RESEARCH PAPER

The Trifecta of Risks: Examining Migration Patterns in the Face of Disasters in Idukki District, Kerala, India

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ABSTRACT

Natural disasters threaten the well-being of people, their personal lives and even their social lives. The continued disaster creates economic, environmental and psychological issues among individuals and families. This study investigates the intricate relationships between economic, environmental, and psychological risks and their impacts on migration patterns in the Idukki District of Kerala, India. A primary sample survey was conducted using stratified random sampling among 312 participants from the three villages of Idukki District, namely Kanjikuzhi, Konnathady, and Rajakkad. The study was conducted from January 2022 to March 2022. The interrelationship between the variables (economic, environmental, and psychological risk) using the Multiple linear regression (MLR) model and Binary logistic regression are analysed to identify reasons behind the migration. The study is grounded in the push-pull theory of migration and the vicious cycle of poverty. Findings reveal that economic risks, particularly housing damage, are significant drivers of migration, alongside environmental challenges and psychological stress, particularly among vulnerable groups like women and older adults. Through the multiple linear regression model, the economic risk and environmental risk create a significant level of impact on psychological risk, and this causes a small ratio of migration and non-migration in the study area. By addressing these interconnected issues, policymakers can better respond to the complex dynamics of disaster risks and migration in vulnerable regions. This study enhances the understanding of environmental migration; future research should consider several aspects.

Keywords: Disaster, Risk, Migration, Economic Support, Environment, Mental Health.

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Introduction

The United Nations Office for Disaster Risk Reduction (UNDRR) defines disaster risk as the combination of hazard, exposure, vulnerability, and capacity, which forms the foundation of global policy frameworks such as the Sendai Framework for Disaster Risk Reduction, the World Health Organisations (WHO), Health Electronic Discovery Reference Model (EDRM) Framework, and the International Accounting Standards Committee (IASC) Technical Note on Linking Disaster Risk Reduction (DRR) and Mental Health and Psychosocial Support (MHPSS). This definition is widely accepted for understanding and realising risk from disaster (Reifels and Duckers, 2023). The World Risk Index understands the increasing threat of disaster, especially in conflict zones exacerbated by climate change. The intensity of multiple crises due to the disaster creates migration, displacement and scarcity of food, water relief supplies and fuels. The Philippines has been considered one of the most disastrous risk countries in the world. 2024 December risk index point mentioned that the country has a 9.7 out of 10 due to the earthquake and 9.4 due to the tsunami (Balita:2024). Indonesia, India, Colombia and Mexico followed closely and continued to present significant and high-intensity risk, (Hille,2024).

India has a 41.52 world risk index, as the Global Disaster Risk Index reported in 2023. In particular, the southern state of Kerala has a high risk due to the natural calamities during the monsoon period. The

ecologist Madav Gardil noted that the deterioration of the Western Ghats has reached critical points with increasing calamities in Kerala. The people who live in the Idukki district, part of the Western Ghats of Kerala, have an interactive relationship with the environment. The majority of them practiced agriculture, but now the same nature that used to depend on their livelihood is turning against them. Kokkayar landslide and Pettimudi landslide were examples. The continuous accidents during the monsoon time make Idukki one of the most disaster-risk-affected places in India (Benny:2024).

The frequency of disasters has extended, not only to the population but also to nature. At the same time, the biosphere around the region also started to suffer in the sense of deforestation, erosion, pollution, and losses of crops and livestock (Benny:2023). The material losses are part of a wide reality. On the other hand, people and families suffer a large number of mental issues like anxiety, worries, depression, etc. So, the people who reside in Idukki started to look for displacement and migration as one of their options.

With an understanding of the above facts, this research examines the intertwined issues of the economic environment and psychological risk and their impact on migration patterns in the disaster. Therefore, this study focused on three villagers in the Idukki district as the recent natural calamities have affected their understanding. This area of research offers a valuable vision of risk and migration caused by the disaster in the study area.

