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Proximate and Structural Determinants of Internal Migration in Nepal

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1. Introduction

Little is known, either at the macro-level or the micro-level, about the determinants of Nepal's internal migration and the reasons for why some people move and others stay as well as the consequences of such moving for and staying in both origin (Hills) and destination (Tarai) areas. since little attention has been paid to the causes and consequences of rural to rural migration in Nepal, this study attempts to investigate structural determinants of internal migration in Nepal (1960-71).

This study utilized published aggregate data at the district level to model Nepal's internal migration. In this macro level analysis two types of model have been conceptualized. The first type relies on conventional explanation of net-migration using proximate variables like urbanization, industrialization, and income differentials. The second type of model relies on structural determinants by using land holding pattern and activities of land redistribution.

The resettlement program of tarai has become an important strategy for attempting to increase production and generate econmoic growth (**ARTEP ,1974**). Especially, land resettlement program of tarai was designed to combat the problems of population pressure in the Hills and resettle the landless and victims of natural disasters in the Tarai

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plains.

Accompanying the resettlement schemes and malaria eradication, however, is an increase in the rate of in–migration to Tarai from the Hills. The determinants of this internal migration from the Hills to Tarai have not been thoroughly investigated previously (**Gurung, 1973**).

With an exception of New ERA's study (**1981**) neither the proximate nor the structural determinants of internal migration have been analyzed for Nepal at the district level. The reason usually stated for this is the lack of data. For this study, however, the three censuses (1954, 1961 and 1971) in Nepal provided rich sources for generating proximate and structural variables for the macro-level analysis.

Proximate Determinants of Internal Migration

The population censuses of 1961 and 1971 were utilized for generating variables for the model of proximate determinants. Other government publications were used as additional data sources when the requisite data were not available from the two population censuses.

Seven independent variables consisting of five economic and two non—economic variables as determinants of net—migration were selected (Todaro 1976). The independent or explanatory variables for the macro-level analysis at the district level were:

1. persons per hectare of cultivated land;
2. literacy (formally means education) denoted by the proportion of the adult population who completed six years or more years of formal schooling;
3. the male population between the ages of 15 and 29;
4. urbanization level; represented by a dummy variable signifying the presence or absence of towns in a district;
5. non–agricultural occupation; represented by the number of persons employed in non—agricultural occupations;
6. agricultural cash income per household; and
7. industrialization expressed by the number of industrial units in a district.

The first five variables were derived from the Population Census of 1971 and the sixth and the seventh variables were respectively generated from the Agricultural Census of 1971 and the Census of Manufacturing, 1968. The dependent variable which was to be explained by the seven independent variables was the net—migration of each of the 75 districts of Nepal and was derived from the Population Censuses of 1961 and 1971.

Generation of the Dependent Variable

The dependent variable (Mj) is the net-migration by district of the entire population of Nepal. Since data were not available at the district level of aggregation, the national aggregates-crude birth rate of 42 per thousand and the crude death rate cf 20 per thousand were adapted by assuming that 95 per cent of the total population of Nepal leave in the rural area. The generation of the net—migration, Mj, is derived from the following vital statistics method

$$Mj = \left(P_{t+n} - P_t\right) - (B - D)$$

Where Mj is the net migration for a district j; P_t is the population of district j in 1961; $\left(P_{t+n}\right)$ is the population of district j in 1971; B is the national birth rate of district j, and D is the national death rate of district j. In the computation of Mj, the population figures of each district for 1961 were based on those derived by Gurung (1974). Gurung adjusted the 1971 district boundary lines and made a corresponding adjustment of population according to those defined boundary lines. The result was an estimation of population in each district of 1961 based on the district boundary lines of 1971.

Generation of Independent Variables

Persons per hectare of cultivated land (Aj) : It is the number of persons per hectare of cultivated land. This variable is assumed to have an inverse relationship with net—migration. *Education* (Ej) is the proportion of the adult population who have completed six or more years of schooling. This variable is assumed to be positively correlated with net—migration. The male population between 15 and 29 years of age (Yj) was the preferred sample due to their high propensity to move. The urbanization variable (Uj) as a pull factor for migrants was represented by a dummy variable in which '1' represented the presence of at least one town in a district and '0' indicated the absence of a town in a district. The definition of a town was according to 1971 population census of Nepal which designated 17 places as towns. A positive relationship between urbanization and migration was hypothesized. Occupation outside the Agricultuaal sector (Oj) was generated from the 6 categories of occupations outside agricultural; professional/technical, administrative, clerical, sales, service, and production workers. The number of workers in each of the categories was summed and the total for each district was used as the study's occupational variable (Oj).

