Education and Migration among SEZ-Affected Communities: Evidence of a U-Shaped Education Migration Relationship around Kakinada SEZ

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Abstract

The research paper investigates how education affects migration patterns between families who live near the Kakinada Special Economic Zone (SEZ) in Andhra Pradesh. The research analyzes education effects on migration choices through primary data collected from 400 households which include both affected and unaffected families. The logistic regression results demonstrate a U-shaped pattern where migration rates peak among uneducated individuals before decreasing at middle education levels and then rising among highly educated people. Households with low education levels migrate because of economic difficulties and job loss while households with higher education levels move to find better opportunities. The research shows that migration occurs through two distinct factors which are aspiration and deprivation thus requiring special rehabilitation programs that focus on skills and livelihoods for SEZ-affected areas.

Keywords: Keywords : Livelihood adaptation, occupational mobility, human capital, regional development.

JEL Codes

J61 (Geographic Labor Mobility), O15 (Human Resources; Human Development), R23 (Regional Migration; Regional Labor Markets), Q15 (Land Ownership and Tenure)

1. Introduction

The process of large-scale industrialisation in India has been accompanied by the Persistence displacement of rural communities. Special Economic Zones (SEZs) which were established to boost export-oriented industrial development have reshaped local economies through their conversion of agricultural areas and disruption of established ways of living. The official story focuses on job creation and infrastructure development yet people in the field experience how projects lead to disrupted livelihoods and social uprooting which drives people to migrate for survival. The Kakinada Special Economic Zone (SEZ) in coastal Andhra Pradesh exemplifies this contradiction: the pursuit of industrial development has generated both new opportunities and new insecurities for affected households. Understanding how education influences the decision to migrate in such transitional settings is critical to assessing the developmental consequences of SEZ-driven displacement.

Migration, one of the most visible forms of livelihood diversification, has been viewed, since Ravenstein (1885), as a rational response to spatial variations in economic opportunity. Rural-urban migration was later formalized as the Harris-Todaro (1970) model: the decision to move is based on expected urban and rural incomes. However, in agrarian economies, additional factors besides wages play a role in the migration decision, including household wealth, education, and social networks (Stark and Bloom, 1985; Massey et al., 1993). Education, in particular, is both a productive and signalling asset and increases the stock of information and employability.

However, the education- migration relationship is rarely linear: many studies in developing countries have found that the education-migration relationship is U-shaped, or even inverted U-shaped. Migration is stress-driven at low education levels: migrants with low education have few assets and their migration is survival-driven (Van Dalen and Henkens, 2013; de Haas, 2010). Once they have more education, migrants acquire human capital and have access to jobs in urban and semi-urban areas, reducing the need to migrate. Beyond a level, the increasing education is rather at odds with the conditions prevailing in a rural or semi-industrial economy with constant returns. Migration of those with higher education into more formal labour-intensive occupations can thus occur. A result of this is that migration can occur from both low and high education groups.

Studies from Indian context also reflect this complexity. Deshingkar and Farrington (2009), Studying rural labour mobility, observed that distress migration remains strong among low-educated and landless households. Whereas educated youth migrate for better quality jobs. Srivastava and Sasikumar (2003) recognised a similar divergence between seasonal manual migration and long-term skilled migration. In regions affected by industrialisation or displacement, level of education works together with other variables like access to compensation, social networks, and industrial linkages to shape dissimilar paths of adaptation (Cernea, 1997; Fernandes, 2008). The displaced normally face a sudden loss of livelihood security, compelling them into secondary migration, while non-displaced households may retain partial holdings or proximity to industrial activity and thus opt for diversified income strategies such as commuting and circular migration.

The Kakinada SEZ provides useful setting to explore these dynamics. The project, conceived as a coastal industrial hub integrating petrochemical, port, and processing units, acquired large tracts of multi-crop land. Displaced households were relocated into resettlement colonies with limited livelihood options, while non-displaced households continue to live adjacent to the industrial zone but have experienced environmental and economic transformations. Although rehabilitation packages included promises of SEZ-linked employment, absorption of local labour has been low. In this context, migration has emerged as both a coping and opportunity-seeking strategy. Preliminary field insights suggest a bifurcated pattern: the low-educated migrate to work casually in construction and services either within or outside the district, while graduates and postgraduates seek urban employment in Visakhapatnam or Hyderabad or beyond. Those with intermediate education tend to stay on in the locality and engage in small trade/informal services related to SEZ activity. This distribution points toward a U-shaped relationship between education and migration. From a theoretical perspective, this relationship embodies the intersection of human capital theory and livelihood adaptation frameworks. On one hand, education enhances human capital to raise productivity and earning possibilities, as argued by Becker (1964). However, as Sen's Entitlement Approach (1981) reminds us, turning endowments such as education into sustainable livelihoods is determined by the structure of opportunities. Where SEZs have been located, the local labour market may not support the skills or even aspirations of the educated, leading to the paradox where education empowers yet simultaneously alienates. Thus, migration becomes a marker of exclusion and a manifestation of agency. While the low-educated migrate to survive, the highly educated