The natural disaster and its impact significantly involved personal risk and financial activities among the affected society. While insurance flood measuring can aid the recovery programme, they were less active in risk reduction previously. The problem of comprehensive preparedness, which involves the economy or the environment, psychology, or behaviour, is increasingly being appreciated. With this in mind, the study seeks; i) to consider the economic, environmental and psychological threats of the vulnerable group, ii) the patterns of migration and iii) out of which age group was the most stressed out after the disaster.

Methodology

The research employs a three-stage sampling procedure to explore the intertwined issues of economic, environmental, and psychological risks influencing migration patterns in the Idukki District of Kerala. Initially, a multistage sampling strategy was used to narrow the focus to three significantly affected villages—Kanjikuzhi, Konnathady, and Rajakkad—in the Idukki district, where primary data was collected through stratified random and simple random sampling selection. The study has designed and used a well-structured interview schedule. A total of 312 respondents is surveyed to ensure diverse representation from each village. The study seeks to address the issue through a two-step approach. In the first phase, it aims to establish the existence of economic and environmental risks concerning psychological risk. This model is applied to examine the associations with independent variables like economic risk, environmental risk and single dependent variable (psychological risk). Therefore, a multiple linear regression model was applied here, the model is specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_n X_n + \varepsilon$$

Y = dependent variable (outcome), β0 = intercept or constant term, β1, β2… βn = coefficients for each independent variable, X1, X2…Xn = independent variables (predictors), ε = error term (residuals). Based on the independent variables, multiple linear regression may therefore be expressed as follows for each risk stage.

a) Economic risk

The economic risk is estimated by using the multiple linear regression model as given below.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$$

Economic risk **(Y)** is the dependent variable in the model, determined by several explanatory factors. β_0 represented the constant term, while the key variables are denoted economic risk, which is defined as the per capita income loss (β_1), per capita expenditure loss (β_2), total loss from agriculture (β_3) and income loss due to the man-day loss (β_4). Together these parameters provide a holistic approach for examining the economic risks posed by disasters in the study area.

b) Environmental risk

The model used to calculate environmental risk is as follows.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$$

Environmental risk (Y) represents the dependent variable depending on the following independent variables, that is type of pollution (β_1), soil quality after the disaster (β_2), and number of trees washed out

from the property (β_3). These independent variables are collaborated and provide environmental risks associated with disaster.

c) Psychological risk

Psychological risk is estimated by following the model.

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2}$$

Psychological risk **(Y)** is denoted as the dependent variable in the model, which is the result of two explaining elements. Among these β_1 mentions environmental risk, while β_2 denotes economic risks. Together these variables help to analyse how combined environmental and economic challenges contribute to psychological risks in disaster-affected populations.

Secondly, the study employs a binary logistic regression model to detect the risk factors that contribute to the probability of migration and interpret the results through odds ratios. The model is specified as:

$$\mathbf{P(Z=1) = 1 / (1 + e^{(-z)})}$$

P (=1) = probability of success (outcome Z=1), e = base of natural logarithm (approximately 2.718),

$$\mathbf{Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6}$$

In the equation, migration is represented by the dependent variable (Z), whereas the constant term is represented by β_0. There are six parameters in this concept; β_1 represents economic risk encountered during the calamity, β_2 denotes the environmental risk encountered during the calamity, and β_3 represents the psychological risk encountered during the calamity. Other parameters include a measure of the economic loss sustained after the catastrophe, which is designated as β_4, the environmental risk after the disaster is reflected by β_5, while those before and during the disaster are represented by β_6, which is the psychological risk encountered after the disaster. Together, these parameters are expected to explain the changes in the migration rate.

Hence, the study utilises the multiplier regression model and binary regression model to quantitatively access the relationship between the identified risk and migration behaviour. This approach enables a clear understanding of how economic conditions, environmental challenges and psychological stressors converge to affect decisions related to relocation. By applying these statistical tools, the research aims to derive meaningful patterns and insights that can inform policies aimed at enhancing resilience and guiding migration strategies in a disaster-prone area.

