

STUDY ON DEMOGRAPHIC TRAITS OF TWO ORAON OCCUPATIONAL GROUPS OF ALIPURDUAR DISTRICT, WEST BENGAL

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ABSTRACT

Present study tries to compare the demographic traits of two Oraon occupational groups, living in the same habitat. The study also aims to see the selection intensity of the populations in the particular habitat. Demographic data, including fertility and mortality, was collected from 323 ever married Oraon tribal women engaged in two different occupational groups of Alipurduar District (West Bengal) using a well-tested questionnaire. Oraons are the largest tribal group in the district who migrated from Chota Nagpur region (presently Jharkhand) about 100 years before. The agricultural group consists of 165 women and tea garden group consists of 158 women. Age-specific fertility, infant and adolescent mortality were calculated. Crow's (1958) and Johnson and Kensinger's (1971) indices were used to estimate the selection intensity of the population. The family planning practice was also presented to justify the birth rate of the population.

Age-sex distribution of the population shows that both of the study groups have less number of children in the lower age group and more number of population in the middle age group. It may be due to the awareness and practice of family planning in recent years. Moreover, the fertility rate and mortality rate of the agricultural worker is comparatively lower than the tea garden labourers. In respect of selection intensity, both fertility (If) and mortality (Im) components are lower in case of women engaged in agricultural work compared to women engaged in tea garden work. Considering both the methodologies of selection intensity, the value of total index (I) was higher in the tea garden population, indicating a better selection opportunity

Key words: Demography, Fertility, Mortality, Selection Intensity.

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INTRODUCTION

Demography, defined by Hauser and Duncan (1959), is 'the study of the size, territorial distribution, and composition of population, changes therein, and the components of such changes'. Classical demography deals with the population dynamics (changes over time and space) and it involves large scale data. But small scale, intensive, anthropological studies can also provide useful information of population. Macfarlane (1976) believes that 'micro-demography can combine some meaningful estimates of general demographic trends with intensive study of the social and economic correlates of such trends, and can still make a very useful contribution to population studies'. Developing countries like India are passing through a phase of demographic transition in recent past. This entitles initially a reduction in the death rate (particularly infant and child) followed by a reduction in birth rate. This may be due to the fact that the fertility patterns are deeply embedded in the system of cultural norms and therefore, change occurs more slowly than mortality reducing behaviors (McMichael, 1982). So, socioeconomic and sociocultural milieu of a population has tremendous impact on fertility and mortality and subsequently on natural selection (Crow, 1958; Spuhler, 1963; Johnston and Kensinger, 1971; Spuhler, 1976; Tripp-Reimer, 1980). The natural selection intensity index assumes that the reproductive differentials are due to the genotypic differences. This index has been extensively studied in human populations because it measures the changes in fitness from specific birth and death rates, if they were all selective and heritability of fitness was complete (Crow, 1972). Several small-scale studies in the Indian context have demonstrated the role of natural selection in imposing characteristic fertility and mortality differentials on different populations (Bharati, 1981; Rao and Murthy, 1984; Padmanabham, 1985; Rajanikumari et. al., 1985; Rajanikumari and Rao, 1985; Barua 1976; Reddy et. al., 1987; Reddy, 1983; Reddy, 1990). All these studies reveal a relationship between socioeconomic conditions and the index of total selection. Reddy and Chopra (1990) presented a comparative study on natural selection in 96 Indian populations and found variability of the selection intensity index according to social, cultural and economic status of the populations. Thus, these attributes of a population can help to rationalize the indices of selection measure.

Several ethnic communities all over the country show diverse ethno-cultural and socioeconomic structures. So, it provides us a unique opportunity to look for the micro-evolutionary dynamics of various population groups by studying their selection pattern. In the present study, the fertility and mortality behaviors of Oraon community residing in Alipurduar district of West Bengal have been studied. In view of the above, the objective of the present study was to compare fertility and mortality of two Oraon groups residing in same geo-climatic region, having two different occupations. Secondly to see as how the opportunity for selection works on both the groups.