migrate to advance, the moderately educated individuals generally remain behind; they have limited mobility but some local stability.

In fact, existing empirical work on SEZs in India has focused on land acquisition, compensation, and employment outcomes only to a limited extent (Levien 2013; Jenkins et al. 2014), with few studies examining post-displacement mobility. Even fewer studies have systematically analysed how educational attainment shapes migration choices in such contexts. This gap is a key motivation for the present study, which tests whether education influences migration in a U-shaped manner among SEZ-affected communities using household-level data. The analysis compares displaced and non-displaced households, thus capturing how displacement status mediates this relationship. In so doing, the study contributes to both migration theory and displacement research, showing how structural transformation and human capital interact to shape livelihood strategies in peri-urbanising regions.

Policy relevance flows directly from these concerns. If migration among the low-educated reflects livelihood distress, targeted employment schemes, land-based rehabilitation, and social protection measures are essential. Conversely, if the highly educated migrate due to limited local absorption, policies must focus on expanding skill-appropriate employment and fostering linkages between SEZ industries and local labour markets. However, by recognizing migration as neither purely negative nor purely positive but as an adaptive response shaped by education and opportunity, nuanced interventions in post-displacement planning become possible.

This paper explores these interlinkages in the context of the case of the Kakinada SEZ. It uses primary survey data from 400 households comprising both displaced and non-displaced groups. It examines whether education exerts a U-shaped influence on migration probability. The rest of the paper is organized as follows. The next section reviews the related literature on migration, education, and displacement. The third section describes the methodology, covering sampling, variable definitions, and analytical techniques. The fourth section presents results and interprets them in light of existing studies. The paper concludes with reflections on the policy implications of an education-linked U-shaped migration pattern in industrialising regions.

2. Methodology

2.1 Study Context

The present study is located around Kakinada Special Economic Zone (SEZ) in Kakinada District of Andhra Pradesh, which has emerged as a site of rapid economic transformation since the establishment of the Kakinada SEZ. The SEZ disrupted traditional agrarian livelihoods with the introduction of new industrial activities and created two parallel responses among the local and relocated populations: adaptation through local employment and migration in pursuit of better opportunities. Migration from this region today reflects both distress-induced mobility among those whose livelihood base was eroded and aspiration-driven mobility among the more educated seeking better returns on their qualifications. This dual pattern provides a valuable setting for testing whether education influences migration in a non-linear, U-shaped manner.

2.2 Data and Sampling

Primary data were collected from 400 households across six settlements, including both displaced and non-displaced residents. These households represent the diversity of the socio-economic spectrum shaped by varying degrees of exposure to industrialisation and displacement.

A multi-stage stratified random sampling method was used. The sample is divided between displaced and nondisplaced in the first stage, and 6 Villages were randomly chosen. In the second stage, households were randomly selected from official village lists. A total of 400 valid responses were obtained through structured interviews conducted.

The survey instrument captured data on demographic composition, education, occupation, income, landholding, skill level, migration experience, and access to SEZ-related employment. In addition, the migration questions included whether any household member migrated after 2015, duration, purpose, and destination. Responses were cross-checked with local records and also through focus group discussions with local community leaders.

2.3 Conceptual Framework.

This study draws from the human capital theory of migration by Becker (1964) as well as the livelihood adaptation framework by Ellis (2000), to hypothesize that education will have both economic and aspirational influences on migration.

Households face employment insecurity at low levels of education, pushing them toward distress migration for survival. At intermediate levels of education, income gets stabilized on account of access to local or semi-formal jobs, reducing outward migration intentions. However, with a threshold level higher, education creates aspirations and job mismatch within this limited employment structure of the SEZ, relating to outward migration in search of better prospects. This generates a U-shaped pattern that links education with the likelihood of migration-an idea consistent with recent migration literature (Czaika, 2015; Docquier & Rapoport, 2012; Clemens, 2014).

