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SELECTION INTENSITY AND ITS OPPORTUNITY AMONG SONOWAL KACHARI WOMEN OF DIBRUGARH DISTRICT, ASSAM

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Abstract: Estimation of selection intensity is useful to understand the impact of natural selection on the fertility and mortality rates in the human population. Both fertility and mortality act as the major forces to determine the fitness of a particular population. The selection potential based on differential fertility and mortality has been computed among the Sonowal Kachari women of Dibrugarh district, Assam. The data is compared with other population groups inhabiting diverse bio-cultural environments from Northeast India to study the similarities and differences if any. The women aged 40 years and above, who have at least one surviving child and their husbands alive are only taken into consideration for the study. Data was collected with the help of the fertility and mortality survey schedule and the intensity of natural selection was analyzed using standardized formulae. The Sonowal Kacharis is one of the numerically dominant plains scheduled tribes of Assam. They belong to the Tibeto-Burman linguistic family. The comparatively higher contribution of differential fertility is found to operate amongst them. However, the 'I' value is found to incline more towards the lower level compared to the range displayed by the Northeast Indian populations.

Introduction

The Sonowal Kachari is an endogamous group of the Kachari tribe and a populous plains scheduled tribe of Assam. They are mainly distributed in the Dibrugarh, Lakhimpur, Dhemaji, Tinsukia, Sivasagar, Jorhat, and Golaghat districts of Assam. They belong to the

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Tibeto-Burman linguistic family and racially belong to Mongoloid ethnic stock. According to the 2011 census, the population of Sonowal Kachari people in Assam is 2,53,344 in number (Male: 1,27,692 and Female: 1,25,652), out of which 2,31,061 are living in rural areas and 22,283 are in the urban setup. Their literacy rate is 85.4 per cent, in which female literacy rate (80.5%) is found to be lower than their male counterpart (90.4%). The Sonowal Kachari women are mostly busy with household activities. They are good weavers. They usually weave their daily used dresses in their looms. Some women are earning by selling their products too.

Natural selection is one of the major evolutionary forces that bring changes in the population. Selection intensity is a measure of the fitness of a population, expressed in terms of differential fertility and differential mortality. Fertility and mortality components are directly responsible for the rise and decline of a population respectively and they operate either singly or jointly. Both are the fundamental events of natural selection. Crow (1958: 1-13) has proposed an index, which is known as the index of total selection intensity or the index of opportunity for selection by taking into account the differential fertility and mortality components of the population. This was modified by Johnston and Kensinger (1971: 356-64) to incorporate the embryonic mortality component.

Though several studies have been carried out to find out the selection intensity among different population groups of India, and again very few studies have been conducted in the Northeast states of India also. In Northeast India, studies on selection intensity were obtained from Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram and Nagaland. In this regard, mention may be made of some recent studies of Kotal and Baruah (2004, 41-7), Varte (2005, 299-300), Sarma (2013, 159-64), and Gogoi (2016, 69-71) in Arunachal Pradesh; Limbu and Khongsdier (2000, 39-43), Khongsdier et al. (2001, 213-22), Sikdar (2008, 112-20), Ahmed Das and Sikdar (2010, 61-6), Dutta Das (2012, 41-8), Dutta Das and Sharma (2013, 1-8), Phukan Gogoi and Sengupta (2013, 102-5), Sarma (2013, 159-64), Saikia (2015, 89-90), Gogoi (2016, 69-71), Borah (2017, 90-2), Patir (2017, 78-80), Rengma (2017, 145-8), Khatoon (2018, 89-96), and Roy Barua and Dutta Das (2018, 69-78) in Assam; Varte (2005, 513-4) in Manipur; Kotal and Sengupta (2003, 205-6) in Meghalaya; Varte and Varte (2006, 213-4) in Mizoram and Chanu and Varte (2009, 59-60) in Nagaland. Even though a number of studies have been carried out, the Northeastern states of India still require greater focus and attention in terms of the health status of women.

Research Objectives: In this paper, an attempt has been made to calculate the intensity of natural selection among the Sonowal Kachari of Dibrugarh district, Assam. The present sample on the Sonowal Kachari population has also been compared with other population groups of Northeast India so far reported.

Materials and Methods: Both primary and secondary data have been used for the present study. The primary data have been collected from 84 ever-married women aged 40 years or above (having at least one surviving child) from two exclusively Sonowal Kachari-dominated villages namely, Paroliguri and Lepetkata Kachari village of Dibrugarh district, Assam. Information on fertility and mortality is collected using a pretested structured schedule. The data on selection intensity is calculated by using Crow's (1958, 1-13) formula as well as Johnston and Kensinger's (1971, 356-64) improvised formula.

