village-Rakhi</p>	Open ground (multi-purpose and religious gathering places)
<p><i>“They (Government institutions) are buying our land for 6 lakh rupees and selling it for crores, but we are not getting enough monetary compensation.”</i> One respondent, Age—38, Gender—Male, Village-Rakhi</p>	Enhancing material and financial compensation
<p><i>“It does not matter that house (lost material) is Kutchra or Pucca; it should be of good quality with good facilities.”</i> One respondent, Age—32, Gender—Male, Village-Nawagaon (Khapri)</p>	Provision of subsidies for admission to school
<p><i>“They have provided us very small houses where we can barely survive.”</i> One respondent, Age—42, Gender—Male, Village-Nawagaon (Khapri)</p>	
<p><i>“Presently, many new schools are open in Rakhi, but we are unable to get admission for our children in these types of schools without subsidies.”</i> One respondent, Age—45, Gender—Female, Village- Upparawara</p>	Relocation near farmland where cultivation is possible
<p><i>“Earlier, we had farm land, and we are farmers, but now we are going for rozi-mazdoori.”</i> One respondent, Age—53, Gender—Male, Village-Rakhi</p>	Relocation near farmland where cultivation is possible
<p><i>“When we used to go to the field, we used to get vegetables, now everything we need to purchase.”</i> One respondent, Age—48, Gender—Female, Village- Kayabandha</p>	

Table 2 LRs and mechanism obtained from the literature review and onsite interview, FGD, and observations

S.No.	The identified mechanism for livelihood resilience	S.N	livelihood recovery interventions initiated by the government institution	Source/s
1	To facilitate resettlement, motivating people to leave their places (Speranza et al., 2014; Tran, 2017)	1.1 1.2	Financial Compensation Land Compensation	Mondal et al., (2021), Orindi et al., (2007) Mondal et al., (2021), Orindi et al., (2007), Perera (2014)
		1.3	Material compensation (house, shop, agricultural tool)	
		1.4	Awareness program (regarding clear knowledge about the development project and benefits to future generations)	Perera (2014), Régnier et al., (2008)
2	Win-win solutions for institutions and people associated with a resettlement project (Li et al., 2022; Van der Ploeg & Vanclay, 2017)	2.1 2.2 2.3	Informative approach (clear knowledge of the project before resettlement) Participation of the resettlers (throughout the implementation of the project) Bottom-up approach (Considering the opinion of the people when the implementation strategies are formulated)	Gyawali et al., (2020), Liu et al., (2020a), Perera (2014), FGD Gyawali et al., (2020), Lawther (2016), Rakodi (1999), Tafti and Tomlinson (2015) Lawther (2016)
		2.4	Top-down approach (when implementation strategies are directly implemented on the people based on field knowledge)	Interview with officials
		2.5	Positive coordination between villagers and institutions from time to time regarding grievance redressal	Perera (2014), Saeed Khan (2019)
3	Reconstructing the social life of the affected families (Li et al., 2022; Nasrnia & Ashktorab, 2021; Speranza et al., 2014; Van der Ploeg & Vanclay, 2017)	3.1 3.2 3.3 3.4 3.5	Low rise high density around a courtyard Not more than 20 families in close proximity Community centre (for enhancing social activities) Open ground (multi-purpose and religious gathering places) Enhancing the recreational activities	Perera (2014) Lynch and Hack (1984), Qie et al., (2019) Lawther (2016), Perera (2014) Observation, FGD Perera (2014)

Table 2 (continued)

S.No.	The identified mechanism for livelihood resilience	S.N	livelihood recovery interventions initiated by the government institution	Source/s
4	Additional facilities to reduce the outmigration of the resettlers (Nasrnia & Ashktorab, 2021; Tran, 2017)	4.1	Provision of convenience stores or government stores for basic day-to-day requirements	Nasrnia and Ashktorab (2021), Rakodi (1999), Tran (2017), Yang et al., (2018)
		4.2	Small industry development	Alinovi et al., (2009), Joakim and Wismer (2015), Saeed Khan (2019)
		4.3	Maintenance of the basic infrastructure facilities (house, safe drinking water, toilet, etc.)	Rakodi (1999), Tran (2017)
5	Handling resistance/ protest created by the villagers or community leaders during the projects (Li et al., 2022; Van der Ploeg & Vanclay, 2017)	5.1	Involvement of intermediate institution or NGO during grievance redressal	Perera (2014), Rakodi (1999), Saeed Khan (2019)
		5.2	Participation of the villagers during policy-making and implementation of the project	Rakodi (1999), Tafti and Tomlinson (2015)
		5.3	Consent of the majority of the villagers at the beginning of the resettlement project	Perera (2014), FGD
		5.4	Enhancing material and financial compensation	Observation, FGD
6	Empowering the people in rural areas for their active participation in the implementation of the development project (Alinovi et al., 2009, 2010; Nasrnia & Ashktorab, 2021)	6.1	Campaigning	Perera (2014), Observation, FGD
		6.2	Door-to-door information	Liu et al., (2020a), Mondal et al., (2021)
		6.3	Social group (self-help group, women group)	Lawther (2016), Orindi et al., (2007)
		6.4	Strong local leadership	Joakim and Wismer (2015), FGD
		6.5	Appointing coordinator/counsellor	Observation, FGD
7	Empowering women in new resettlement areas provided by the government (Alinovi et al., 2010; Nasrnia & Ashktorab, 2021; Van der Ploeg & Vanclay, 2018)	7.1	Capacity building (skill development, improving education level)	Gyawali et al., (2020), Joakim and Wismer (2015)
		7.2	Information regarding the legal and judicial support	Observation and FGD
		7.3	Formation of social groups	Gyawali et al., (2020), Régnier et al., (2008)
		7.4	Appointing a counsellor	Observation

Table 2 (continued)