Agricultural Income (Ij) was generated on the basis of the revenue of ten chief crops; rice, maize, wheat, millet, barley, potatoes, oilseed, sugarcane, jute, and tobacco. The revenues from these crops in 1970 accounted for 85 per cent of the total revenue from agricultural production in Nepal. Because of the unavailability of a wholesale price of potatoes, barley, and sugarcane, the price was assigned on the basis of field experience using 1970 exchange rates. The revenue of each district was computed and divided by the number of households in each of the 75 districts of Nepal. It is hypothesized that the higher the level of agricultural income per household of a district the higher the positive net-migration during 1961-1971. Industrialization (Sj) was generated from all types of manufacturing establishments (modern and traditional) as listed in a 1968 publication of the Ministry of Industry and Commerce. Four categories of industries were listed according to the number of people employed: Categories were termed 'units' with 1 to 10 workers; 11 to 30 workers; 31 to 60 workers; and more than 60 workers. All of these categories were enumerated and summed for each district to compute an industrialization variable (Sj). A positive relationship between the number of industries in a district and its net-migration rate was hypothesized.

Models of Proximate Determinants

The model which was developed in this section utilizes proximate variables as the explanatory variables for the dependent variable, net—migration. The modelling procedure used for explaining the dependent variable by seven independent variables was the ordinary least squares regression. The units of observation were the 75 districts of Nepal. The functional forms of the model were:

$$M_j = f\ (Aj\ Ej,\ Yj,\ Uj,\ Oj,\ Ij,\ Sj)$$

Mj = net migration (persons gained or lost) to district j between 1961 and 1971.

Where

- Aj = persons per hectare of cultivated land;
- Ej = adult population with 6 years or more education in district j in 1971;
- Yj = proportion of males between the ages 15 and 29 in district j in 1971;
- Uj = Urbanization represented by a dummy variable signifying the presence of towns in district j in 1971;
- Oj = number of persons employed in non-agricultural occupations in district j in 1971;

Ij = estimated agricultural income per household of district j in 1970; and
Sj = number of industrial units in district j in 1968.

The linear model in which the parameters $\beta_0 \ldots\ldots \beta_n$ were estimated using OLS regression analysis is:

$$Mj = (\alpha_0 + \beta_1 Aj + \beta_2 Ej + \beta_3 Yj + \beta_4 Uj + \beta_5 Oj + \beta_6 Ij + \beta_7 Sj) + \varepsilon j$$

A stepwise regression analysis was carried out to determine the relative importance of t e independent or explanatory variables of model A. The estimated equation of this model was arrived at as follows:

$$Mj = 4310.83 - 99.52\ Aj - 3.86\ Ej + .34\ Yj + 1672.45\ Uj + 1.82\ Oj + 31.32\ Ij + 373.99\ Sj$$

Predicted on the t and F tests and controls for multicollinearity the results of the analysis of model A were used to generate a reduced form model B The functional form of the model is

$$M = f\ (Uj, Ij, Sj)$$

The model in linear form is:

$$Mj = (\alpha_0 + \beta_1\ Uj + \beta_2 Ij + \beta_3 Sj) + \varepsilon j$$

The estimated equation of this model is:

$$Mj = 1412.85 + 18,964.08Uj + 31.07Ij + 487.98Sj + \varepsilon j$$

The parameter estimates and the t and F ratios for each of the hypothesized relationship between the dependent variable, net–migration and the independent variables for model A and B are presented in Table 1

Testing the Hypothesis of Model A and B

The coefficient of multiple determination or R^2 in model A was .63 Only the parameter for variable Ij (agricultural income) was significant at 01 level. Agricultural income alone accounted for 68 per cent of the explanation. Other variables contributed very little in explaining net migration Hence, a test for multicollinearity between the independent variables was conducted (Table 2).