MATERIALS AND METHODS

As a part of an ongoing bio-medical project on Oraon labourers, demographic data were collected from two occupational subgroups of Oraon, one engaged in agricultural work and other in tea garden. A total number of 1394 adult individuals were studied, of which 750 adults were agricultural labourers (male= 369, female= 381) from five villages (Madhya Rangalibajna, Uttar Rangalibajna, Chanpaguri, Doldulia and Nabipur) under Madarihaat police station area of Alipurduar district, West Bengal. The rest 644 individuals were tea garden labourers (male= 338, female= 306) of Tasati tea Estate under Falakata police station of Alipurduar district of West Bengal. Oraons are supposed to be the inhabitants of Chotonagpur and Santal parganas of Bihar (presently Jharkhand State); they were brought into this area by the labour contractors as labourers in the tea gardens at the end of the eighteenth century (Chowdhury, 1978; Dalton, 1872). The study was restricted to an endogamous ethnic group-the Oraons. Later on, due to the scarcity of jobs in the tea gardens, some of them have shifted to agricultural activity in the nearby villages. At present, there are contrasting socioeconomic and sociocultural condition between this two occupational groups.

The study was performed with the prior consent of the participants. No statistical sampling was done, because any kind of selection within the population would have raised suspicion in the minds of the people studied regarding the purpose of the study. However, the participants were chosen without any conscious bias; actually the participants who could be persuaded to participate in the study and volunteered for participation in the study were included in the sample.

In the present study age, sex, marital status was recorded from the individuals. Due to absence of birth records, age was estimated by reference to some important local events and cross checked from a number of elderly individuals. Data on pregnancies, abortions, still births, live births, mortality (including neonatal, infant, childhood and adolescent), per capita expenditure, years of education were also collected through pre-tested schedule or questionnaire.

Analysis of Data

Fertility: Age-specific fertility has been calculated by grouping the mothers into 7 age-cohorts and the birth of each child in each age cohort was cross tabulated. Then total number of children were divided by the number of mothers in each age cohort.

Mortality: Neo-natal, infant, child and adolescent death were cross tabulated with the age cohort of mothers. Then number of deaths to each cell was divided by the respective number of pregnancies and live births.

Calculation of selection intensity index

Both Crow's (1958) as well as Johnston and Kensinger's (1971) indices were applied to calculate the total selection intensity indices and its components. The following formulae were used to calculate the indices:

Crow's index

$$I = I_m + \left(\frac{I_f}{P_s} \right), \text{ where } I_m = \left(\frac{P_d}{P_s} \right), P_s = (1 - P_d) \text{ and } I_f = V_f / (\bar{x})^2$$

Where I= index of total selection intensity, I_m = index of selection due to mortality, P_d = probability of deaths up to pre-reproductive age (i.e. before 15 years), P_s = probability of survival up to reproductive age, I_f = index of selection due to fertility, V_f = variance due to fertility and \bar{x} = mean number of live births.

Johnston and Kensinger's index

$$I = I_{me} + \frac{I_{mc}}{P_b} + I_f / (P_b \times P_s), \text{ where } I_{me} = \left(\frac{P_{ed}}{P_b} \right), P_b = (1 - P_{ed}), I_{mc} = \left(\frac{P_d}{P_s} \right), P_s = (1 - P_d)$$

$$\text{and } I_f = \frac{V_f}{(\bar{x})^2}$$

Where I= index of total selection intensity, = index of total selection due to prenatal mortality, = probability of death before birth, = probability to survive till birth, = index of total selection due to postnatal mortality, = probability of death before reaching reproductive age (i.e. before 15 years), = probability to survive till reproductive age, = index of total selection due to fertility, = variance due to fertility and \bar{x} = mean number of live births per women.

Descriptive statistics and z-statistic have been used to find out the differences in selected demographic traits. All the data were analyzed using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

The total Oraon population having two different occupations has been presented, by age and sex, in Table 1 and Figures 1 and 2. Tables 1 and 2 describe the distribution of population by age, sex and marital status. Figures 1 and 2 show that, in agricultural labourer group, for males and females, respectively, the highest percentages were in age groups of 15-19 years and 20-24 years. Similarly, in the tea garden group, the highest percentage of males and females were in 15 to 19 years age group.

