

# Occupational Mobility among Residents of Burdwan Town and Durgapur Town

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**Abstract:** Occupational mobility is a key characteristic of social mobility of a region. We can get an idea of intergenerational and intragenerational occupational mobility situation of a town. In this paper, we can get ideas of occupational mobility situation of Burdwan and Durgapur town of West Bengal, India through different occupational mobility measures based on survey data.

**Keywords:** Occupational Mobility, Measure, Transition Probability Matrix

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## 1 Introduction

Income, occupation, social statuses or place of residence are some of the index of stratification of human society. These are considered as the main causes of social mobility. These movements are very much unpredictable at the individual level, it is necessary to study this mobility with only in terms of probabilities not with certainty.

The changes in occupational classes over generation or within generation is termed as occupational mobility. These are results in changes of the distribution of the total population among the constitute classes from one generation to another generation or within generation or from one period of time to another. This distribution reach to a steady state. The variations in the number of offsprings to different progenitors and the inter-dependence among occupational groups occupied by the different offsprings of the same progenitor is used to obtain the modification of the distribution of successive generations. The final status of both father and son are considered in order to find the inter-generational occupational mobility.

Due to needs of empirical research, the social mobility or occupational mobility measurements were developed. Primarily measures were developed without considering mathematical models by [9], [16], [3] and several other authors. [13] also developed a few such measures based on measures of association. [15] was probably the first author to apply chain theory to social mobility. The society is characterized by the transition probability matrix and most of the measures proposed are based on the elements of this matrix. Some examples are given in [11]. Measures related to occupation changes of a particular individual based on Semi-markov processes were proposed by [8], [1], [14] and others. When the social classes can be ordered with respect to certain character(s), measured to represent the overall pattern of association and the direction of movement were developed by [13] and [4]. [7] have proposed an occupational mobility measure based on Mahalanabis distance. [10] have developed a measure based on the first passage time.

The objective of the present study is to investigate the inter and intra generational mobility situation among the residents of Burdwan town and Durgapur town. This work has done on the light of [5] in which they are studied this among the residents of Kolkata. This investigation has done on the basis of the data which has been collected during 2012-2013 by ourselves funded by a DST research project supported by DST, Government of India over 100 residents of Burdwan and Durgapur cities each which selected at random from voter list of Election Commission, Government of India.

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## 2 The Data

The survey has been conducted to study the pattern of occupational mobility of residents of Burdwan town and Durgapur town, over two successive generations (i.e. from fathers to sons) and within generation over two time points. The respondent have been considered as the first generation. The survey schedule has been designed for collection of the following information gender, age, marital status, highest educational level, employment status, type of work of the employed members of the family with period and type of works of respondent's previous generation and brother(s)/sister(s).

We have collected the voter list of Burdwan North and Durgapur assembly constituency from Election Commission, Government of India. At first we have selected five polling stations randomly without replacement. After selection of polling station we have selected twenty voters from voter list of that polling station randomly without replacement. So one hundred voters which have randomly selected in the above manner are surveyed through specially designed survey schedule by our selves for each town.

We have classified the occupations into 3 groups viz Service, Business and Labour. From the data we have estimated two transition matrix one is for intergenerational (Table 1) and other is intragenerational (Table 2) for Burdwan Town.

**Table 1:** Estimated Intergenerational Transition Matrix of Burdwan Town

	Service	Business	Labour
Service	0.315	0.515	0.170
Business	0.334	0.459	0.207
Labour	0.324	0.448	0.228

The proportion of respondents of these categories are (0.32,0.49,0.19) at time of survey. And the proportion of respondents belongs to these three categories at the initial time point is (0.59,0.19,0.22).

**Table 2:** Estimated Intragenerational Transition Matrix of Burdwan Town

	Service	Business	Labour
Service	0.231	0.616	0.153
Business	0.056	0.650	0.294
Labour	0.313	0.500	0.187

For studying the intragenerational mobility we have collected the information of occupation for same generation. All respondents did not give the information of his/her brother's occupation. The proportion of respondents of these three categories are (0.24548,0.57396,0.17997) at time of survey. And the proportion of respondents belongs to these three categories at the initial time point is (0.51,0.10,0.39). These proportion are calculated on the basis of the information of his/her brother's occupation.