A high or moderate correlation between the explanatory variable is not only indicator of multicollinearity in the Model. Another method of testing for multicollinearity is to compare the R^2 of .63 of Model A with the R^2 of 7 other regression equations, one equation for each independent variable. Each independent variable was regressed as a function of the other six (Table 3).

Table 1

Regression Equation For model A and B

Model A			*Model B*	
Independent Variables	Coefficients	Order of importance	Coefficients	Order of Importance
Aj	β: — 99.53	6		
	t: —.17)			
Ej	— 3.87	4		
	(— 4.23)			
yj	— .34	7		
	(— .90)			
Uj	16,721.45	3	18,964.08*	2
	(1.93)		(2.43)	
Oj	1.83	5		
	(1.08)			
Ij	31.32*	1	31.07*	1
	(2.96)		(3.53)	
Sj	373.99	2	482.98*	3
	(1.68)		(6.38)	
R^2	.63		0.62	
F	58.77		57.73	

* Significant at 01 level

Table 2

Simple Correlation Matrix of Model A

		Mj	Aj	Ej	Yj	Uj	Oj	Ij	Sj
1	Aj	.277	X						
2	Ej	.651	.129	X					
3	Yj	.578	.132	.844*	X				
4	Uj	.561	.304	557	.482	X			
5	Oj	703	.116	.937*	.770**	582	X		
6	Ij	.418	.552	.193	.173	.241	.167	X	
7	Sj	.707	.094*	.900*	.744*	.519	.952*	.182	X

* *High correlation*

***Moderate correlations.*

Table 3

Test for Multicollinearity Between Indepedent Variables

Equation	R^2	Dependent variable
1.	.32	Aj
2.	.83	Ej
3.	.76	Yj
4.	.72	Uj
5.	.74	Oj
6.	.46	Ij
7.	94	Sj

The results (Table 3) showed that equations 2, 3, 4, 5 and 7 have R^2 values higher than the R^2 value of .63 for the whole equation of Model A An indication of multicollinearity was present among the independent variables denoting education, population between 15 and 29 years of age, industrialization, occupational employment outside the agricultural sector, and urbanization.

Another indication of multicollinearity among the independent variables was the low level of statistical significance and therefore, by acknowledging the problems of multicollinearity, the moderate R^2 value of .63 in model A may be considered valid.

The results of the multicollinearity tests on model A caused 4 of the independent variables to be eliminated from the analysis. The remaining 3 independent variables, Uj (Urbanization), Ij (agricultural income), and Sj (industrialization) were used for explaining net migration by means of a stepwise regression analysis. The variables accounted for 62 per cent of the variation in the net migration. All three independent variables were significant at the .01 level with higher t statistics. Industrialization accounted for 49 per cent of the migration followed by urbanization 31 (per cent) and agricultural income (16 per cent).

An implication of the findings of this study is that Nepalese people are migrating out of the districts where income from agriculture is low relative to that of the destination districts. Industrialization appears to function as a "pull" factor for the members of the rural agricultural labour force. It seems that for every additional industrial establishment in a district there is on average a thirty fold increase in the net-migration of the district. Urbanization is an important factor in the explanation of migration in this study, which is contrary to previous finding based on qualitative studies in which the growth of the urban population was found to be due to an increase in the number of urban centers and such growth because of migration was nominal (**Rana and Thapa, 1974**) The next phase of this research is an investigation of the structural determinants which are causing the internal migrationof Nepal.

Structural Determinants of Internal Migration

Utilizing the samer dependent variable, net-migration, the ordinary least square regression was used to estimate parameters of seven structural independent variables in the 75 districts of Nepal. The selection of indepenent variables was again made on the basis of previous research (**Lipton, 1976**). The functional form of the model is:

$$Mj = f(Fj,\ Hj,\ Tj,\ Wj,\ Gj,\ Rj,\ Cj)$$

Where,

Mj = is net-migration(persons gained or lost) of distrtrict j between 1961 and 1971;

Fj = number of households with more than 6 parcels of land in district j in 1971;

Hj = number of hospital beds in district j in 1971;

Tj = density of motorable roads per square kilometer in district j in1971;

Wj = amount of goverment managed irrigated area in district j in 1971;

Gj = number of government employees in district j in 1972;

Rj = dummy variable representing the presence 1) or absence (0) of resettlement projects in district j in 1971; and

Cj = amout of authorized industrial capital allocated by the government in district j in 1971.