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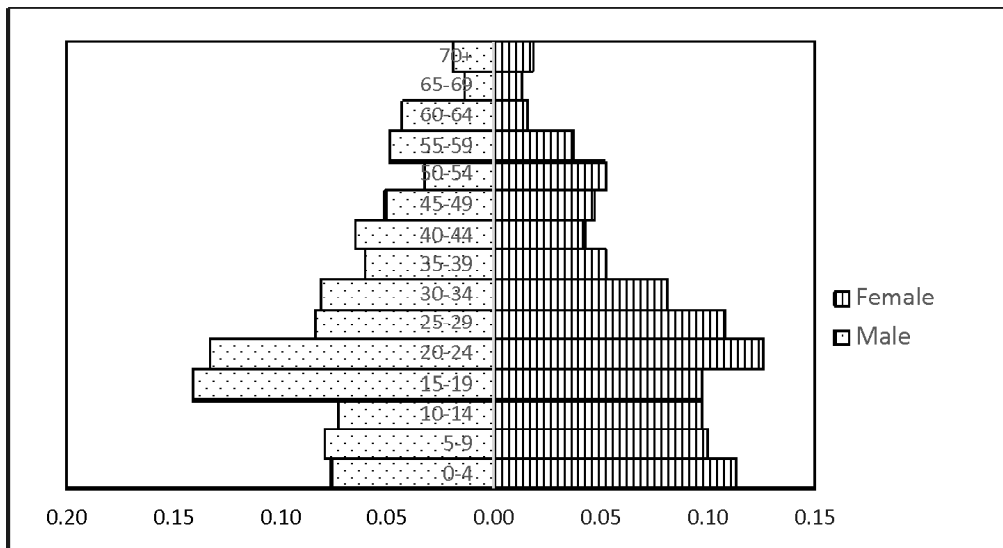


Figure 1: Population pyramid of Agricultural Labourer

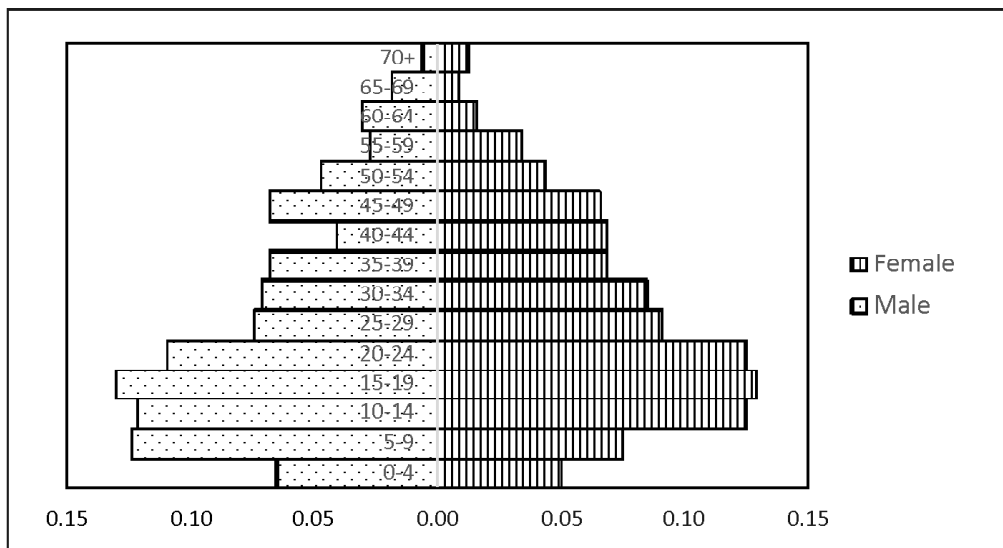


Figure 2: Population pyramid of Tea Garden Labourer

Table 3 describes the family planning practices during 5-yearly age periods of agricultural and tea garden labourer. Row of the table represents number of women in each age cohort and column represents the type family planning they were practicing. Percentages in each row and column represents as how many women were practicing that type of family planning in that particular age cohort in respect to the total number of women. In agricultural group, 27.27% of the participants have not used any type of family planning methods. Whereas 20.25% females of

tea garden group did not use any type of family planning methods. Tubectomy is the mostly practiced method among both the study groups (Agricultural labourer = 47.88%; Tea garden labourer = 55.06%). While most of the women of agricultural group started family planning at the end of their child bearing age, i.e. 40-44 years, the women of tea garden labourer group started family planning at an earlier age, i.e. 35-39 years.

Table-4 describes the live births during 5-yearly age periods and total fertility rate of agricultural and tea garden labourers. In both the groups, higher fertility has been observed among older females (45+ years). Completed family size was relatively higher in agricultural group (4.812) than tea garden group (4.468). The total fertility rate was higher in the women of agricultural group (3.08) than the women of tea garden group (2.925).

