



## The Impact of Climate Change on Migration: An Empirical Study

**SK Acharya<sup>1</sup>, Anannya Chakraborty<sup>2\*</sup> and Chethana K<sup>3</sup>**

<sup>1</sup>Professor, Department of Agricultural Extension, BCKV, Mohanpur, West Bengal, India

<sup>2</sup>Ph D Scholar (UGC fellow), Department of Agricultural Extension, BCKV, Mohanpur, West Bengal, India

<sup>3</sup>PG Scholar (Pass Out), Department of Agricultural Extension, BCKV, Mohanpur, West Bengal, India

**\*Corresponding Author:** Anannya Chakraborty, Ph D Scholar (UGC fellow), Department of Agricultural Extension, BCKV, Mohanpur, West Bengal, India.

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### Abstract

Changing climate is one of the most important factors of rural to urban migration. Due to climatic aberrations and deviation from normal climate, the production and productivity of agricultural crop hampers. This creates a substantial impact on agriculture related employments. As there is less chances of income and employment, the rural community is bound to migrate to urban regions to earn their bread and butter. The present study is conducted in Ghoragachha village under Saguna gram panchayat, Nadia, West Bengal. The numbers of respondents were 60 and they were selected randomly. The data were collected through pilot survey, structured interview and focused group interview. The statistical tools used for data analysis are correlation coefficient, step down regression, path analysis and factor analysis. Here in this study we can see that Age at the time of migration - (X1), schooling of Migrant (number of years) - (X2), family Education (in years) - (X3), change in number of occupations after migration - (X7), family material possession - (X10), Per capita income from Agriculture and livestock - (X16) are some of the variables those have created a significant correlation with climate change.

**Keywords:** Age; Income; Material Possession; Schooling of Migrant

### Introduction

Migration of farming diaspora is conspicuously contributed by vagaries of climate in countries like India wherein rain fed agriculture is incredibly linked with favourable response from climate and weather. Scott [1] has referred that Rural and urban areas differ in ways that strongly shape vulnerability to climate variability. Despite the trend toward growing employment in non-agricultural wage-labour, Ahmed *et.al.* [2] has shown that the adverse climate impacts on agricultural production have the potential to increase food prices in cities, with especially negative implications for poor urban wage workers who, as consumers, spend a significant proportion of their income on food. Hsiang SM [3] thermal stress can also adversely impact labor productivity. The climatic factors like rain, heat stress, drought, flood etc. creates a significant impact on quality and quantity of labour which substantially affect the employment and income of the residents.

### General objective

Rural Urban Migration: The understanding and analysis on socio-ecological perspectives

### Specific Objectives

- To build up concept rural urban migration, factors and consequences.
- To identify socio-ecological and socio-economic factors contributing to rural urban migration.
- To estimate socio-economic and socio-ecological on the consequent factor, Nature, Level and Direction of migration.
- To generate some micro-level policy implications, from this

empirical study as applicable to socio-ecological setting having similarity with research location.

### Research setting

The area of investigation is situated in the state of Karnataka located in the south western part of India. The State of Karnataka in southern India has a unique social, cultural and ecological background, which influence the living standard and behavioural patterns of the people in many ways. The area of investigation belongs to the Sira block of the Tumkur district. The area of the study is comprised of villages namely Devarahalli, Chikkanahalli, under Chikkanahalli gram panchyath.

### Methods

State, district, sub division, block, panchyate and village is selected through purposive sampling. Sixty respondents are selected through random sampling. Here, in this study we have considered 19 independent variables against one dependent variable that is climate change (Y).

### Result and Discussion

#### Result

Table 1 presents the coefficient of correlation between Y: climate change vs. 19 independent variables(x1-x19). It has been found that following variables viz. Age at the time of migration-(X1), schooling of Migrant (number of years) - (X2), family Education (in years) - (X3), change in number of occupations after migration-(X7), family material possession-(X10), Per capita area(acre)-(X15) and Per capita income from Agriculture and livestock - (X16) have recorded significant correlation with the dependent variable.