All of these stuctural determinants reprsent measures of government investment and redistribution strategies and hence the resultant model indicates the positive influences on net-mrgration.

Generation of Inpependent Variables

The variable Fj is an enumeration of the number of households in each district which own 6 or more parcels of land. The data for this variable was obtained from the 1971 Agriculture Census of Nepal which categorizes the households by number of parcels of land they own. The hypothesis is that there is an inverse relationship between the number of households in a distict with 6 or more parcels of land and net migration.

The variable Hj (hospital beds) in each district is a surrogate variable denoting government expenditures for social services, and was obtained from the 1971 annual statistics published by the Ministry of Health. A positive relationship between the number of hospital beds and net migration is hypothesized.[8]

Density of Motorable roads (Tj) was represented by the density per square kilometer of motorable roads, denoting the investment by the government in transportation infra structure. The data for this variable were obtained from statatics published by the Department of Roads in 1971. Since motorable roads can attract migrants, a positive relationship between this variable and net-migration in the studied districts was hypothesized.

Irrigated Area (A_j) in a district is assumed to be positively related to net-migration to that district. The Statistics published by the Nepal Ministry of Agriculture in 1971 categorized irrigated land in each district as follows: land receiving irrigation water all year; land receiving water only during specific seasons, and land receiving irrigation water only in the winter months. These categories were enumerated to form the surrogate variable Aj.

The variable Gj (Governmnet Employees) was represented by an enumeration of government employees at the district level obtained from Nepal Home Ministry, 1972. It included all categories of workers: different heirarchical positions of government employees stationed in the districts. Since the presence of jobs tends to attract migrants and the government is the major recruiter of employees in a district, positive net-migration to a district is hypothesized to cause a positive growth in the number of government employees of that district.

Agricultural Resettlement Projects (Rj) was selected on the premise that the opening of the Tarai to settlement and redistribution of land by the government brought landless people down from the hills, who were willing to acquire land. A variable denoting resettlement was derived from information by the Nepal Resettlement Office for the year 1971. The data indicated that all of the seven resettlement projects were situated in the Tarai. It was hypothesized that district having resettlement projects have positive net-migration.

Authorized Industrial Capital Ij) signifies the monetary investment by the central government of Nepal in the industrial sector of the economy. Nepal Industrial Development Corporation is responsible for financing, consulting, and feasibility assessment of the development of industry in Nepal. It also recommends to the Ministry of Industry and Commerce about the expenditure of authorized industrial capital in the various districts throughout Nepal. Data for this variable were obtained from statistics published by NIDC in 1971. In this publication the amount of authorized industrial capital was categorized (in Nepalese Currency) by district and by industry type: large, small and cottage. The amounts for each category of industry were added together for each district. The resulting sum was the amount of authorized industrial capital (Ij). More employment opportunities are associated with more investment of industrial capital in a district. It was hypothesized that there is a positive relationship between the amount of authorized industrial capital in a district and the net—migration of that district.

Models of Structural Determinants

The linear model in which the parameters $\beta_0 \ldots \beta_n$ were estimated using OLS regression analysis is:

$$Mj = (\beta_0 + \beta_1 Fj + \beta_2 Hj + \beta_3 Tj + \beta_4 Aj + \beta_5 Gj + \beta_6 Rj + \beta_7 Ij) + \varepsilon j$$

A stepwise regression was performed to ascertain the importance of various explanatory variables to explain net-migration in this model C. On the basis of t test and F ratios, a reduced form of the model was generated, which is:

$$Mj = f\ (Aj, Gj, Rj, Ij)$$

The linear form of this model 'D' is:

$$Mj = (\beta_0 + \beta_1 Aj + \beta_2 Gj + \beta_3 Rj + \beta_4 Ij) + \varepsilon j$$

The parameters of model 'D' was also estimated by OLS regression technique and stepwise regression was used to ascertain the relative importance of independent variables in explaining net-migration.