S.No.	The identified mechanism for livelihood resilience	S.N	livelihood recovery interventions initiated by the government institution	Source/s
8	Motivating the children in their studies after the disruption caused by the development project (Alinovi et al., 2010; Van der Ploeg & Vancley, 2018)	8.1	Campaigning	Perera (2014)
		8.2	Door-to-door information	Liu et al., (2020a), Mondal et al., (2021)
		8.3	Relief in school fees	Donnell (2006)
		8.4	Provision of subsidies for admission to school	Observation, FGD
		8.5	Appointing coordinators/counsellors for being in continuous touch with children and their parents	Observation
9	Enhancing the occupational skills of resettlers (Alinovi et al., 2009, 2010)	9.1	Campaigning	Perera (2014)
		9.2	Door-to-door information	Liu et al., (2020a), Mondal et al., (2021)
		9.3	Engaging resettlers in various localized activities	Perera (2014), FGD
		9.4	Local government support for engaging resettlers in alternative options for their skill	Joakim and Wismer (2015), Régnier et al., (2008)
		9.5	Social group (self-help group, women group)	Lawther (2016), Orindi et al., (2007)
		9.6	Strong local leadership	Joakim and Wismer (2015)
		9.7	Appointing coordinators/ counsellors	Observation
10	Agricultural development and intensification for resettlers (Quandt, 2018; Tran, 2017; Yang et al., 2018)	10.1	Relocation near farmland where cultivation is possible	Observation, FGD
		10.2	Provisions for new tools and techniques	Observation, FGD
		10.3	To facilitate purchasing new agricultural land	FGD
11	Financial management, adapted by the institutions for the resettlers (Alinovi et al., 2010; Nasmia & Ashktorab, 2021)	11.1	Investment ideas and support	Joakim and Wismer (2015)
		11.2	Loan facilities with subsidies	Gyawali et al., (2020), Joakim and Wismer (2015), Mondal et al., (2021)
		11.3	Money lending facilities	Perera (2014), Régnier et al., (2008)

Table 2 (continued)

S.No.	The identified mechanism for livelihood resilience	S.N	livelihood recovery interventions initiated by the government institution	Source/s
12	Mediators can help the affected families cope with the changing scenario (Nasrnia & Ashktorab, 2021; Singh et al., 2021; Supriatna & van der Molen, 2014)	12.1	Non-government organizations (NGOs)	Régnier et al., (2008), Saeed Khan (2019)
		12.2	Local level-specific team	Orindi et al., (2007)
		12.3	Educational and extension groups	Bafioe and Matsuda (2018), Diaz-montenegro et al., (2018), Rakodi (1999)
		12.4	Cooperative formation	Joakim and Wismer (2015)
		12.5	Vocational training schools	Gyawali et al., (2020), Perera (2014), Rakodi (1999), Saeed Khan (2019)
13	Role of formulated team/organizations/NGO that can be helpful for affected villagers (Alinovi et al., 2009; Nasrnia & Ashktorab, 2021; Singh et al., 2021; Van der Ploeg & Vanclay, 2018)	13.1	Nurturing community participation	Gyawali et al., (2020), Lawther, (2016)
		13.2	Delivering benefits provided by the institution more efficiently	Régnier et al., (2008), Saeed Khan (2019)
		13.3	Serve as the link between the resettlers and the institution	Saeed Khan (2019)
		13.4	Instruments of capacity-building	Joakim and Wismer (2015)
		13.5	Social capital formation	Naithani and Saha (2021)
		13.6	Offering collective awareness programs	Naithani and Saha (2021), Saeed Khan (2019)
		13.7	Formation of community mobilization strategies	Gyawali et al., (2020), Perera (2014), Saeed Khan (2019)

Table 2 (continued)

S.No.	The identified mechanism for livelihood resilience	S.N	livelihood recovery interventions initiated by the government institution	Source/s
14	Enhancing the adaptive capacity of the resettled villagers (Alinovi et al., 2009; Liu et al., 2020b; Nasrnia & Ashktorab, 2021)	14.1	Utilizing the available resources	Frankenberger and Mccaston (1998), Mondal et al., (2021), Rakodi (1999)
		14.2	Utilizing individuals' skills and past experiences	Gyawali et al., (2020)
		14.3	Ability to acquire new knowledge	Mondal et al., (2021)
		14.4	Participation in external opportunities	Donnell (2006), Lawther (2016)
		14.5	Strengthening of self-help groups (SHGs)	Gyawali et al., (2020), Régnier et al., (2008)
		14.6	Other community-based organizations (CBOs)	Mondal et al., (2021), Perera (2014)
		14.7	The time limit of the proposal	Mondal et al., (2021), Perera (2014), Rakodi (1999), Saeed Khan (2019), Tafti and Tomlinson (2015)
15	Long-term approaches that the government can adapt to achieve sustainability (environmental, economic, and social) through displacement and resettlement projects (Alinovi et al., 2010; Nasrnia & Ashktorab, 2021; Singh et al., 2021)	15.1	Enforcement policies toward sustainable use of natural resources	Donnell (2006), Gyawali et al., (2020), Rakodi (1999)
		15.2	Intensified human capacity development (skill development)	Gyawali et al., (2020), Liu et al., (2020a), Saeed Khan (2019)
		15.3	Investment in post-settlement welfare and benefit-sharing measures	Lawther (2016), Perera (2014)
		15.4	Providing proper educational facilities for the children (affordable education)	Donnell (2006), Liu et al., (2020a)
		15.5	Providing proper health care facilities (affordable health care)	Baffoe and Matsuda (2018), (Díaz-montenegro et al., 2018), Rakodi (1999), FGD
		15.6	Proper handling and targeting of marginalized households	Mondal et al., (2021), Saeed Khan (2019)

2.1.4 Questionnaire development

The identified livelihood resilience mechanisms were utilized in the format of questions, and specific LRIs were provided as the option to attain resilience through the consensus of the experts. The questionnaire was transformed into a web-based platform and written in English. The questionnaire was designed on a 5-point Likert scale (5—strongly agree to 1—strongly disagree) to attain the agreement of the experts. The questionnaire was pilot-tested by three local experts for clarity and consistency and then updated as per their advice. After selecting the list of LRIs and mechanisms, the designed questionnaire was sent to the experts, inviting their opinions through the Delphi technique and ensuring more add-ons from the experts.

2.2 The DELPHI technique

The Delphi technique is a systematic way of acquiring and collecting detailed opinions from a group of experts on a specific area of study (Heiko, 2012). This technique allows the participation of geographically distant specialists in the process and increases the external validity of the scenarios (Perveen et al., 2017). Delphi assures expert anonymity, which ensures that the results are not biased due to the dominance of a particular group or individual. Rather than depending on the opinion of a single expert, the group consensus approach is more reliable, as ascertained by the researchers (Chakraborty & Mishra, 2013).