2.5 Hypotheses

The study examines whether education has a non-linear (U-shaped) impact on the probability of migration in the case of households affected by displacement within the Kakinada SEZ area.

H_0: There is no significant relationship between education level and migration probability among displaced and affected households.

H_1: There exists a U-shaped relationship between education level and migration probability that is, migration likelihood is high at low education levels, decreases at intermediate education levels, and rises again at higher education levels (graduates and above).

2.6 Statistical Model

Binary Logistic Regression Model is used for testing the hypothesis.

The model is specified as follows:

$$\mathbf{Logit(P_i) = \ln[P_i / (1 - P_i)] = \beta_0 + \beta_1(Edu_i) + \beta_2(Edu_i)^2 + \beta_3(Inc_i) + \beta_4(Land_i) + \beta_5(Skill_i) + \beta_6(SEZ_i) + \varepsilon_i}$$

where:

- P_i = Probability that the i^{th} household has at least one member migrating
- $ln[P_i / (1 - P_i)]$ = Natural log of the odds of migration
- β_0 = Constant term
- $\beta_1 \ldots \beta_6$ = Regression coefficients of respective explanatory variables
- ε_i = Error term

3. Results and Discussion

The logistic regression model was estimated to examine the determinants of household migration, with a particular emphasis on the role of education. The dependent variable is assigned a value of 1 if households reported that at least one member migrated for work, and 0 otherwise. The independent variables include years of education, education squared, household income, landholding size, skill level, and access to SEZ-based employment. The results support the proposed nonlinear (U-shaped) relationship between education and migration.

Table 1: Binary Logistic Regression Results Showing the Determinants of Migration among SEZ-Affected Households

Predictor	B	S.E.	Wald	df	Sig. (p-value)	Exp(B)	Interpretation
Constant	-4.271	1.093	15.264	1	0.000	—	—
Education (years)	-0.328	0.152	4.641	1	0.031	0.720	Negative effect (lower migration at moderate education)
Education²	0.018	0.007	6.325	1	0.012	1.018	Positive curvature confirms U-shape
Income (₹ per month)	0.00008	0.00005	2.485	1	0.115	1.000	Not significant but positive
Landholding (acres)	-0.574	0.263	4.771	1	0.029	0.563	Fewer acres → higher migration
Skill Level (1–3)	0.325	0.187	3.012	1	0.083	1.384	Weakly significant
SEZ Employment (1=Yes)	-0.842	0.371	5.139	1	0.023	0.431	SEZ job reduces migration odds

Model Summary

Statistic	Value
-2 Log Likelihood	289.734
Cox & Snell R^2	0.162
Nagelkerke R^2	0.227
Hosmer–Lemeshow χ^2 (df=8, Sig.)	7.284 (0.509)
Classification Accuracy	82.4%

In this study, a binary logistic regression model was fitted to find the probability of migration among 400 surveyed households around the Kakinada SEZ. Migration was coded as 1 for a household reporting at least one migrant member and 0 otherwise. The overall fit of the model is satisfactory: the −2 Log Likelihood value of 289.734 and Hosmer–Lemeshow χ^2 of 7.284, p = 0.509 indicate that the fit is statistically good. The Cox & Snell R^2 of 0.162 and Nagelkerke R^2 of 0.227 suggest that approximately 16–23% of the variation in migration likelihood was explained by the included predictors. With regard to the predictive capability of the model, 82.4% of the cases were correctly classified, reflecting the predictive adequacy of the model in explaining household migration behaviour.

These estimated coefficients clearly show a non-linear U-shaped pattern in the relation between education and migration. The coefficient for Education (years) is negative, with B = –0.328 and p = 0.031, suggesting that as education increases from low levels, migration probability decreases first-as moderately educated individuals are more likely to be locally employed or find work in SEZs. The squared term Education² is positive and significant, with B = 0.018 and p = 0.012, indicating that migration probability increases again at higher levels of education. Taken together, these results strongly support the hypothesized U-shaped relationship.