The same was done for Durgapur Town. We construct two transition matrix one is for intergenerational(Table 3) and other is intragenerational(Table 4)

**Table 3:** Estimated Intergenerational Transition Matrix of Durgapur Town

	Service	Business	Labour
Service	0.838	0.162	0.0001
Business	0.589	0.411	0.0001
Labour	0.586	0.276	0.138

The proportion of respondents of these categories are (0.67992,0.28006,0.04009) at time of survey. And the proportion of respondents belongs to these three categories at the initial time point is (0.37,0.34,0.29). These proportions have been calculated in same way as Burdwan city.

The proportion of respondents of these three categories are (0.71980,0.24992,0.03028) at time of survey. And the proportion of respondents belongs to these three categories at the initial time point is (0.68,0.28,0.04). These proportion are calculated on the basis of the information of his/her brother's occupation.

**Table 4:** Estimated Intragenerational Transition Matrix of Durgapur Town

	Service	Business	Labour
Service	0.941	0.044	0.015
Business	0.214	0.750	0.036
Labour	0.500	0.250	0.250

### 3 Some Perfect Situations

Let us define the following two perfect situations regarding promotion.

**Perfect promotion situation**

Under this situation a particular individual has the equal chances of moving to next higher category or no promotion.

$$P^{k \times k} = \begin{pmatrix} 1/2 & 1/2 & 0 & \dots & 0 \\ 0 & 1/2 & 1/2 & \dots & 0 \\ \vdots & & & & \\ 0 & \dots & 1/2 & & 1/2 \\ 0 & \dots & \dots & \dots & 1 \end{pmatrix}$$

**No promotion situation**

Under this situation a particular individual has no chance of promotion.

$$P^{k \times k} = \begin{pmatrix} 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \vdots & & & \\ 0 & 0 & \dots & 1 \end{pmatrix}$$

### 4 Measures of Occupational Mobility

#### 4.1 Measures Based on Stochastic Models

We have considered the measures of occupational mobility based on stochastic models. For measures based on stochastic models, a simple markov model can be used to explain the mobility situation. The transition probability matrix at time point  $t$  is given by

$$P^t = ((p_{ij})), i = 1, 2, \dots, k; j = 1, 2, \dots, k$$

where  $k$ = total number of occupation categories

$p_{ij}$ = P(son is in category  $j$  at time point  $(t + 1)$ —father was in category  $i$  at time point  $t$ ).

We also define  $\pi^t$ = proportion of total population at time  $t$  belonging to category  $i$ .

Assuming that  $P^t = P$  is independent of time, we have

$$\pi^{t+1} = P^t \pi^t$$

where  $P^t$  is the transition of  $P$ .

A number of the measures of mobility had been proposed on the basis of the above model. Some of measures are as follows:

$$\begin{aligned} -\text{cos}\Delta &= \sum_{i=1}^k \sqrt{\pi_i^{(t)} \pi_i^{(t+1)}} \\ -J(1, 2) &= \sum_{i=1}^k (\pi_i^{(t)} - \pi_i^{(t+1)}) \ln\left(\frac{\pi_i^{(t)}}{\pi_i^{(t+1)}}\right) \\ -M_2 &= \sum_{i=1}^k (\pi_i^{(t)} - \pi_i^{(t+1)})^2 / \pi_i^{(t+1)} \\ -M - D &= (\pi(t) - \pi(t + 1))' S^{-1} (\pi(t) - \pi(t + 1)) \end{aligned}$$

## 4.2 Measures Based on Association

We may consider a measure of association as an inverse measure of mobility since in the case of perfect mobility there will be no association between two successive generation.

### –Karl Pearsons coefficient of contingency

$$C_{AB} = \left[ \frac{\sum \sum (p_{ij}^2 / p_{0j}) - 1}{\sum \sum (p_{ij}^2 / p_{0j})} \right]^{1/2}$$

### –Tschuprow's coefficient

$$T_{AB} = \left[ \frac{\sum \sum (p_{ij}^2 / p_{0j}) - 1}{(k-1)} \right]^{1/2}$$

## 4.3 Measures Based on Transition Probability Matrix

### – Trace of $P$

According to [12] a simple measure of occupational mobility based on the transition probability matrix is  $trP$ .