The primary objective of this step of the research process was to take opinions from the experts to harness and strengthen the identified recovery interventions. The identified interventions are legitimized and critically reviewed to ensure that they reflect a varied range of perspectives on livelihood resilience during the pandemic (COVID-19); with the advancement of computer-based communication technologies, Delphi offered significant potential for enhancing consensus-building (Perveen et al., 2017).

2.2.1 Identification of experts for the Delphi technique

In a Delphi technique, identifying relevant experts is critical for getting a comprehensive cross-sectoral opinion on the relevance of interventions (Perveen et al., 2017). Previous research (Anisurrahman & Alshuwaikhat, 2019) has emphasized integrating a comprehensive array of opinions to minimize deceptive consensus amongst like-minded specialists. Experts from various cognitive and functional backgrounds help to determine the broad spectrum of opinion to understand varied perceptions in evaluating the interventions.

A thorough review of professional profiles was conducted to compile a list of Indian experts from the academic and professional disciplines of the relevant field. Thirty-two experts were identified and divided into four categories: architect practitioners, planner practitioners, academicians and planners, and other related professionals (geographers, sociologists, economists, and psychologists) who have already worked in the field. This study mainly focused on the Nava Raipur region and its surroundings to ensure that people have adequate contextual information about the region: West Bengal, Odisha, Chhattisgarh, Jharkhand, and Madhya-Pradesh. A comprehensive collection of information and opinions from a multidisciplinary expert panel improved the outcome of the Delphi. Experts were invited to participate in the online survey from October to April 2021–2022. Reminders

were sent to the invited experts three times to complete the survey. A higher rate of experts' participation from diverse expertise and knowledge provided valuable input and critical insight into the selection process.

2.2.2 Data collection procedure for the Delphi technique

The Delphi was conducted in three rounds. A web-based questionnaire was sent to the thirty-two experts through their e-mails and text communication apps. The round-1 questionnaire was sent in October 2021. One week later, experts received a request e-mail to complete the form. After three reminders till December 2021, twenty-two of thirty-two experts responded positively for round-1, yielding a 71% response rate. The analyzed questionnaire of round-1 with results was again sent to the 23 experts who responded in round-1 in January 2022. After analyzing the responses of the first and second rounds, the third round of questionnaires was sent again in March 2022. In each round of Delphi, experts were given 3 weeks to complete the questionnaire and modify their earlier opinions based on the results of previous rounds. Experts who did not respond received request reminders to attain a 100% response rate for the second and third rounds.

2.2.3 Delphi round-1

For round-1, experts were invited to give their preference on identified recovery interventions (from the literature and field study) on a five-point Likert scale and their suggestions for inclusion in the list of LRIs (Table 3). For suggestions, open text box questions were provided as 'Any other (Please Specify)' in round-1.

2.2.4 Delphi round-2

The twenty-three experts who responded positively in round-1 were requested to participate again in round-2 of Delphi. A revised questionnaire containing additional LRIs, identified from round-1, as 'social infrastructure like schools, health facilities', 'relation between the local level policy implementation and mainstream Government policy,' 'involvement of women in education sectors', 'better regional connectivity and market link', 'strong financial institutions', etc. (Table 4), was sent to the experts. Experts were

Table 3 Example questionnaire format for Round-1 Delphi technique

1. In the case of resettlement, which aspects can motivate people to leave their places?		Opinion				
		Strongly agree				Strongly disagree
		5	4	3	2	1
1.1	Financial Compensation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.2	Land Compensation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.3	Material compensation (house, shop, agricultural tool)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.4	Awareness program (regarding clear knowledge about the development project and benefits to future generations)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.5	If you have any other suggestions, please specify					

Table 4 Example questionnaire format for Round-2 Delphi technique (Suggestions from round-1 added in the questionnaire)

1. In the case of resettlement, which aspects can motivate people to leave their places?			Opinion					
			Strongly Agree ←					→ Strongly Disagree
			5	4	3	2	1	
1.1	Financial Compensation	The preferred option for Round 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Results of first round %	39%	48%	4%	4%	4%	
1.2	Land Compensation	A preferred option for Round 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Results of first round %	48%	43%	4%	0%	4%	
1.3	Material compensation (house, shop, agricultural tool)	A preferred option for Round 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Results of first round %	30%	52%	9%	9%	0%	
1.4	Awareness program (regarding clear knowledge about the development project and benefits to future generations)	A preferred option for Round 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Results of first round %	13%	48%	26%	4%	9%	
1.5	Providing new Job opportunities*	A preferred option for Round 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

*The bold texted cell represents the additional interventions from the round-1 Delphi result.

asked to assess the significance of the seventy-three LRIs for livelihood resilience mechanisms along with seventeen new LRIs identified from round-1. The round-2 data analysis necessitates one more round of the Delphi to validate and authenticate the obtained LRIs to attain livelihood resilience.

2.2.5 Delphi round-3

The questionnaire for Delphi round-3 contained the result of round-2 (Table 5). Each participant was asked again to complete the questionnaire on a 5-point Likert scale.

2.3 Data analysis procedure

Data collected in each round were analyzed to summarise the ratings and suggestions for appropriate LRIs for livelihood resilience. The analysis was done for each round of Delphi by using SPSS version 24. The median score for consensus was identified for each round as suggested by the researchers (Muhuri & Basu, 2018; Perveen et al., 2017), and the amount of dispersion on the rating was calculated using an interquartile range (Hasson et al., 2000; Schuckmann et al., 2012). We have selected an LRI; if the median value was more than or equal to 4 (Baumfield et al., 2012), the interquartile range (IQR) was less than 2.5 (Giannarou & Zervas, 2014). The percentage of preference in the top two bands (rank '4' and rank '5') was equal to or greater than 70 as an aggregated average preference after round-3 (Muhuri & Basu, 2018; Verhagen et al., 1998). However, before achieving consensus, a pairwise comparison was conducted. The step-by-step procedure for the Delphi technique for experts' opinions and consensus built-up is shown in Fig. 2.