Results and Discussion

In this study area, between 42 per cent and 57 per cent of household samples are above the poverty line and below the poverty line. Similarly, 76 per cent of respondents identified agriculture as their primary source of income. Geographically, this region is characterized by its sloped terrain. The major crops include coffee, cardamom, and tea, which have made the district famously known as the Spices Garden. In this study, 57 per cent of individuals were cultivating their land, while others were engaged in different fields. The continuous rainfall presents a significant risk for natural calamities. About 72 per cent of the samples reported crop loss, while 22.8% remained unaffected. 43 per cent of people indicated that their crops were completely damaged, while the remaining 45 per cent experienced partial damage. In the agricultural sector, 54 per cent of losses were reported, and 59 per cent of individuals sustained injuries due to the disaster. Additionally, 31 per cent of people continue to face distress as a result of the calamity. Livestock losses also accounted for 32 per cent

Migration Status of Households

The results presented in Table 1 show the migration status of Kanjikuzhi, Konnathady, and Rajakkad villages in Idukki district of Kerala. Out of 312 sample respondents from village, 25.3 per cent have migrated. The highest migration takes place in Konnathady, where 35 families are relocated and the remaining 147 individuals have opted to stay in their native. Konnathady had the highest number of non-migrants (147), while Kanjikuzhi had a relatively balanced distribution. Examining these patterns concentrates on how disaster risk can impact decisions regarding migration, based on socio-economic factors. At the same time, these trends can inform future preparedness and strategies for the common needs of villages (Rajendran:2021). There are some factors which pushed them to stay in their homelands. The survey clearly shows that their psychological mindset was not allowed to leave their natives and also, they are practiced to face the upcoming tragedies.

Table: 1 Village wise Migration Status of Households

Villages	Migrated (No of persons)	Not Migrated (No of persons)	Total
Kanjikuzhi	34	51	85
Konnathady	35	147	182
Rajakkad	10	35	45
Total	**79**	**233**	**312**

Sources *The author's assessment is derived from data obtained through field surveys., N =312*

Disaster impact on migration decision

The data presented in Table 2 reveals how the disaster impacts the decision to migrate through the economic, environmental, and psychological aspects.47.37 per cent of migrants faced damages to their own homes, which significantly highlighted that economic risk from housing instability largely drives the relocation of the people (Mbaye & Okara;2023). Conversely, 10.37 per cent of the migrants experienced a loss in agriculture, and 4.65 per cent faced employment loss, indicating that economic risk leads to migration among the people. But those who heavily depend on farming may remain in the places after the disaster. Because their production depends on the region's climate and geographical conditions. These factors may contribute to the people remain the same place despite adversely. (Mbaye & Okara;2023). The environmental factors Mud sliding (6.97%), Flash flood (21.5%) land washed off (39%) land devaluated (23.19%) showed that 25.32% of sample respondents were suffering a significant level of migration. Psychological risks such as fear, and anxiety led to migration decisions. However, the majority of the sample was not influenced by the psychological risks. Out of 312 samples, 227 respondents experienced various types of risk from economic, environmental, and psychological backgrounds, and the decision to migrate by the respondents for various reasons. It's based on the people's thinking ability and how they were handling the situation. The paradox is that even when the risk is increased, the displacement rate is lower.

Table 2: Impact of Disasters on Economic, Environmental, and Psychological Risks and Subsequent Migration Decisions

Risk due to the disaster		Migration due to the disaster					
		Migrated		Not migrated		Total	
		F	%	F	%	F	%
Economic Risk	Damage cost on house	63	47.37	70	52.63	133	***42.6***
	Agriculture loss	12	10.37	106	89.83	118	***37.82***
	Employment loss	2	4.65	41	95.35	43	***13.7***
	Loss on property	2	11.11	16	88.89	18	***5.76***
	Total	**79**	**25.32**	**233**	**74.68**	**312**	**100**
Environmental Risk	Mud sliding	5	6.97	67	93.06	72	***23.07***
	Flash flood	11	21.5	41	78.85	52	***16.66***
	Land washed off	47	39.50	72	60.50	119	***38.14***
	Land devaluated	16	23.19	53	76.81	69	***22.11***
	Total	**79**	**25.32**	**233**	**74.68**	**312**	**100**
Psychological Risks	Fear	23	28.05	59	71.95	82	***26.28***
	Anxiety	30	25.64	87	74.36	117	***37.5***
	Mental stress	26	23.01	87	76.99	113	***36.21***
	Total	**79**	**25.32**	**233**	**74.68**	**312**	**100**