Table 5 describes the infant, child and adolescent mortality rate by 5-yearly age periods of ever married females of both occupational groups. Tea garden labourers have shown higher mortality rate (including neonatal, infant, child and adolescent mortality) than the agricultural labourer. However, the proportion of deaths from early embryos to reproductive age has been gradually increased in both study groups.

Result of t-test as well as z-test for equality of proportion has been carried out to find out the difference of fertility and mortality rates between the two occupational groups (Table 6). Result shows non-significant difference between groups in any of the traits.

Table 7 shows the Indices of selection intensity obtained from two methods of calculation. Crow's method of selection intensity (I) for agricultural labourer was 0.407, and for tea garden labourer it was 0.726. Using Johnston and Kensinger's method, the selection intensity for agricultural labourer was 0.495, and for tea garden labourer it was 0.882. The increase of selection intensity value in Johnston and Kensinger's method may be due to additional consideration of prenatal mortality. Still selection (I) is stronger in tea garden labourers than agricultural labourer, although the values in two methods change marginally.

DISCUSSION

The effort of the present study was to see the differences between two Oraon occupational groups in terms of basic demographic characteristics like fertility and mortality as well as selection intensity. Both the Oraon occupational groups share the common ecology and environment, the only difference lies in their occupation- one group was engaged in agriculture and another group was tea garden labourer. The protocol for data collection and time of data collection was similar for the both the groups. It was intuitive that there would be no difference and if any difference lies that would be caused due to occupation (which generally determines the life style of a group).

Population pyramid depicts that both the groups have characteristics of a 'stationary' population (Dutta, 1972). Therefore, it has a low fertility rate and has larger percentages of the population in the younger age groups. The possible explanation behind the lower frequencies at the infant age may be due to the fact that both the groups have already come across family planning practices in recent decades. Data on family planning practices (Table-3) supports such possibility. Among different methods of contraception, tubectomy was most popular in both the study groups, which may be due to the attitude of the women folk as well as lucrative offer of money from government whereas men were rather reluctant due to some misconceptions. Saha (2007) reported similar trend of family planning practices in tea garden tribal women of North Bengal. Several other studies (Sircar, 1974; Bhattacharjee, 2013; Mahanta, 2014), conducted in Darjeeling and Assam tea garden, also reported such findings and mentioned that women labourers were more receptive to adopt family planning methods than men. Result also demonstrated that frequency of family planning was more among tea garden labourers than agricultural labourers because of frequent visit of government health workers to the tea garden labour lines.

The fertility rate is higher in agricultural labourers than tea garden labourers. However, mortality rates (Table 5) were higher in tea garden labourers than the agricultural labourers but the differences between the groups in fertility and mortality were not significant. This may be due to socio-economic influences as well as occupational differences between the groups. As, both of the groups are from same ethnic stock, significant difference in reproductive performance was not obtained. The minor differences in fertility and mortality may be claimed due to socio-economic reasons. This justification corroborates with the findings of Baranski (1993). Many studies explained literacy as one of the major influencing factor (Cochrane, 1979; Jejeebhoy, 1995; Rutstein, 2002; Bongaarts, 2008, 2010; Shapiro and Gebreselassie, 2008).

Comparing the selection intensity index (I) of Crow (1958) and its components (I_f and I_m) between the two study groups, agricultural group has lower value than the tea garden group, though there was no significant difference in fertility rate and mortality rate between the groups. Again comparing selection intensity index (I) of Johnson and Kensinger (1971) and its component of fertility and mortality index (I_f and I_m), where neonatal mortality has also been included to see if the indices differ between groups. The picture of the trend did not differ but show a higher value for all the components. Many small scale studies have reported lower selection intensity values in advanced socio-cultural groups than traditional socio-cultural groups (Bharati, 1981; Rao and Murty, 1984; Rajanikumari et al., 1985; Reddy et al., 1987). However, the calculation of present selection intensity does not consider socio-cultural traits and it is really difficult to measure the influences of socio-cultural behavior like education, occupation, family income, beliefs and awareness towards health upon the gene-pool of the particular population. There are other possibilities also which cannot altogether be ignored like sample size of the

population, large sample sizes may be one of the ways of removing the effects of socio-cultural factors.