Results and Discussion

Table 1 shows the demographic variables used for the calculation of selection intensity among the ever-married Sonowal Kachari women. The average number of live birth per mother is 2.62±0.10 and the variance for mean live birth is found to be 0.86. The proportion of embryonic death is found to be 0.0437 which is slightly higher than the child deaths up to 15 years of age i.e. 0.0364. Hence, the proportion of survivors up to 15 years of age and above is calculated as 0.9636.

Table 1: Demographic variables used in calculating selection potential

Parameters	*Sonowal Kachari*
Number of mothers aged 40 years and above	84
Number of Pregnancies	229*
No. of live births	220
Number of embryonic deaths	10
The proportion of embryonic deaths	0.0437
Number of dead children up to 15 years of age	8
The proportion of child deaths up to 15 years of age	0.0364
Survivors up to 15 years of age and above	212
The proportion of survivors up to 15 years of age and above	0.9636
Number of live births per woman of completed fertility	2.62±0.10
The variance of mean live births	0.86

* Indicates 1 Twin birth, Source: Field study, 2017

Table 2 depicts the index for selection opportunities among the ever-married Sonowal Kachari women. The index for natural selection according to Johnston and Kensinger index is 0.2003, which is found to be higher than Crow's index i.e. 0.1497. The index of selection intensity for mortality and fertility component is found to be 0.0377 and 0.1079 respectively according to both the original and the modified methods. It represents the

comparatively higher contribution of differential fertility than the mortality component in the present population.

Table 2: Index for selection intensity of the ever-married women

Formula	*Rural*
Crow (1958)	
I_m	0.0377
I_f	0.1079
I	0.1497
Johnston and Kensinger (1971)	
I_{me}	0.0445
I_{mc}	0.0377
I_f	0.1079
I	0.2003

Source: Field study, 2017

The index of selection potential in the present population is compared with some other population groups of Northeast India (Table 3). Similar finding that the relatively higher contribution of differential fertility than mortality component among the present Sonowal Kachari sample is also found among the Sonowal Kachari population reported earlier (Sikdar 2008, 112-20; Dutta Das and Sharma 2013, 1-8; Saikia 2015, 89-90), Boro Kachari (Guha and Mukherjee 1990, 73-81), Garia Muslim (Buzarbarua and Rizvi 1996, 62-72), Oraon (Phukan Gogoi and Sengupta 1997, 102-5; Ahmed Das and Sikdar 2010, 61-6), Ahom (Sengupta and Chakravarti 1998, 83-5; Gogoi 2016, 69-71), Sayeed Muslim (Sengupta and Begum 1998, 95-7), Pnar (Khongsdier, Nsarangbe and Phimu 2001, 213-22), Khamyang (Ahmed Das and Sikdar 2010, 61-6; Dutta and Sengupta 2017, 129-37), Rengma Naga (Rengma 2017, 145-8), Assamese Muslim and Manipuri Meitei studied by Ahmed Das and Sikdar (2010, 61-6), Hajong (Dutta Das 2012, 41-8), Khamti (Borah 2014, 171-5), Phake (Gogoi 2016, 69-71), Dibongiya Deori (Borah 2017, 90-2), Mishing (Patir 2017, 78-80; Khatoon 2018, 89-96; Morang 2018, 97-102) and Mog (Roy Barua and Dutta Das 2018, 69-78) population in Assam. Population groups from other states of Northeast India like the Muklom (Sarkar 1997, 140-3) and Khamti (Choudhary, Behera and Adak 1994, 103-5) in Arunachal Pradesh; Hmar (Varte 1998, 513-4) and Vaiphei (Varte 2005, 299-300) in Manipur; both Christian and non-Christian War Khasi (Khongsdier 1994, 307-10), Panjabi Sonar (Jaswal and Dutta Chaudhury 1989, 51-8), Pnar (Banerjii, Choudhary and Adak 1994, 196-201) and Sakachep (Kropi 2018, 79-88) in Meghalaya; the Hmar of Mizoram

(Varte and Varte 2006, 213-4) and Chakhesang of Nagaland (Chanu and Varte 2009, 59-60) also have a higher contribution of differential fertility than mortality component.