Sources *The author's assessment is derived from data obtained through field surveys., N =312, F is the number of people*

Application of Binary Logistic Regression Model

The binary logistic regression model in Table 3 reflected the effect of the disaster on migration at two

different times of risk. The dichotomous variable is applied here (1= yes, 0 = No). The results indicated that a log-likelihood ratio of 172.223 correctly classified in the 93.3 per cent of causes. The economic risk faced at the time of the disaster (β=.991, SE= .285, p=.001) and Environmental risk after a disaster (β = 2.591, SE = .448, p =.000) were largely corresponding with the migration in the region. Environmental risk faced at the time of the disaster (β = -.372, SE =.207, p = .073) and psychological risk after the disaster (β =.791, SE =.364, p = .030) also support the decision to migrate. Similarly, the study analysed the perceptions of migration regarding decision economic risk faced at the time of disaster is a strong prediction of migration. But economic risk after the disaster (β =-3.15, SE =.492, p =.532) and psychological risk at the time of disaster (β = .068, se =.257, P = 790) show a poor rate of relation between the migration. These findings suggest that economic and environmental factors critically shape migration behaviour in the region and acme the multipart interaction between immediate risks and long-term psychological pressures that force individuals to be displaced.

Table 3: Estimates of the Binary Logistic Regression Model

Variables	B	S.E.	Wald	Df	Sig.	Exp(B)	95%C.I. for EXP (B) Lower	Upper
Economic risk faced at the time of disaster	.991	.285	12.105	1	.001*	2.694	1.542	4.709
Environmental risk faced at the time of disaster	-.372	.207	3.222	1	.073**	.689	.459	1.035
Psychological risk at the time of disaster	.068	.257	.071	1	.790***	1.071	.647	1.772
Economic risk after the disaster	-.315	.492	.408	1	.523***	.730	.278	1.916
Environmental risk after the disaster	2.591	.448	33.381	1	.000*	13.337	5.539	32.114
Psychological risk after the disaster	.791	.364	4.729	1	.030**	2.205	1.081	4.495
Constant	-5.558	1.345	17.087	1	.000**	.004		

Log likelihood; 172.223, Cox & Snell R²: .440, Overall % Correct: 93.3%, Observation:312
Sources The author's assessment is derived from data obtained through field surveys., N =312

Relationship between psychological risk and economic environmental risk

The results presented in the Table: 4 provide the factor influencing psychological risk after the disaster. The model reveals a strong positive relationship between the independent and dependent variable.93.4 per cent of the variances in psychological risk after the disaster indicate the combination of environmental and economic risk. The unstandardized (β = 0.682), (β= 0.578) and a standardized coefficient of (β = 0.585) (β = 0.400) demonstrate the strongest predictors of psychological risk. That means one unit of increased economic risk is associated with a 0.578-unit increase in psychological, and one unit of increase in environmental risk is associated with a 0.682-unit increase in psychological risk. The high rate of *t* value (15.780), (10.797) and significant levels ($p < 0.001$) underscore the statistical significance of this relationship as well. Economic and environmental risk creates a stronger multifaceted risk in the environment that profoundly affects the psychological health condition of people. The cumulative financial burden is related to a higher rate of depression anxiety, PTSD, and related mental health issues (Vellaram;2024). Prolonged exposure to harmful pesticides is associated with serious mental health issues including depression, and trauma (Swaminathan;2011). For instance, the disaster reduces agricultural productivity which will reduce income, leading to sharp stress, and anxiety, associated with financial instability (Vellaram;2024).