CONCLUSION

Present study on two occupational groups indicated that value of the selection intensity index is relatively larger in tea garden group than agricultural group. That means tea garden group is more naturally selected than the agricultural group. However, selection intensity is a function of only fertility and mortality which was conspicuously better (higher fertility and lower mortality) in agricultural group. Still the selection forces did not operate properly as has been mentioned in several published studies. There were some underlying socio-economic and cultural reasons, which may have hindered the actual selection index and it may be one of the limitations of calculating intensity index. It would be ideal to rethink the calculation of selection intensity, where may have scopes to include socioeconomic and cultural variables. In addition to that small sample size may have some effects that might be eradicated in the interest of small anthropological study.

Table 1: Distribution of Oraon Agricultural labourer group by age, sex and marital status

Age Group	Male (n= 369)			Female (n=381)		
	Unmarried	Married	W/D/S	Unmarried	Married	W/D/S
0-4	28			43		
5-9	29			38		
10-14	27			37		
0-14	84 (22.76)*			118 (30.97)		
15-19	51	1		25	12	
20-24	32	17		24	23	1
25-29	9	22		8	31	2
30-34	5	25		2	27	2
35-39	2	20		2	15	3
40-44		23	1		16	
45-49		17	2		16	2
15-49	99 (26.83)	125 (33.88)	3 (0.81)	61 (16.01)	140 (36.75)	10 (2.62)
50-54		11	1		14	6
55-59		15	3		12	2
60-64		12	4		2	4
65-69	1	3	1		1	4
70+		4	3			7
50+	1 (0.27)	45 (12.20)	12 (3.25)		29 (7.61)	23 (6.04)
Total	184	170	15	179	169	33

*percentage in parenthesis

Table 2: Distribution of Oraon Tea garden labourer group by age, sex and marital status

Age Group	Male (n= 338)			Female (n=306)		
	Unmarried	Married	W/D/S	Unmarried	Married	W/D/S
0-4	22			16		
5-9	42			24		
10-14	41			40		
0-14	105 (31.07)			80 (26.14)		
15-19	42	2		33	8	
20-24	21	15	1	19	21	
25-29	5	19	1	2	25	2
30-34	2	22		3	22	2
35-39	2	20	1	1	19	2
40-44	1	12	1	1	17	4
45-49	2	21			18	3
15-49	75 (22.19)	111 (32.84)	4 (1.18)	59 (19.28)	130 (42.48)	13 (4.25)
50-54		15	1	1	7	6
55-59		6	3	1	3	7
60-64	1	8	1		3	2
65-69	1	3	2			3
70+			2	1		3
50+	2 (0.59)	32 (9.47)	9 (2.66)	3 (0.98)	13 (4.25)	21 (6.86)
Total	182	143	13	142	143	34

*percentage in parenthesis

Table 3: Family planning practice (as reported by the females) among different age groups of female Agricultural and Tea garden labourers

Age group	No. of Women	Not Using contraceptives	Types of Contraception				Widow	Menopause	Gynecological Problems
			Tubectomy	Vasectomy	Using Contraceptives				
Agricultural Labourers									
<20	9	9 (5.45)*							
20-24	18	13 (7.88)	2 (1.21)		2 (1.21)	1 (0.61)			
25-29	28	14 (8.48)	10 (6.06)	1 (0.61)	2 (1.21)	1 (0.61)			
30-34	24	7 (4.24)	10 (6.06)	1 (0.61)	4 (2.42)	1 (0.61)		1 (0.61)	
35-39	17	1 (0.61)	9 (5.45)	3 (1.82)	1 (0.61)	2 (1.21)		1 (0.61)	
40-44	16	1 (0.61)	14 (8.48)					1 (0.61)	
≥ 45	53		34 (20.61)			1 (0.61)	18 (10.91)		
Total	165	45 (27.27)	79 (47.88)	5 (3.03)	9 (5.45)	6 (3.64)	18 (10.91)	3 (1.82)	
Tea Garden Labourers									
<20	13	13 (8.23)							
20-24	13	9 (5.70)	3 (1.90)		1 (0.63)				
25-29	21	7 (4.43)	10 (6.33)	1 (0.63)	2 (1.27)	1 (0.63)		1 (0.63)	
30-34	22	2 (1.27)	14 (8.86)	3 (1.90)	1 (0.63)	1 (0.63)		1 (0.63)	
35-39	21	1 (0.63)	17 (10.76)	1 (0.63)	1 (0.63)			1 (0.63)	
40-44	21		15 (9.49)	5 (3.16)		1 (0.63)			
≥ 45	47		28 (17.72)	2 (1.27)		3 (1.90)	11 (6.96)	3 (1.92)	
Total	158	32 (20.25)	87 (55.06)	12 (7.59)	5 (3.16)	6 (3.80)	11 (6.96)	5 (3.16)	