Table 5 Example questionnaire format for Round-3 Delphi technique

1. In the case of resettlement, which aspects can motivate people to leave their places?			Opinion				
			Strongly Agree	←————→			Strongly Disagree
			5	4	3	2	1
1.1	Financial Compensation	A preferred option for Round 3	○	○	○	○	○
		Results of first round %	39%	48%	4%	4%	4%
		Results of second round %	52%	35%	9%	4%	0%
1.2	Land Compensation	A preferred option for Round 3	○	○	○	○	○
		Results of first round %	48%	43%	4%	0%	4%
		Results of second round %	57%	35%	4%	4%	0%
1.3	Material compensation (house, shop, agricultural tool)	A preferred option for Round 3	○	○	○	○	○
		Results of first round %	30%	52%	9%	9%	0%
		Results of second round %	48%	26%	13%	4%	9%
1.4	Awareness program (regarding clear knowledge about the development project and benefits to future generations)	A preferred option for Round 3	○	○	○	○	○
		Results of first round %	13%	48%	26%	4%	9%
		Results of second round %	13%	61%	13%	9%	4%
1.5	Providing new Job opportunities*	A preferred option for Round 3	○	○	○	○	○
		Results of second round %	39%	43%	13%	4%	0%

*The bold texted cell represents the additional interventions from the round-1 Delphi result.

2.3.1 Pairwise comparison and validation of data

Before the inferential statistical tests, Kolmogorov–Smirnov and Shapiro–Wilk tests were performed to test the normal distribution of the data set (Cleff & Cleff, 2014). Since the obtained data were not normal, the Wilcoxon Paired Signed Rank Test was performed to identify (i) the difference between opinions of round-1 and round-2 and (ii) between round-2 and round-3 (Table 6).

With reference to Carbno (2007; pp. 691), differences between opinions in various rounds were considered significant when the probability measure was below 5%, i.e. p value < 0.05 . Table 6 represents the example result; out of eighty-six LRIs, eight resulted in a significant difference ($p < 0.05$) between the experts' opinions in round-1 and round-2. Further, for round-2 and round-3, only three LRIs resulted in significant differences in experts' opinions for each LRI.

Although there are significant differences in experts' opinions between round-2 and round-3 at the individual level, as expected, there is not much difference in the variable-wise opinion of experts, as shown in Table 6. Henceforth, no successive round of Delphi was conducted to build consensus.

2.3.2 Consensus built-up

Table 7 provides an overview of obtained results from the descriptive analysis (Median, IQR, and aggregate preference percentage) from the agreement level responded by the experts in each round of the Delphi.

The experts rated eighty-six livelihood recovery interventions (LRIs) listed under fifteen livelihood resilience mechanisms in the final round of Delphi. According to the consensus criteria in round-1, round-2, and round-3, none of the interventions achieved the strongly agreed consensus level (rank '5'). Since outcome variations were observed across

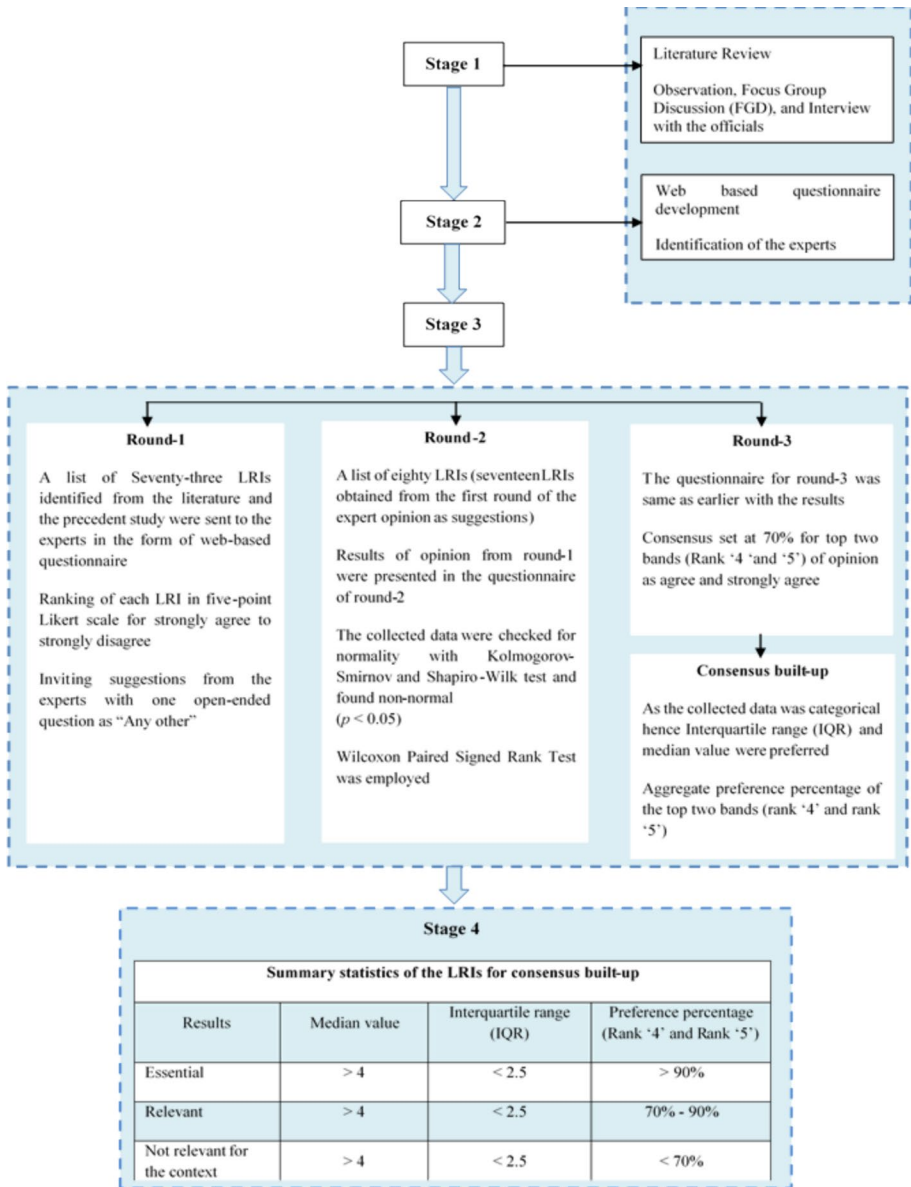


Fig. 2 Step-by-step procedure of the Delphi Technique

rounds, the aggregate preference percentage was used to calculate the final selection results (rank '4' and rank '5'). Thirty-one LRIs have been found to have more than 90% average aggregate preference percentage in three rounds and thus can be considered as the essential interventions (Coloured cells in Table 7). Four LRIs were considered not relevant for this case as they did not fulfil the consensus criteria (average aggregate preference percentage is less than 70%).