Table: 4 Multiple Linear Regression Economic, Environmental and Psychological Risk

Model	ıstandardised Coefficients B	Std.Error	Standardized Coefficients Beta	Sig.
Environmental risk after the disaster	.682	.043	.585	.000*
Economic risk after the disaster	.578	.054	.400	.000*

Dependent Variable: Psychological risk after the disaster r = 967, r sq = 934
Sources: *The author's assessment is derived from data obtained through field surveys. N =312*

Economic risk

Table 5 demonstrates the economic risk, and discloses the several key factors substantially influenced by the variables, particularly, per capita income loess, and per capita expenditure loess. These two variables reveal a meaningful statical impact on economic risk, with per capita income loess and per capita expenditure loess showing an Unstandardised coefficient of 0.000 and Standardised coefficient β of 0.296. resulting in t statics of 5.896 and a p-value of 0.000 likewise per capita expenditure loss reveals an unstandardized coefficient of 0.254 with a t value of 5.38 and a p-value is 0.000, indicating a strong statistical significance (International Monetary Fund,1989). The requirements of high-income availability can reduce the per capita income loss and also lead the better standards of living conditions, and better financial stability (Kenton,2024) That can reduce the economic risk during a vulnerable situation. The model explains one unit of the increased independent variable (X_1, X_2, X_3, and X_4) with 0.000,0.000,4.481, and 7.853 units of increased economic risk. Economic risk is a condition when people do not purchase sufficient resources and allocations. Here the majority of the sample respondents were working in the plantation or primary sector. The unpredictable circumstances have resulted in employment loss, income loss, and financial instability among the family members. The primary investigation reports reveal that the majority of the respondents belonged to the Below Poverty Line (BPL)

category; they weren't able to overcome the situation without support and financial aid. The continued disaster and its impact threaten the economic condition of the individuals.

Table: 5 Multiple Linear Regression Economic Risk

Model	Unstandardised Coefficients		*Standardised Coefficients* Beta	Sig.
Per capita Income loss	.000	.000	.296	.000*
Per capita expenditure loss	.000	.000	.254	.000*
Total loss from agriculture	4.481	.000	.156	.000*
Income loss on man-day loss	7.853	.000	.153	.054**

Dependent Variable: Economic risk, r =.886, r sq = 785
Sources *The author's assessment is derived from data obtained through field surveys., N =312*

Environmental risk

Table 6 highlights the factors influencing environmental risk. This model was performed to ascertain the effect of regions with different environmental issues. The model applied the dichotomous variable (1= Yes, 0 = No) p <.001 and rightly confidential in 93.8 per cent of cases. In the aftermath of the disaster, people were harmed by pollution (β =.362, SE =.052, p<.000) depletion of trees (β =.007, SE =.002, p <.000), soil quality (β =.499, SE =.050, p <.000). These independent variables strongly says that these outcomes run the environmental risk in the region disasters (Bhoopathi & Anees;2023). But it not only results in environmental risk but also marks agricultural instability (Sreepriya & Balasubramanian,2020) The disaster reduce the richness of soil quality and increases the depletion of trees. This will root challenges all around the agriculture production and productivity such as low production of crops, loss of arable land, and soil degradation, significantly triggering an economic impact on the major livelihood activities of the region. After the 2018 flood, Idukki suffered a stunning rise of 220% rise in soil erosion (Nair;2021). Soil erosion has become a critical environmental issue during the monsoon. The loss of soil reduces nutrient-rich topsoil and leads to low farming productivity (Balan & Jessy,2023). The heavy rainfall led to a high rate of soil erosion and also created contamination of water bodies and unhealthy living conditions for aquatic living things (A Complete Guide to Soil Pollution: Causes, Effects, And Solutions,2023). A blend of these issues directs the environmental risk.

Table:6: Multiple Linear Regression Environmental Risk

Model	standardised Coefficients B	Std.Error	Standardised Coefficients Beta	Sig.
Pollution due to the disaster	.362	.052	.347	.000*
Trees washed out on the property	.007	.002	-.086	.000*
Soil quality after disaster	.499	.050	.585	.050**

Dependent Variable: Environmental risk r =938, r sq = .881
Sources *The author's assessment is derived from data obtained through field surveys., N =312*