*percentage in parenthesis

Table 4: Age specific fertility rate, by age group, of ever-married females of Agricultural and Tea garden labourers

Mothers' Present Age	<20	20-24	25-29	30-34	35-39	40-44	≥45	Total	
Agricultural labourers									
No. of women	9	18	28	24	17	16	53	165	
Live births at age periods	<20	0.555	0.722	0.571	0.417	0.882	0.75	0.472	0.582
	20-24		0.389	0.857	0.792	1.235	1.125	1.283	0.952
	25-29			0.429	0.875	1.176	1.25	1.585	0.952
	30-34				0.125	0.294	0.375	1.019	0.412
	35-39						0.25	0.415	0.158
	40-44						0.125	0.038	0.024
	≥ 45								
	Total	0.555	1.111	1.857	2.209	3.587	3.875	4.812	3.08
Tea Garden labourers									
No. of Women	13	13	21	22	21	21	47	158	
Live births at age periods	<20	0.462	0.539	0.619	0.636	0.714	0.524	0.383	0.532
	20-24		0.539	0.857	1.045	1.048	0.762	0.851	0.797
	25-29			0.190	0.727	1.000	1.380	1.468	0.880
	30-34					0.429	0.762	1.149	0.5
	35-39					0.048	0.190	0.511	0.184
	40-44							0.106	0.032
	≥ 45								
	Total	0.462	1.078	1.666	2.408	3.239	3.618	4.468	2.925

Table 5: Infant, child and adolescent mortality rate by age group of ever-married females of Agricultural and tea garden group

	Mother Age group	No. of Women	No. of Pregnancies	No. of Live Births	Neonatal Mortality	Infant Mortality (<1 yrs. Age)	Child Mortality (<5 yrs. Age)	Adolescent Mortality (<15 yrs. Age)
Agricultural labourer	<20	9	6	6		1	1	1
	20-24	18	21	19	2	1	1	1
	25-29	28	60	52	8	4	5	5
	30-34	24	55	53	2	5	5	5
	35-39	17	64	61	3	7	7	8
	40-44	16	65	62	3	10	11	13
	≥ 45	53	271	255	16	20	28	36
	Total	165	542	508	34 (6.27)*	48 (9.45)	58 (11.42)	69 (13.58)
Tea garden labourer	<20	13	6	6		1	1	1
	20-24	13	16	14	2			
	25-29	21	35	35		4	4	4
	30-34	22	53	53		6	6	10
	35-39	21	71	68	3	11	12	14
	40-44	21	85	76	9	7	9	11
	≥ 45	47	229	210	19	30	40	51
	Total	158	495	462	33 (6.67)	59 (12.77)	62 (13.42)	81 (17.53)

*rate in parenthesis

Table 6: Result of Test for equality of proportion between Agricultural labourers and Tea garden labourers in terms of fertility and mortality

Test Variables	Test Statistics
Fertility (Total no. of Live births/Total no. of women)	0.83 (P value)
Neonatal Mortality (Total no. of neonatal death/Total no. of pregnancies)	0.267 (z scores)
Infant Mortality (Total no. of infant death/Total no. of live births)	1.7 (z scores)
Child Mortality (Total on. of child death/Total no. of live births)	1 (z scores)
Adolescent Mortality (Total no. of adolescent death/Total no. of live births)	1.95 (z scores)

P<0.05, z<1.96

Table 7: Selection intensity or opportunity of selection between two occupational groups of Oraon of Alipurduar District of West Bengal

Selection Components	Crow's Index				Johnston and Kensingers Index			
	If	Im	If/Ps	I	Ime	Imc/Pb	If/Pb.Ps	I
Agricultural Labourers	0.191	0.181	0.226	0.407	0.063	0.192	0.240	0.495
Tea garden labourers	0.374	0.256	0.470	0.726	0.091	0.279	0.512	0.882

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