Sl. No	Variable	r value	Remarks
1	Age at the time of migration-(X1)	0.509	**
2	schooling of Migrant (number of years) - (X2)	0.491	**
3	family Education (in years) - (X3)	0.802	**
4	Caste - (X4)	-0.001	
5	family size - (X5)	0.084	
6	number of years since Marriage - (X6)	-0.009	
7	change in number of occupations after migration - (X7)	0.262	*
8	number of source information acquired - (X8)	0.095	
9	number of source of money for migration - (X9)	-0.005	
10	family material possession - (X10)	0.266	*
11	family house type - (X11)	0.113	
12	family Social participation - (X12)	0.101	
13	Cosmopoliteness - (X13)	-0.017	
14	mass media exposure - (X14)	-0.107	
15	Per capita area(acre) - (X15)	0.637	**
16	Per capita income from Agriculture and livestock - (X16)	0.303	*
17	Per capita income from another source - (X17)	0.051	
18	Per capita annual Expenditure on education - (X18)	-0.008	
19	per capita annual other Expenditures - (X19)	0.124	

**Table 1:** Coefficient of Correlation (r): Y: climate change vs. 19 independent variables (x<sub>1</sub>-x<sub>19</sub>).

**Revelation**

The high profile of perception on climate change has been observed in relatively elder educated migrants with well-educated family back ground. Where family is cause and support for cognitive development and analytical ability helps to interprets effect of

climate change. The large land holding with positive benefit cost ratio helps them to maintain high inventory which supports expansions of occupations, by discovering diversification as solution to climate change effects.

Sl. no.	Variables	BETA	BETA × R	REG COEF-B	S E OF B	T-VAL OF B
1	X1: Age at the time of migration	0.033	0.754	0.004	0.029	0.148
2	X2: schooling of Migrant (number of years)	0.237	5.234	0.072	0.056	1.291
3	X3: family Education (in years)	-0.329	11.858	-0.032	0.019	1.668
4	X4: caste	-0.161	0.134	-0.123	0.141	0.875
5	X5: family size	0.212	8.029	0.112	0.107	1.047
6	X6: number of years since Marriage	0.095	-0.395	0.012	0.023	0.430
7	X7: change in number of occupations after migration	0.264	27.912	-0.123	0.076	1.547
8	X8: number of source information acquired	0.122	1.229	0.022	0.104	0.714
9	X9: number of source of money for migration	-0.162	0.414	0.155	0.134	0.921
10	X10: family material possession	0.141	4.517	000	000	0.705
11	X11: family house type	0.200	10.505	000	000	1.023
12	X12: family Social participation	0.015	0.699	-0.018	0.109	0.099
13	X13: cosmopoliteness	-0.268	1.100	0.085	0.530	1.213
14	X14: mass media exposure	-0.112	5.380	0.200	0.026	0.068
15	X15: area(acre) Per capita(Area)	0.061	1.757	0.600	0.242	0.358
16	x16: Family income (Agriculture and livestock)	-0.311	32.544	0.011	0.032	1.196
17	x17: family income (other percapita)	0.404	0.921	-0.064	0.152	0.251
18	X18: Family annual Expenditure Per capita(education)	-0.006	0.023	000	000	0.033
19	X19: Family annual Expenditure per capita (family)	0.370	1.670	000	000	1.360

**Table 2:** Regression Analysis, Y: climate change vs 19 Causal variables (x1-x19).

Multiple R - SQ = 82.25%.

S.E = 1.71.

**Result**

Table 3 presents the multiple regression analysis between exogenous variable Y: climate change vs. 19 Causal variables (x1 - x19): It has been found that the variable X7: Change in number of occu-

pations after migration and x16: Family income (Agriculture and livestock) has contributed to the substantive variance embedded with the consequent variable Y4: Climate change.

Variables	Beta	Beta x R	Reg. coef. B	S.E. of B	t value
X7: change in number of occupations after migration	0.190	43.870	0.850	0.051	1.469
x16: Family income (Agriculture and livestock)	0.209	56.130	0.033	0.021	1.616

**Table 3:** Regression Analysis, Y: climate change vs 2 Causal variables (x<sub>7</sub>, x<sub>16</sub>).

Multiple R-SQ = 76.19%

S.E = 0.30.