Mental health impact

Table 7 emphasised that most of the categories of people suffered mental stress due to the agricultural loess (120). This evidence reveals that environmental risk results in the psychological risk also. The primary investigation showed that the majority of the sample respondents were working in the plantations and agriculture sectors, The geographical conditions and suitable weather may increase the production and productivity of the crops. The data indicates that 130 females were suffering the most mental stress aftermath of the disaster. Generally, men produce less oxytocin than women during stressful times, which may influence how they cope with stress (Takayanagi & Onaka;2022). The old age people were suffering more mental and physical issues. They not only face increased health issues but also have less ability to survive the consequences of disasters related to younger generations. The disaster can worsen the pre-existing conditions of old age people, resulting a mental health issues like anxiety, stress, and depression (Older Adults and Disaster: Preparedness and Response - American Association for Geriatric Psychiatry;2022).

Table: 7 People who suffered psychological stress most after the Disaster

Categories of people	Loss makes for most psychological stress Employment Loss	Property Loss	Agricultural Loss	Household Damage	Total
Male	6	7	16	9	38
Female	17	24	45	44	130
Children	6	3	5	13	27
Old age	7	11	54	45	117
Total	**36 (11%)**	**45 (14%)**	**120 (38%)**	**111(35%)**	**312**

Sources *The author's assessment is derived from data obtained through field surveys., N =312*

Factors Preventing Migration

Table 8 explains the reasons for not migrating from the region, personal preference, financial burden, and lack of government support are the hidden reasons. Out of 312 sample respondents, 26.3 per cent were not interested in migrating due to the strong emotional ties to their community, and culture. However, most of the people depended on the agriculture sector, so migration may not be creating a proper place for the cultivation of crops, as reported in the primary survey. Additionally, 29.5 per cent were not migrated from the region due to their financial background. Out of 312

samples that belong below the poverty line, agriculture is the main source of their income. These specific cultivations of crops depend on the geographical conditions and weather also. From this, it is clear that the livelihood pattern and financial condition may pull the villagers to stick to the place and lack of government support also causes the people to be not interested in migration. Furthermore, 3.8% indicate that a lack of employment opportunities may not trigger the ability to migrate.

Table 8: Reasons for not migrating

	Frequency	Percentage
Not interested in leaving the place	82	26.3
No financial background	92	29.5
No assistance from govt to move safer place	49	15.7
Lack of employment	10	3.8
Total	233	75.3

Sources *The author's assessment is derived from data obtained through field surveys., N =312*

Theoretical Perceptions

1. Push-Pull Theory of Migration

Concept and definition

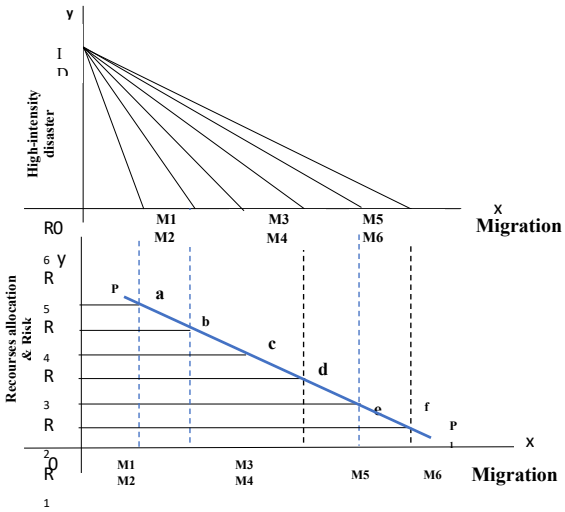
People who live in hilly regions are at high risk and are threatened by disasters that arise during monsoon season. High-intensity rainfall produced landslides and soil erosion. This may lead to interruption from top to bottom of their life. But nowadays a small portion of people leave the area. nevertheless, a big portion remains their natives. Understanding this status quo this study adopted the concept of push-pull theory of migration.

According to Evert Lee (1966), the decision of migration is based on the following categories such as area of origin, area of destination, intervening obstacles, and personal factors. When examining the motivation for migration by considering between origin and destination are affected by Push and Pull factors. Push factors exist at the point of origin and the act of motivation out of migration (lack of economic opportunities, education etc.). Pull factors are present (work opportunities, educational facilities, and religious freedom). The theory says that Push factors encourage people to leave their place and pull factors attract people to settle in their destination.