Table 6 Example results of the Wilcoxon paired rank test (Z- test) for round-1 versus round-2 and round-2 versus round-3

Question asked to the expert	Round-1 versus round-2		Round-2 versus round-3	
	Z	p value	Z	p value
Que. 4- Additional facilities to reduce the outmigration of the resettlers' from the resettlement area				
q4.1	Provision of convenience stores or government stores for basic day-to-day requirements	-2.121 ^c	0.034*	0.593
q4.2	Small industry development	-1.732 ^c	0.083	0.782
q4.3	Maintenance of the basic infrastructure facilities (house, safe drinking water, toilet, etc)	-3.000 ^c	0.003*	0.617
q4.4	Social infrastructures like schools and health facilities	-	-	0.763
q4.5	Mobility and connectivity with working places	-	-	1.357 ^b
Que. 5- How to handle the resistance/ protest created by the villagers or any community leaders during displacement caused by the development project?				
q5.1	Involvement of intermediate institution or NGO during grievance redressal	-1.897 ^c	0.058	0.762
q5.2	Participation of the villagers during policy-making and implementation of the project	-0.832 ^b	0.405	0.449
q5.3	Consent of the majority of the villagers at the beginning of the resettlement project	-0.277 ^c	0.782	1.000
q5.4	Enhancing material and financial compensation	-1.903 ^c	0.057	0.796
q5.5	Benefits caused by resettlement should be promoted	-	-	1.547 ^b
Que. 6- What would be the strategies for empowering the rural people so that they can actively participate in the implementation of the development project?				
q6.1	Campaigning	-2.121 ^c	0.034*	0.763
q6.2	Door-to-door information	-1.000 ^b	0.317	0.020*
q6.3	Social group (self-help group)	-0.832 ^c	0.405	0.822
q6.4	Strong local leadership	-0.333 ^b	0.739	0.035*
q6.5	Appointing a coordinator	0.000 ^d	1.000	0.813
q6.6	Relation between the local level policy implementation and mainstream Government policy	-	-	0.805
Que. 7- How to empower women in the new resettlement area provided by the government?				
q7.1	Capacity building (skill development, improving the education level)	-2.530 ^c	0.011*	0.782
q7.2	Information regarding the legal and judicial support	-0.471 ^c	0.637	1.000
q7.3	Formation of social groups	-0.905 ^c	0.366	0.499
q7.4	Appointing a counsellors	-01.184 ^e	0.236	0.869
q7.5	School scholarships to educate women	-	-	0.439

Table 6 (continued)

Question asked to the expert	Round-1 versus round-2		Round-2 versus round-3	
	Z	p value	Z	p value
q7.6 Involvement of women in education sectors	-	-	-1.155 ^c	0.248
q7.7 Job opportunities through SHGs	-	-	-1.994 ^b	0.046*

*Bold value represents the significant difference ($p < 0.05$) in variable-wise expert's opinion

Table 7 Example results of analysis of round-1, round-2, and round-3 Delphi

No.	The identified mechanism for livelihood resilience	Livelihood recovery interventions (multiple choice question from strongly disagree -1 to strongly agree +5)	Median			Interquartile range			Aggregate Preference percentage in the top two bands (Rank '4' and Rank '5')			Average Aggregate preference %	Remark
			Round-1	Round-2	Round-3	Round-1	Round-2	Round-3	Round-1	Round-2	Round-3		
1	The aspects that can motivate people to leave their places	1.1 Financial Compensation	4	5	4	1	1	1	87	87	87	87	Relevant
		1.2 Land Compensation	4	5	5	1	1	1	91	91	87	90	Essential
		1.3 Material compensation (house, shop, agricultural tool)	4	4	4	1	2	2	83	74	70	76	Relevant
		1.4 Awareness programme (regarding clear knowledge about the development project benefits to future generations)	4	4	4	1	1	2	61	74	74	70	Relevant
		1.5 Providing new Job opportunities	–	4	4	–	1	1	–	83	83	83	Relevant
2	Wise -w in solutions for institutions and people associated with a resettlement project.	2.1 Informative approach (clear knowledge of the project before resettlement)	5	4	4	1	1	1	96	91	91	93	Essential
		2.2 Participation of the resettlers (throughout the implementation of the project)	4	4	4	1	1	1	96	78	83	86	Relevant
		2.3 Bottom-up approach (Considering the opinion of the people when the implementation strategies are formulated)	4	4	4	1	2	1	78	74	78	77	Relevant
		2.4 Top-down approach (when implementation strategies are directly implemented on the people based on field knowledge)	4	4	3	2	1	1	65	52	43	53	Not relevant to the context
		2.5 Positive coordination between villagers and institutions with time-to-time grievance redressal	5	5	4	1	1	0	100	96	96	97	Essential
3	Reason structing the social life of the affected families	3.1 Low rise high- density buildings around a courtyard	4	4	3	2	1	1	65	57	48	57	Not relevant to the context
		3.2 Not more than 20 families in close proximity	4	4	3	2	1	1	70	57	48	59	Not relevant to the context
		3.3 Community centre (for enhancing social activities)	4	4	4	1	1	1	91	96	96	94	Essential
		3.4 Open ground (multi-purpose and religious gathering places)	5	4	4	1	1	1	96	87	91	91	Essential
		3.5 Enhancing the recreational activities	4	4	4	1	1	0.5	87	87	100	91	Essential
		3.6 Rural infrastructure development/ regional connectivity	–	4	4	–	1	0	–	91	87	89	Relevant
		3.7 Community Participation in revenue generation	–	4	4	–	1	0.5	–	83	83	83	Relevant
4	Additional facilities to reduce the outmigration of the resettlers	4.1 Provision of convenience stores or government stores for basic day-to-day requirements	4	4	4	1	0	0	100	87	96	94	Essential
		4.2 Small industry development	4	4	4	1	1	0	91	87	91	90	Essential
		4.3 Maintenance of the basic infrastructure facilities (house, safe drinking water, toilet, etc.)	5	4	4	1	1	1	100	87	87	91	Essential
		4.4 Social infrastructure like schools, health facility	–	5	5	–	1	1	–	96	96	96	Essential
		4.5 Mobility and connectivity with working places	–	4	4	–	1	1	–	96	78	87	Relevant
5	Handling resistance/ protest created by the villagers or community leaders during the project	5.1 Involvement of intermediate institution or NGO during grievance redressal	4	4	4	0	1	0	87	74	83	81	Relevant
		5.2 Participation of the villagers during policy-making and implementation of the project	4	4	4	1	1	1	91	87	87	88	Relevant
		5.3 Consent of the majority of the villagers at the beginning of the resettlement project.	4	4	4	1	1	1	91	91	96	93	Essential
		5.4 Enhancing material and financial compensation	5	4	4	1	1	1	91	78	87	86	Relevant
		5.5 Benefits caused by resettlement should be promoted	–	4	4	–	1	0	–	91	78	85	Relevant
6	Empowering the people in rural areas for their active participation in the implementation of the development project	6.1 Campaigning	4	4	4	1	0	0	87	91	83	87	Relevant
		6.2 Door-to-door information	4	4	4	1	1	0	91	100	91	94	Essential
		6.3 Social group (self-help group)	4	4	4	1	1	0	100	83	87	90	Essential
		6.4 Strong local leadership	4	4	4	1	1	0	100	100	91	97	Essential
		6.5 Appointing coordinators	4	4	4	1	1	0	87	87	91	88	Relevant
		6.6 Relation between the local level policy implementation and mainstream Government policy	–	4	4	–	1	0	–	87	96	91	Essential
7	Empowering women in new resettlement areas provided by the government	7.1 Capacity building (skill development, improving education level)	5	4	4	1	1	1	100	96	96	97	Essential
		7.2 Information regarding the legal and judicial support	4	4	4	1	1	1	87	87	87	87	Relevant
		7.3 Formation of social groups	4	4	4	1	1	0	96	91	91	93	Essential
		7.4 Appointing counsellors	4	4	4	1	0	0	87	87	87	87	Relevant
		7.5 School Scholarship to educate women	–	4	4	–	1	1	–	96	83	89	Relevant
		7.6 Involvement of women in education sectors	–	4	4	–	1	1	–	91	100	96	Essential
		7.7 Job opportunities through SHGs	–	5	4	–	1	1	–	96	78	87	Relevant