However, contrary to the above, a few more sample from Sonowal Kachari reported earlier (Deka 1980, 136-40; Sengupta and Kalita 1996, 73-80), Khampti (Sarkar, Barua and Varte 1994, 217-20), Semsa (Limbu and Khongsdier 2000, 39-43), Kaibarta (Sengupta and Gogoi 1995, 267-70; Ahmed Das and Sikdar 2010, 61-6), Garo and Deori (Ahmed Das and Sikdar 2010, 61-6), Bodo-Kachari (Dutta Das and Sharma 2013, 1-8), Savar, Hindu and Christian Oraon, Hindu and Christian Munda studied by (Phukan Gogoi and Sengupta 2013, 102-5), Mishing (Sarma 2013, 159-64), Mishing (Patir 2017, 78-80) of Assam; Khamti (Gogoi 2016, 69-71), Gallong (Chakravarty and Ahmed 1989, 1-5), Digaru Mishmi (Kotal and Baruah 2004, 41-7) and Minyong (Sarma 2013, 1-8) of Arunachal Pradesh; Purum/ Chote of Manipur (Dasgupta, Basu and Raychaudhuri 1985, 36-51); Hajong (Baruah 1983, 190-200), Jaintia (Deka 1989, 6-11), Pnar (Khongsdier 1990, 182-4; Kropi 2018, 79-88), Dalu (Patra and Kapoor 1996, 273-8) and Sankar Koch (Kotal and Sengupta 2003, 205-6) of Meghalaya; the Kheza/Chakesang of Nagaland (Devi, Sengupta and Ghosh 1998, 515-6) have experienced higher component of mortality selection than its fertility component.

Among the population groups so far reported before 2000, in the majority of the populations, the mortality component is higher than the fertility component except for the Bodo Kachari[1], Garia Muslim, and Ahom[1] of Assam; Muklom and Khamti[1] of Arunachal Pradesh; Hmar of Manipur; Christian and Non-Christian War Khasi, Pnar[1] and Punjabi Sonar of Meghalaya. The situation seems to be reversed from the year 2000 onwards in several population groups of Assam as well as Northeast India barring the samples from Semsa, Kaibarta[1], Garo, Deori, Bodo-Kachari[2], Savar, Oraon[1], Munda, Mishing[1&2] of Assam; Khamti[2], Digaru Mishmi and Minyong of Arunachal Pradesh; Pnar[2], Sankar Koch of Meghalaya and the Kheza/Chakesang of Nagaland. It may be because of the improvement in the medical facilities and maybe because of the good socio-economic condition which helps the people to provide a better environment for themselves.

In the present study, the value of 'I' is found to be 0.2003, which inclines more towards the lower level compared to the range displayed by the Northeast Indian populations according to Johnston and Kensinger (1971, 356-64) index. A comparatively higher value of 'I' in Assam is found among the Semsa (0.677; Limbu and Khongsdier 2000, 39-43), which is followed by the Sayeed Muslim (0.604; Sengupta and Begum 1998, 95-7) and Mishing (0.552; Sarma 2013, 159-64) population. A relatively lower value is found among the Bodo-Kachari (0.141) as reported by (Dutta Das and Sharma, 2013, 1-8). However, in other states of Northeast India, a comparatively higher value of 'I' is found among the Digaru Mishmi (1.922) of Arunachal Pradesh (Kotal and Baruah 2004, 41-7) and the lower value is observed among the Khamti of Arunachal Pradesh (0.306; Gogoi 2016, 69-71).

Table 3: Index of selection potential in some population groups of Northeast India