According to the present researcher, the push-pull analysis of migration can be defined as a form of relocation diffusion involving permanent moves to new locations. Based on the study, variables like the high intensity of risk create economic instability or lack of economic opportunities among the people which Pushes them to migrate to the place and relocate some other place. However, the region was filled with resources to produce crops and the cultivation of spices. It creates working opportunities for the people in the area and some personal interest also exists to Pull them to not migrate from the region.

Diagrammatical illustration

Intervening obstacles



The relationship between push-pull influences and migration is explained in the diagram above. The lower part illustrates the elements that contribute to migration and the region's immobility, while the upper part shows the trends in movement during periods of high catastrophe intensity. The horizontal axis displays the migration levels at points M_1, M_2, M_3, M_4, M_5, and M_6, with the lowest migration occurring at point M_1. At point R_6, resource allocation and risk are also high, indicating that they acquired resources to improve their standard of living while remaining in the area. However, It increases the likelihood of risk during a disaster. It is stated at the M_1aR_6 combination point due to the low rate of migration. The risk and resource allocation rate decreased from R_6 to R_5 as the migration rate increased from M_1 to M_2. The M_2bR_4 incorporates the previously described point b. M_3cR_4 illustrates how risk and resource allocation are declining while migration is rising. The PP_1 curve's downward slope illustrates the inverse link between resource allocation, risk and migration. The rate of migration level of the M_4dR_3 is high. When people are prepared to migrate, the risk of a disaster occurs, as explained by the inverse relationship between variables. However, it causes a lack of resources in the region. Likewise, the

combination points also changed when migration decreased from M_6 to M_5, such as M_6fR1 shift to left M_5eR_2. such as that. This indicates a decline in the migration trade. At the same time, risk factors will rise. It will establish advantageous circumstances, resources, and allocation for their means of subsistence.

Migration is a better option for people to secure healthy socio-economic surroundings for their lives. However, the present scenario of the region was not interested in migrating from the location even the high risk of disaster also. Because most of the people depend on agriculture and livestock. while relocation or displacement creates a shortage of resources. Based on the primary investigation, 96.8 per cent of the sample depended on the primary sector, 85 per cent of them cultivating spices crops like cardamom, pepper, and tea. The district is popularly known as the spice garden of Kerala. Therefore, the geographical condition may help to increase the production and productivity of the crops. When the farmers leave the native and settle in another area, it creates financial instability and economic backwardness for the household people. At the same time, 15.7 per cent of the samples responded that lack of assistance from the government, may not to move to safer places. The continued occurrences of disasters may create loss of per capita income, expenditure, and pollution also, these environmental and economic factors create the decision to migrate around 25 per cent of the sample, reaching 75 per cent still suffering these issues.

Therefore, the push-pull theory of migration is partially accepted here. While the factors that cause migration are considered as the Push factors, some other decision (Pull factors) determines them to withdraw and remain in the same place for a longer period. So, it is evident that Push factors contribute to the migration while Pull factors pull back the decision to migrate. In the year-by-year, people are suffocating the economic and environmental risks which generate the psychological risk (Stress, anxieties, depression) among the women and old age people in the region.

2. Vicious circle of poverty

The study emphasises the connection between migration, risk and the vicious circle of poverty. The impact of the disaster caused economic instability among the rural areas, especially economically weaker sections of society. To study disaster impact caused migration in only a small percentage, remain portion was not leaving their current place, and they were year by year suffering the poverty due to the impact of the disaster. Thereby, figure.2 explains how the factors are interconnected and flow.