3 Results and discussion

3.1 The outcome of the study

This study employed the Delphi technique to identify the essential LRIs to attain livelihood resilience in an Indian context. Out of eighty-six, thirty-one LRIs were identified as essential, with more than 90% aggregated preference. These LRIs must be prioritized during planned urban development projects. Table 8 represents the essential livelihood recovery interventions for livelihood resilience from the consensus of the experts.

Table 7 (continued)

No.	The identified mechanism for livelihood resilience	Livelihood recovery interventions (multiple choice question from strongly disagree -1 to strongly agree -5)	Median			Interquartile range			Aggregate Preference percentage in the top two bands (Rank '4' and Rank '5')			Average aggregate preference %	Remark	
			Round-1	Round-2	Round-3	Round-1	Round-2	Round-3	Round-1	Round-2	Round-3			
8	Motivating the children in their studies after the disruption caused by the development project	8.1 Campaigning	4	4	4	1	0	0	87	87	87	87	87	Relevant
		8.2 Door-to-door information	4	4	4	1	1	1	87	96	91	91	81	Essential
		8.3 Relief in school fees	4	4	4	1	1	2	96	83	74	84	84	Relevant
		8.4 Provision of Subsidies for admission to school	4	4	4	1	1	0.5	96	83	87		88	Relevant
		8.5 Appointing a coordinator for being in continuous touch with children and their parents	4	4	4	0	1	0	87	87	96	90		Essential
9	Enhancing the occupational skills of resettlers	9.1 Campaigning	4	4	4	0	0	1	87	87	74		83	Relevant
		9.2 Door-to-door information	4	4	4	1	0	0	91	87	87		88	Relevant
		9.3 Engaging resettlers in various localized activities	4	4	4	1	1	1	96	96	87		93	Essential
		9.4 Local government support for engaging resettlers in alternative options of their skill	4	4	4	1	1	1	96	83	87		88	Relevant
		9.5 Social group	4	4	4	0	0	0	87	78	78		81	Relevant
		9.6 Strong local leadership	4	4	4	1	1	0	87	83	87		86	Relevant
		9.7 Appointing coordinator	4	4	4	1	0	0	96	78	78		84	Relevant
10	Agricultural development and intensification for resettlers	10.1 Relocation near farmland where cultivation is possible	4	4	4	1	0	0.5	91	87	91		90	Relevant
		10.2 Provisions for new tools and technique	4	4	4	1	1	0	100	91	91		94	Essential
		10.3 To facilitate purchasing new agricultural land	4	4	4	1	0	0	78	78	83		80	Relevant
		10.4 Provide irrigation facilities and raw materials at subsidized rates	-	4	4	-	1	1	-	87	83		85	Relevant
		10.5 Better regional connectivity and market link	-	4	4	-	1	1	-	91	91		91	Essential
		11.1 Investment idea and support	4	4	4	1	0	0	91	78	87		86	Relevant
		11.2 Loan facilities with subsidies	4	4	4	1	1	1	87	91	100		93	Essential
		11.3 Money lending facilities	4	4	4	0	0	0	78	83	83		81	Relevant
		11.4 Institutions with cross-subsidy benefits	-	4	4	-	0	0	-	87	87		87	Relevant
		11.5 Microcredit	-	4	4	-	1	0	-	87	78		83	Relevant
12	Mediators that can help the affected families cope with the changing scenario	12.1 Non-government organizations (NGO)	4	4	4	0	0	0	87	83	87		86	Relevant
		12.2 Local level specific team	4	4	4	1	1	0	87	87	83		86	Relevant
		12.3 Educational and extension groups	4	4	4	1	0	0	83	87	83		86	Relevant
		12.4 Cooperative	4	4	4	0	1	0	78	78	78		78	Relevant
		12.5 Vocational schools	4	4	4	1	1	0	87	87	87		87	Relevant
		12.6 Appointment of Anthropologist as a counsellor	-	4	4	-	2	1	-	57	52	55		
13	The aspects for formulated teams/organizations/NGOs can be helpful for resettled villagers.	13.1 Nurturing community participation	4	4	4	1	1	0	87	87	91		88	Relevant
		13.2 Delivering benefits provided by the institution more efficiently	4	4	4	0	1	0	83	91	91		88	Relevant
		13.3 Serve as the link between the resettlers and the institution	4	4	4	1	2	0	87	74	78		80	Relevant
		13.4 Instruments of capacity-building	4	4	4	0	0	1	96	78	83		86	Relevant
		13.5 Social capital formation	4	4	4	2	0	1	74	78	91		81	Relevant
		13.6 Offering collective awareness programmes	4	4	4	1	0	0	87	87	87		87	Relevant
		13.7 Formation of Mobilisation Strategies	4	4	4	0	0	0	83	87	78		83	Relevant
14	Enhancing the adaptive capacity of the resettled villagers	14.1 Utilizing the available resources	4	4	4	1	1	1	100	96	96		97	Essential
		14.2 Utilizing individuals' skills and past experiences	4	4	4	1	1	1	96	96	91		94	Essential
		14.3 Ability to acquire new knowledge	4	4	4	1	1	0	87	83	83		84	Relevant
		14.4 Participation in external opportunities	4	4	4	1	0	0.5	83	78	83		81	Relevant
		14.5 Strengthening of SHGs	4	4	4	1	0	0.5	91	78	87		86	Relevant
		14.6 Other community-based organizations (CBOs)	4	4	4	0	1	1	91	74	70		78	Relevant
		14.7 The time limit of the proposal	4	4	4	1	0	0	74	78	83		78	Relevant
15	Long-term strategies that the government can adopt to achieve sustainability (environmental, economic, and social) through displacement and resettlement projects	15.1 Enforcement policies toward sustainable use of natural resources	5	4	4	1	1	1	100	96	96		97	Essential
		15.2 Intensified and sustained on human capacity development (skill development)	4	4	4	1	0	0	87	96	96		93	Essential
		15.3 Investment in post-settlement welfare and benefit-sharing measures	4	4	4	1	1	0.5	87	74	96		86	Relevant
		15.4 Providing proper educational facilities for the children (affordable education)	5	5	4	1	1	1	96	96	100		97	Essential
		15.5 Providing proper health care facility (affordable health care)	5	5	5	1	1	1	96	96	100		97	Essential
		15.6 handling and Targeting the marginalized households	4	4	4	1	1	0.5	91	87	87		88	Relevant
		15.7 Strong financial institutions	-	4	4	-	1	0.5	-	87	96		91	Essential