The R<sup>2</sup> value being 0.8225, it is to infer that 82.25 percent of variation in the consequent variable has been explained by the combination of these 19 causal variables.

Table 3 presents the step wise regression and it has been depicted that the 2 causal variables, X7: change in number of occupations after migration and X16: Family income (Agriculture and livestock) has been retained at the last step.

The R<sup>2</sup> value being 0.7619, it is to infer that 76.19 percent of variation in the consequent variable has been explained by the combination of these 2-causal variable.

**Revelation**

So, the climate change of migration has been well estimated with variable x16: Per capita Family income (Agriculture and livestock) and X7: Change in number of occupations after migration.

The wide exposure from informative urban centres make migrants discover the need of stabilized income by diversifying their occupations to reduce the effect of climate. The better returns from farm enterprises support financially to venture into new occupations to stabilize income.

**Results**

The variable X7: change in number of occupations after migration has enrooted the highest indirect effect (for 8 times) on the consequent variable. Table 4 presents the path analysis to decompose the TE into direct, indirect and residual effect. It has been found that the variable x16: Per capita Family income (Agriculture and livestock) (-0.361) has highest direct effect, while the variable x17: family income (other per capita) (0.612) has exerted the highest indirect effect on the Y: Climate change.

Sl. No.	Variables	Total effect	Total Direct Effect	Total Indirect Effect	Highest indirect Effect
1	X1: Age at the time of migration	0.509	0.033	0.476	-0.056 (x7)
2	X2: schooling of Migrant (number of years)	0.491	0.237	0.254	-0.156 (x2)
3	X3: family Education (in years)	0.802	0.329	0.473	0.113 (x2)
4	X4: caste	-0.001	-0.161	0.16	0.074 (x3)
5	X5: family size	0.084	0.211	-0.127	-0.145 (x5)
6	X6: number of years since Marriage	-0.009	0.094	-0.103	0.069 (x3)
7	X7: change in number of occupations after migration	0.262	-0.263	0.425	0.084 (x7)
8	X8: number of source information acquired	0.095	0.122	-0.027	-0.068 (x7)
9	X9: number of source of money for migration	-0.005	-0.162	0.157	0.060 (x16)
10	X10: family material possession	0.266	0.140	0.126	0.127 (x7)
11	X11: family house type	0.113	0.200	-0.087	-0.121 (x13)
12	X12: family Social participation	0.101	0.053	0.048	0.056 (x7)
13	X13: cosmopolitaness	-0.017	-0.267	0.25	0.090 (x11)
14	X14: mass media exposure	-0.107	-0.111	0.004	-0.057 (x7)
15	X15: Per capita area(acre)	0.637	0.061	0.576	0.110 (x3)
16	x16: Per capita Family income (Agriculture and livestock)	0.303	-0.361	0.314	0.244 (x16)
17	x17: family income (other percapita)	0.051	0.039	0.612	0.143 (x7)
18	X18: Family annual Expenditure Per capita(education)	-0.008	-0.006	-0.002	0.133(x7)
19	X19: Percapita other Family annual Expenditure	0.124	0.369	-0.245	-0.205 (x16)

**Table 4:** Path analysis: Decomposition of total effect (r) into Direct, Indirect and Residual effect

Y: climate change VS 19 consequent variables (x<sub>1</sub>-x<sub>7</sub>).

The residual effect being 0.1775percent, it is to infer that with the combination of these 19 exogenous variables, 100 per cent of variance can be explained.

So, the predominated factors, as formed by internationally accommodating them based on factor loading, can offer a strategic implication by effectively downsizing the sphere of variables into well textured factors.

**Revelation**

The better perception of climate change and its effects forces

migrants to realise the need for solution. So, they tend to specialize the farm enterprise to derive better returns and to take up allied different occupation to have stable income. That is the realisation of diversification as solution to climate change with better benefits.