Theoretical perception

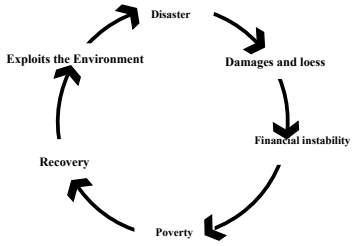


Figure 2 vicious circle of poverty, due to the impact of disaster

Figure.2 explains the vicious circle of poverty under the impact of disaster dimension. The impact of disasters produces socio-economic and environmental challenges for the people. In this study, the disaster caused loss and damage in the agriculture sector. The majority of them lose their crops and land due to the direct impact of disaster, which impacts the financial instability of the farmers like unemployment, loss of per capita income and expenditure, loss of savings etc. The certain lack financial assistances, personal reasons, therefore the reaming portion of the people who are forced to stay there. Meanwhile, financial instability creates poverty and economic vulnerability. Therefore, these people who started to recover from the situation for a better life, consequently they it's against the environment and nature, continues exploitation of resources making their fields clearness by cutting trees, and creating land layer by layer. It will cause damage to the structure of the soil condition as well as increase the possibility of soil erosion and landslides. During the monsoon period which is creating a vulnerable situation, The heavy rainfall and environmental damages generate favorable conditions for natural tragedies.

Here, migration is the only factor that can break the situation in the region. However, the majority of the people which not interested in migration, it may result the poverty, vulnerability, risk and psychological issues in the people. Hence Ragnar Nurkse's theory of the vicious circle of poverty (1953) is fit in this study. The impact of the disaster created poverty in an economically backward class of people in the study

region. This was a cyclical process whenever a disaster happened in the region.

Findings and scope of the future research

In the study region, more than half of the population are engaged in the primary sector. Through the data collection out of 312 sample, 84 per cent of them are cultivating spices. That has created high market prices and demand. However, Natural disasters like floods and landslides have destroyed the production of crops. This led to market failure, especially because it affected the cardamom plantation sector. 60 per cent of crops were fully lost, and 27 per cent were partially damaged. One of the farmers who has been cultivating cardamom in the last 20 years reported that he lost 80 per cent of his crop production. It shows that the impact of disaster creates a financial backward and psychological impact on the households. At the same time, environmental vulnerability emerged due to the aftermath of pollution, loss of soil quality and tree losses. The pollution creates epidemical diseases and non-living conditions among the villages. The people who have cow goats suffer from FMD[1]. Which significantly impacted the livestock production and the products of the people.

Due to unemployment and shortage of money, people seek help from moneylenders and the banking sectors. The government provided compensation based on the losses of the people, but it did not balance their needs and wants. That is why they depend on private bankers and financial institutions. Quoting words, "Human beings wants are unlimited, but the resources are limited". The contradiction is that, the people who have suffered high risk due to the impact of disaster not be moving from the location. But in the depth of research, it should be clear that, psychological factors and financial backwardness make them stay there. Only a small portion migrated from the region and the remaining portion suffered from the economic, environment and psychological risks.

Unemployment and financial instability produce a shortage of basic needs, poverty, and vulnerability. Due to the unhealthy lifestyle which focuses on the unhealthy living habits of the household people it may reflect on these ways. Women and children were suffering from urinary infections, menstruation issues and stress. From this point of views that still the people are triggered by the disaster and its impact. Therefore, the current study focused on the risk factors in the economic, environmental, and psychological aspects as well as the migration status. Meanwhile, future research can be built on the mental health of the vulnerable people in the study region, and the failure of policies that are implemented by the State government.

Conclusion

Idukki is a multi-hazard-prone area. During the monsoon period, it was a horrible situation for the village people. The continued struggle due to the impact of the disaster creates socio-economic and environmental issues. Economic support through livelihood programs and skill development initiatives can help communities recover financially, while environmental restoration efforts, such as sustainable land management and reforestation, will enhance natural buffers against future disasters. Equally important is the provision of mental health services, particularly for vulnerable groups like women and older adults, who often experience greater psychological stress. Accessible mental health programs, community-based counselling, and social support systems can aid in addressing trauma and building social resilience. By integrating these elements, policymakers can foster more sustainable recovery pathways, reducing the long-term impact of disasters on livelihoods, ecosystems, and overall well-being.

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[1] *Foot-and-Mouth Disease*-Foot-and-mouth disease (FMD) or hoof-and-mouth disease (HMD) is an infectious and sometimes fatal viral disease that primarily affects even-toed ungulates, including domestic and wild bovids.

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