LRIs gained the consensus of more than 90% in aggregated preferences

Bold value cells represent the LRIs that have not been selected

For example, the ‘Informative approach (clear knowledge of the project before resettlement)’ and ‘positive coordination between villagers and institution with time-to-time grievance redressal’ are found to be the essential interventions for the win-win solution. Perera (2014) also identified similar requirements of formal grievance redressal mechanisms for affected people and their participation in converting the disaster into an opportunity. Further, Gyawali et al. (2020) highlighted that the participation of stakeholders in the reconstruction and livelihood intervention processes is essential for sustaining livelihood recovery. We have identified that the ‘consent of the majority of the villagers at the beginning of the resettlement project;’ is the essential intervention to handle the resistance/protest created by the villagers or any community leaders during displacement. However, the ‘top-down approach’ mentioned by the officials during interviews was not selected by the experts as an essential intervention for win-win solutions. Although the ‘top-down

Table 8 Essential livelihood recovery interventions for livelihood resilience

No.	The identified mechanism for livelihood resilience	Livelihood recovery interventions	Average aggregate preference %
1	The aspects that can motivate people to leave their places	Land Compensation	90
2	Win-win solutions for institutions and people associated with a resettlement project	Informative approach (explicit knowledge of the project before resettlement) Positive coordination between villagers and institutions with time-to-time grievance redressal	93 97
3	Reconstructing the social life of the affected families	Community centre (for enhancing social activities) Open ground (multi-purpose and religious gathering places) Enhancing the recreational activities	94 91 91
4	Additional facilities to reduce the outmigration of the resettlers	Provision of convenience stores or government stores for basic day-to-day requirements Small industry development Maintenance of the basic infrastructural facilities (house, safe drinking water, toilet, etc.)	94 90 91
5	Handling resistance/protest created by the villagers or community leaders during the project	Social infrastructure like school health facility Consent of the majority of the villagers at the beginning of the resettlement project	96 93
6	Empowering the people in rural areas for their active participation in the implementation of the development project	Door-to-door information Social group (self-help group) Strong local leadership	94 90 97
7	Empowering women in new resettlement areas provided by the government	Relation between the local level policy implementation and mainstream Government policy Capacity building (skill development, improving education level) Formation of social groups	91 97 93
8	Motivating the children in their studies after the disruption caused by the development project	Involvement of women in education sectors Door-to-door information Appointing a coordinator for being in continuous touch with children and their parents	96 91 90

Table 8 (continued)

No.	The identified mechanism for livelihood resilience	Livelihood recovery interventions	Average aggregate preference %
9	Enhancing the occupational skills of resettlers	Engaging resettlers in various localized activities	93
10	Agricultural development and intensification for resettlers	Provisions for new tools and techniques for agricultural activities	94
11	Financial management, adapted by the institutions for the resettlers	Better regional connectivity and market link	91
14	Enhancing the adaptive capacity of the resettled villagers	Loan facilities with subsidies	93
		Utilizing the available resources	97
		Utilizing individuals' skills and past experiences	94
15	Long-term strategies that the government can adapt to achieve sustainability (environmental, economic, and social) through displacement and resettlement projects	Enforcement policies toward sustainable use of natural resources	97
		Intensified and sustained human capacity development (skill development)	93
		Providing proper educational facilities for the children (affordable education)	97
		Providing proper health care facilities (affordable health care)	97
		Strong financial institutions	91

approach' (when implementation strategies are directly implemented on the people based on field knowledge) is easily applicable from the official point of view, that may lead to conflict if the opinions of the stakeholders are not considered.

Some LRIs for reconstructing social life, such as 'community centre' (for enhancing social activities), 'open ground' (multi-purpose and religious gathering places)', and 'enhancing the recreational activities', were found relevant; yet none of the interventions were found essential in this case. In this connection, Baffoe et al. (2021) argued that social networks help increase employment opportunities and mitigate financial constraints in rural areas. The contrasting result of this research may be because the places of resettlement are nearby (within a distance of 2 km. in our case) from the original place of displacement. Further, the sense of community has not been disrupted because of a large number of people resettling together.

Another mechanism for livelihood resilience, reduction in outmigration of the resettlers, can be achieved through some essential LRIs like 'provision of the convenience store or government stores for day to day basic requirements', 'small industry development', 'maintenance of the basic infrastructure facilities (house, safe drinking water, toilet, etc.)', and 'social infrastructure like school, health facility'. It implies better employment opportunities at the resettlement site, decreases migration to urban centres, improves household incomes, and enhances household livelihood resilience (Nasrnia & Ashktorab, 2021).