Analysis of Model C and Model D

The coefficient of multiple determination R^2 in model C was .71 (Table 4). An examination of the simple correlation coefficients (Table 5) demonstrated that multicollinearity among the explanatory variables was not a problem with model C, however, all of the explanatory variables were not significant at the .01 level. In particular, the three Variables: Fj, Hj, and Tj, accounted for only 6 per cent of the total explanation and were not significant at .01 level, hence there variables were eliminated from model C to generate the reduced form model D.

Table 4

Regression Equation of Model C and Model D

Independent Variable		Model C Coefficient	Model C Order of Importance	Model D Coefficients	Model D Order of Importance
Fj	β:	— .9884	7		
	t:	(– .9827)			
Hj		68 8112			
		(1.3312)	6		
Tj		12854.1433			
		(1 9084)	5		
Aj		2006.7300*			
		(1.1874)	4	2192.7833*	
				(2.3720)	3
Gj		23.8643		33.3584*	
		(1.5406)	2	(2.3279)	1
Rj		33,031.2543		31,839 7913*	
		(3.6612)	1	(3.6135)	4
Ij		.0732*		.1069*	
		(2.3354)	3	(4.9287	2
R^2			.71		.67
F			75 61		71.83

* significant at .01 level

The four remaining independent variables in Model D are:

Aj (irrigated area), Gj (number of government employees); Rj (agricultural resettlement projects, and Ij (authorized industrial capital) explained 67 per cent (R^2) of the explanation of net–migration. All of these variable were significant at .01 level. The resulting equation of model D is:

$$Mj = 4{,}437.1030 + 2192.7833\ Aj + 33.3484\ Gj + 3{,}189.7913\ Rj + .1068\ Ij + \varepsilon j$$

Governmenet employes (Gj) explained 27 per cent of the variation in net-migration followed by authorized industrial capital (Ij) which accounted for 52 per cent, irrigated area (Aj) accounting for 8 per cent and the presence of resettlement projects (Rj) accounting for 7 percent.

Table 5

Simple Correlation Coefficients of Model C

	Mj	Fj	Hj	Tj	Aj	Gj	Rj
Fj	.297						
Hj	.613	-.121					
Tj	.455	-.139	.430				
Aj	.476	-.219	.193	.127			
Gj	.665	-.345	.507	.480	.431		
Rj	.454	-.308	.011	.016	.409	.231	
Ij	655	-.166	.531	.383	.151	.439	.102

Conclusion

The modelling of proximate and structural determinants of the internal migration system did not distinguish between the character of the flows but rather focused on district level net—migration during 1961—71 decade. Data limitations prohibited the disaggregation of the dependent variable into in and out-migration components, or into ruarl-to-rural, rural-to-urban streams. The net—migration generated here represents approximately the national migration system attempted in this study.

None of the other studies including that of New ERA (1981) is so conclusive as attempted in this study. Because the study by New ERA does specify variable both dependent and independent—but does not elaborate on the processess by which it reaches conclusions. Most of the propositions New Era developed proved to be inconclusive because of methodological error or the lack of methodological details Hence certain conculsions from the present study can be derived as follows:

(1) differentials in income derived from agriculture are positive by related to net migration. Migration appears to be from rural district where the earnings from agricultural activities are low compared to those of the destination districts.

(2) The location of goverment resettlement projects are targets for migrants.

(3) Government investment in irrigation for the agricultural sector is also positively related to net-migation.

(4) Government investment in the industrial sector and industrial activity is also positively related to net—migration suggesting that industrial activities in a district act as pull factors for in—migrants.

(5) The presence of a town in a district is an influence on migration.

(6) Migration is responding very much to government development and administr—ative policies in a district suggesting that administrative activities focused on specific towns appears to be contributing to district growth via migration.

Further research in this area should concentrate on the internal migration including the rural-to-rural and urban-to-urban sectors. This should be undertaken in the remaining districts of Tarai. A micro—level study examining the nature and extent of international migration — both emigration and immigration and its socioeconomic impact would be an important contribution for formulating national policies on population.

At the national level, additional infra-structure and the provision of adminis-trative and socioeconomic services would enable urban areas to absorb some migrants thereby lessening the burden on the rural areas. More people should be diverted to non-agricultural occupations to help lessen the burden on the rural land owners and the land itself.

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