**Results**

Table 5 presents the factor analysis, wherein 19 numbers of independent variables have been conglomerated into 6 dominant factors.

Factors	Variables	Factor Loading	% of variance	Cumulative %	Factors Renamed
Factor 1	X3: family Education (in years)	.584	17.530	17.53	Family capacity
	X5: family size	.534			
	x16: Family income (Agriculture and livestock)	.746			
	X19: Family annual Expenditure per capita (family)	.816			
Factor 2	X2: Schooling of Migrant (number of years)	.533	13.795	31.32	Family resource
	X10: Family material possession	.611			
	X11: Family house type	.733			
	X13: Cosmopolitaness	.687			
Factor 3	X1: Age at the time of migration	.585	12.366	44.69	Migration chronology
	X6: Number of years since Marriage	.696			
	X7: Change in number of occupations after migration	.569			
	x17: Per capita family income (from other Sources)	.579			
Factor 4	X4: Caste	.618	9.978	54.67	Community affiliation
	X12: Family Social participation	.502			
Factor 5	X8: Number of source information acquired	.557	9.343	64.01	Communication proficiency
	X9: Number of source of money for migration	.528			
	X14: Mass media exposure	.542			
Factor 6	X15: Per capita area(acre)	.532	7.128	71.14	Economic proficiency
	X18: Family annual Expenditure Per capita(education)	.543			

**Table 5:** Factor Analysis - Conglomeration of 19 variables in 6 Factors.

Factor 1 is consists of 4 variables viz X3: family Education (in years), X5: family size, x16: Family income (Agriculture and livestock) and X19: Family annual Expenditure per capita (family). These variables contribute about 17.53 per cent of variance, and the factor renamed as Family capacity.

Factor 2 consists of 4 variables viz. X2: schooling of Migrant (number of years), X10: family material possession, X11: family house type and X13: cosmopolitans. These variables contribute about 31.25 per cent of variance and is renamed as Family resource.

Factor 3 consists of 4 variables those are size of X2: schooling of Migrant (number of years), X10: family material possession, X11: family house type and X13: cosmopolitans. Which contributes about 44.691 per cent of variance and is renamed as Migration chronology.

Factor 4 consists of 2 variables viz X4: caste and X12: family Social participation. These 2 variables contribute 54.670 per cent variance and is renamed as Community affiliation.

Factor 5 consists of 3 variables viz. X8: number of source information acquired, X9: number of source of money for migration and

X14: mass media exposure. These 2 variables contribute 64.013 per cent of variance and is renamed as agro ecological proficiency.

Factor 6 consists of 2 variables X15: Per capita area(acre) and X18: Family annual Expenditure Per capita(education). These 2 variables contribute 71.141 per cent variance and is renamed as Community affiliation.

**Interpretation**

The factor Family capacity (Variance contribution 17.53 per cent), by becoming the prime mover of change in process of Rural-Urban migration, has contributed substantially towards start of migration along with financial and information support to stay in urban areas.

Family capacity has rightly contributed the highest to become the prime factor in Rural-Urban migration

Rural-Urban migration, on other way higher the family capacity is higher family needs and aspiration along with better support that is how and why these factor percentage has contributed substantially towards Rural-Urban migration.

## Conclusion

Climatic aberrations and natural disasters are most important factor behind migration. It is not only true for this modern era, but also it is quite relevant cause of migration in ancient ages. Thousands of kingdoms and dynasties had risen and fallen due to drastic climatic changes. A glorious and radiant city can just become a cemetery due to a seasonal drought, flood or any other drastic climatic hazard, whereas a dry land can be changed into perfect greenery or agricultural land by the sediment deposition of a huge flood. Romero [4] has referred that the Climate vulnerability in rural areas is further aggravated by smaller labour markets, lower incomes, and imperfect and/or incomplete access to public services. As far as our study is concerned, it is clearly seen that the most important factors are income and occupation. If the climate change has a negative income on both of this, then people are more likely to migrate to the higher opportunity places. After all bread butter comes first.

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