Empowerment of people in rural areas is an important and relevant way to attain livelihood resilience (Pandey et al., 2018). In this line, our research found that 'Skill development and improving education level', 'formation of social groups', like earlier research (Gyawali et al., 2020; Joakim & Wismer, 2015; Régnier et al., 2008) and 'involvement of women in education sectors' as a contextual LRI obtained from experts suggestions, are the essential recovery interventions for empowering women in resettlement sites. While actively providing training and financial resources, participatory groups can help improve economic conditions and promote gender equity (Gyawali et al., 2020). 'Door-to-door information', 'strong local leadership', 'social group (self-help group)', and 'relation between the local level policy implementation and mainstream Government policy' can empower the rural people. In this connection, FGD with the resettlers also reported that the power in the hand of the '*Sarpanch*' or local leadership might understand them better and fulfil their requirements. Hence, Saeed Khan (2019) recommends that local interests and leadership of recovery initiatives be supported and encouraged for development policy and practice to be effective.

Moreover, to motivate the children for their studies after resettlement, 'appointing a coordinator/councillor (observation) to be in continuous touch with the children and their parents' and 'door-to-door information' is essential. The field observation and FGD revealed that the affected people do not have accurate information regarding government initiatives due to a lack of education; hence, a coordinator is required to provide accurate information. Further, we found that the lack of information among the resettles and demand for the requirement of 'information regarding the legal and judicial support, and 'awareness program' (regarding explicit knowledge about the development project and benefits to future generations) is an essential livelihood intervention for livelihood resilience (Perera, 2014; Régnier et al., 2008).

For financial management, 'loan facilities with subsidies' can be beneficial, and thus, it is an essential intervention. In this connection, Gyawali et al. (2020) highlighted that financial support through loan programs plays a significant role in livelihood resilience and advancement. Moreover, researchers (Quandt, 2018; Tran, 2017; Yang et al., 2018) mentioned 'agricultural development and intensification for resettlers as one livelihood

resilience mechanism that can be achieved through ‘provisions for new tools and techniques’ and ‘better regional connectivity and market link’; these interventions are essential even in our case. One of the participants in FGD mentioned that “*the Government has taken all of our agricultural land; we do not know what to do, where to go, and how to feed our family.*” Another participant elaborates, “*We only know farming, but now we do not have any work.*” Therefore, ‘New tools and techniques for farming in urban areas will help them continue their agriculture practices and essential food requirements.

Additionally, for livelihood resilience, there are requirements of mediators, namely non-government organizations (NGO), local-level specific teams, educational and extension groups, and cooperative and vocational schools, that can help the affected families cope with the changing scenario of displacement and resettlement identified by various researchers (Nasrnia & Ashktorab, 2021; Singh et al., 2021), yet none of these are found essential in this case. This result may come from fear of delay in the development and implementation of the project, employing more mediators.

To enhance the adaptive capacity of the resettled villagers, ‘utilizing the available resources’ and ‘individual skills and past experiences’ are essential interventions. In this connection, Liu et al., (2020a, 2020b) found that households with professional skills, higher awareness, and greater information acquisition tend to shape livelihoods to be more resilient and make the affected people more adaptive. ‘Enforcement policies towards sustainable use of the natural resources,’ ‘provision of proper educational facilities for the children’ (currently the fee structure is not affordable for the resettlers), ‘health care facilities’ (affordable health care facilities), and ‘strong financial institution’ are the interventions associated with the long-term strategies the government can adopt for achieving sustainability. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (2013) highlights the basic infrastructural facilities like schools as per the provisions of the Right of Children to Free and Compulsory Education Act, 2009 (35 of 2009) in the resettlement site. However, the Nava Raipur Atal Nagar villages have inadequate schools. The children need to travel more than 5 km to schools, and the fee structure of the schools in urban areas is not affordable for the resettlers.

Besides the above-mentioned essential LRIs, four LRIs do not reach the consensus with an aggregate preference percentage of less than 70%, namely: ‘Low rise high-density buildings around a courtyard’, and ‘Not more than 20 families in close proximity for reconstructing the social life’. ‘Appointment of the anthropologist as a counsellor to cope with the changing scenario’, and ‘Top-down approach (when implementation strategies are directly implemented on the people based on field knowledge)’ for a win–win solution. The LRIs may not be relevant in this particular case, yet these can be applicable in other cases and validated through large samples.

3.2 Limitations and strengths of the study

One of the novelties of this paper is identifying the LRIs for the resettlers affected by urban development-induced rural displacement and resettlement projects through the Delphi technique. Although the Delphi technique helped identify honest opinions free from peer group pressure (Lewis et al., 1999), this study invested more than 7 months (October 2021–April 2022) in gaining expert opinions. Since Delphi is a qualitative method, this research depends on convenience sampling to choose experts from a case-specific region. Yet, the resulting expert sample was well balanced, chosen from four categories: architect practitioners, planner practitioners, academic planners, and other related planning

professionals. Rigorous search approaches and selection criteria were applied to reduce bias and clarify the selection of a final list of LRIs through multiple rounds of the expert survey. Despite that, more samples and cases can be identified in future for the generic application of the study.

3.3 The implication of the research

This research explores LRIs that can be adapted to attain livelihood resilience through an intense literature review and field study and validated and augmented through experts' opinions. The results of this study may help to formulate recovery interventions for a man-made disaster like urban development-induced rural displacement and resettlement, through which livelihood resilience of the affected people can be achieved. It would also be interesting to replicate the current studies in other parts of the world to determine whether specific interventions are universally relevant for achieving the livelihood resilience of people in rural areas for urban development projects.

4 Conclusions

This research contributes to the knowledge of livelihood resilience by identifying LRIs for urban development-induced rural displacement and resettlement. Seventy-three LRIs under fifteen questions as a mechanism for livelihood resilience were identified from the literature reviews, observation, FGD, and interviews with officials. The suitability of these LRIs was tested through a three-round Delphi technique involving experts from specific regions considering the context. The results provide valuable insights for planners, professionals, and policy-makers in formulating appropriate recovery interventions that can simplify the difficult process of sustainable urban development.

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Declarations

Conflict of interest The authors declared that they do not have any conflicts of interest.

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