### –Based on class boundaries

As suggested by [1] a more direct and meaningful measure is obtained by counting the class boundaries crossed in passing from one generation to the next, given by

$$D = \sum_i \sum_j \pi^t p_{ij} |i - j|$$

### –Based on the distributions of the population

A measure of divergence between two multinomial populations as at times  $t$  and  $(t + 1)$  by using Bhattacharyya's distance (1945-46), has been suggested in [12] as below

$$\cos \Delta = \sum_i \sqrt{\pi_i^t \pi_i^{t+1}}$$

### –Based on the variances of $\pi_i^t$

Another measure based on the variances of  $\pi_i^t$ s is given by

$$R = \frac{\pi^t P' P \pi^t}{\pi^t \pi^t}$$

## 5 Analysis

### 5.1 Burdwan Town

Now we are comparing the measures we obtained from the data.

On the basis of the values of the above measures (Table: 5) it can be said that intergenerational occupational movement over these three categories among the residents of Burdwan city were quite significant but it is difficult to say about the direction of the movement of Burdwan city.

On the basis of the values of the above measures (Table: 6) it can be said that intragenerational occupational movement over these three categories among the residents of Burdwan city were quite significant but it is difficult to say about the direction of the movement of Burdwan city.

### 5.2 Durgapur Town

Now we are comparing the measures we obtained from the data.

On the basis of the values of the above measures (Table: 7) it can be said that intragenerational occupational movement over these three categories among the residents of Durgapur city were quite significant but it is difficult to say about the direction of the movement of Durgapur city.

On the basis of the values of the above measures (Table: 8) it can be said that intragenerational occupational movement over these three categories among the residents of Burdwan city were quite significant but it is difficult to say about the direction of the movement of Durgapur city.

**Table 5:** Comparison of different measures of Intergenerational Occupational Mobility for Burdwan Town

Measures	Observed value	Perfect mobility	Perfect Immobility
P	-0.0007	0.25	1.00
trP	1.002	2.00	3.00
$cos\Delta$	0.944	0.952	1.00
J(1,2)	0.452	0.382	0
R	0.736	0.560	1.00
$C_{AB}$	0.069	0.674	0.816
$T_{AB}$	0.049	0.645	1.00
$M_2$	0.414	0.420	0
M-D	0.239	0.20	0

**Table 6:** Comparison of different measures of Intragenerational Occupational Mobility for Burdwan Town

Measures	Observed value	Perfect mobility	Perfect Immobility
P	0.0175	0.25	1.00
trP	1.068	2	3.00
$cos\Delta$	0.858	0.952	1.00
J(1,2)	1.184	0.382	0
R	0.427	0.560	1.00
$C_{AB}$	0.274	0.674	0.816
$T_{AB}$	0.202	0.645	1.00
$M_2$	0.92	0.420	0
M-D	0.20	0.20	0

**Table 7:** Comparison of different measures of Intergenerational Occupational Mobility for Durgapur Town

Measures	Observed value	Perfect mobility	Perfect Immobility
P	0.0344	0.25	1.00
trP	1.388	2.00	3.00
$cos\Delta$	0.9179	0.974	1.00
J(1,2)	0.6947	0.207	0
R	1.1416	0.91	1.00
$C_{AB}$	0.36	0.67	0.816
$T_{AB}$	0.273	0.64	1.00
$M_2$	1.712	0.24	0
M-D	0.334	0.106	0

**Table 8:** Comparison of different measures of Intragenerational Occupational Mobility for Durgapur Town

Measures	Observed value	Perfect mobility	Perfect Immobility
P	0.161	0.25	1.00
trP	1.941	2.00	3.00
$cos\Delta$	0.998	0.93	1.00
J(1,2)	0.008	0.554	0
R	1.34	0.475	1.00
$C_{AB}$	0.58	0.67	0.816
$T_{AB}$	0.513	0.645	0.1.00
$M_2$	0.008	0.532	0
M-D	0.0041	0.292	0

## 6 Conclusion

From this paper we can get an idea of occupational mobility situation of these two towns. We can extend this work for other towns as well as for different states or countries.

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