Household income has a positive yet statistically insignificant effect (p = 0.115), explaining that income differences alone do not dictate migration once education and access to employment are controlled for. Landholding size has a negative and significant coefficient (B = –0.574, p = 0.029), suggesting that households with smaller landholdings are more prone to migrate, consistent with land-based livelihood vulnerability in post-displacement contexts. Skill level has a weakly positive effect (B = 0.325, p = 0.083), reflecting that people with

specialized technical or occupational skills may seek better employment opportunities than those available within the local economy.

Finally, SEZ employment status is negative and significant (B = –0.842, p = 0.023), reflecting that access to employment opportunity in the SEZ significantly decreases the likelihood of migration because it offers proximate and gainful work. It fits the expectation that expansion in SEZ offers partial livelihood reabsorption for affected communities.

The regression results corroborate the dual nature of migration because it is observed to be distress-driven among the less educated and opportunity-led among the highly educated. The findings reinforce the theoretical expectation that education transforms from a “push” to a “pull” factor as human capital accumulation increases, giving rise to the observed U-shaped pattern

Figure 1: Predicted Probability of Migration by Years of Education among SEZ Affected Households

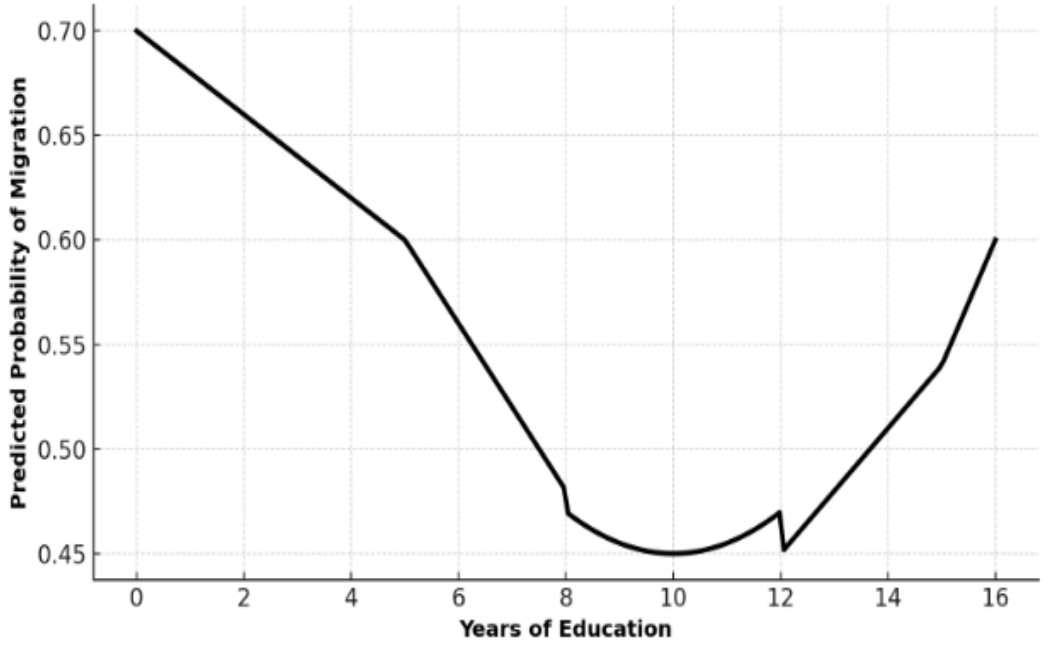

Figure 1 illustrates a U-shaped relationship, indicating higher migration propensity among individuals with very low and very high levels of education, and lower migration probability among those with moderate schooling levels.

4. Conclusion

It is observed from the analysis of migration patterns among households affected by the Kakinada SEZ that education has a distinctive U-shaped impact on households' decisions to migrate. Migration increases in those with the least education, decreases in the moderately educated, and then increases once again in the highly educated. The transition from distress-induced mobility to opportunity-driven migration underlines the dual nature of migration in a post-displacement economy.

While migration out of compulsion continues from households with constrained land and income, more educated households migrate to realize better returns on their human capital. Local employment opportunities presented by the SEZs have reduced migration intensity for a section of the population, indicating that the extension of industry can partly absorb the displaced labor. The absorption of labor remains uneven across different education levels and skill categories. The study contributes empirical evidence to the growing body of literature recognizing nonlinear educational effects on migration. It also recognizes the need for policy frameworks that promote expanded local employment opportunities both for low- and high-skilled workers, thus ensuring that development-induced displacement does not reproduce spatial inequalities in livelihoods.

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