Population	*According to Crow (1958)*			*According to Johnston and Kensinger (1971)*				*Source*
	I_m	I_f	I	I_{me}	I_{mc}	I_f	I	
ASSAM								
Sonowal Kachari	0.038	0.108	0.150	0.045	0.038	0.108	0.200	Present Study
	0.070	0.105	0.182	0.069	0.070	0.105	0.264	Saikia, 2015
	0.070	0.163	0.244	0.032	0.070	0.163	0.284	Sikdar, 2008
	0.185	0.179	0.364	0.103	0.185	0.179	0.541	Deka, 1980
	0.127	0.267	0.429	0.060	0.127	0.268	0.516	Dutta Das and Sharma, 2013
	0.168	0.164	0.360	0.054	0.168	0.164	0.432	Sengupta and Kalita,1996
Bodo-Kachari[2]	0.040	0.019	0.060	0.077	0.040	0.019	0.141	Dutta Das and Sharma, 2013
Boro Kachari[1]	0.110	0.130	0.250	-	-	-	-	Guha and Mukherjee,1990
Deori	0.226	0.179	0.445	0.070	0.226	0.179	0.546	Ahmed Das and Sikdar, 2010
Dibongiya Deori	0.072	0.197	0.282	0.086	0.072	0.197	0.390	Borah, 2017
Pnar	0.104	0.234	0.363	0.047	0.047	0.234	0.428	Khongsdier et al.,2001
Garo	0.116	0.114	0.244	0.028	0.092	0.142	0.281	Ahmed Das and Sikdar, 2010
Manipuri Meitei	0.097	0.101	0.207	0.053	0.097	0.101	0.271	
Mishing[1]	0.194	0.084	0.294	0.199	0.194	0.842	0.552	Sarma, 2013
Mishing	0.080	0.338	0.446	0.054	0.080	0.338	0.522	Khatoon, 2018
Mishing	0.062	0.169	0.241	0.084	0.062	0.169	0.345	Morang, 2018
Mishing (Lakhimpur)	0.076	0.158	0.246	0.091	0.076	0.158	0.359	Patir, 2017
Mishing[2] (Dhemaji)	0.143	0.135	0.299	0.124	0.143	0.135	0.459	
Mishing (Jorhat)	0.083	0.173	0.270	0.092	0.083	0.173	0.368	
Mishing (Dibrugarh)	0.052	0.053	0.108	0.050	0.0.52	0.053	0.161	
Semsa	0.471	0.098	0.616	0.038	0.471	0.098	0.677	Limbu and Khongsdier, 2000
Rengma Naga	0.109	0.163	0.290	0.102	0.109	0.163	0.422	Rengma, 2017
Hajong	0.020	0.107	0.129	0.050	0.020	0.107	0.186	Dutta Das, 2012

contd. table 3

Ahom[1]	0.083	0.119	0.218	0.074	0.083	0.119	0.309	Sengupta and Chakravarti, 1998
Ahom	0.156	0.166	0.348	0.080	0.156	0.166	0.454	Gogoi, 2016
Khampti	0.179	0.113	0.312	0.005	0.179	0.113	0.319	Sarkar et al., 1994
Khamti	0.022	0.210	0.236	0.014	0.022	0.210	0.252	Borah, 2014
Khamyang	0.092	0.142	0.246	0.028	0.092	0.142	0.281	Ahmed Das and Sikdar, 2010
	0.050	0.158	0.216	0.057	0.050	0.158	0.286	Dutta and Sengupta, 2017
Phake	0.081	0.212	0.311	0.026	0.081	0.212	0.344	Gogoi, 2016
Kaibarta[1]	0.127	0.124	0.267	0.063	0.127	0.124	0.346	Ahmed Das and Sikdar, 2010
Kaibata	0.204	0.110	0.336	0.131	0.204	0.110	0.510	Sengupta and Gogoi, 1995
Sayeed Muslim	0.152	0.230	0.418	0.132	0.152	0.230	0.604	Sengupta and Begum, 1998
Assamese Muslim	0.075	0.146	0.232	0.042	0.075	0.146	0.283	Ahmed Das and Sikdar, 2010
Garia Muslim	0.026	0.440	0.478	0.037	0.026	0.440	0.533	Buzarbarua and Rizvi, 1996
Munda (Hindu)	0.140	0.062	0.211	0.099	0.140	0.062	0.330	Phukan Gogoi and Sengupta, 2013
Munda (Christian)	0.166	0.075	0.253	0.135	0.166	0.075	0.422	
Munda	0.151	0.067	0.228	0.115	0.151	0.067	0.370	
Oraon	0.083	0.087	0.176	0.076	0.083	0.087	0.266	Ahmed Das and Sikdar, 2010
Oraon[1] (Hindu)	0.182	0.053	0.245	0.094	0.182	0.053	0.361	Phukan Gogoi and Sengupta, 2013
Oraon[1] (Christian)	0.168	0.072	0.252	0.126	0.168	0.072	0.409	
Oraon[1]	0.176	0.060	0.247	0.107	0.176	0.060	0.380	
Oraon	0.099	0.130	0.243	0.102	0.099	0.131	0.370	Sengupta and Phukan Gogoi, 1997
Savar	0.130	0.063	0.201	0.091	0.130	0.063	0.310	Phukan Gogoi and Sengupta, 2013
Mog	0.054	0.225	0.291	0.115	0.054	0.225	0.392	Roy Barua and Dutta Das, 2018
ARUNACHAL PRADESH								
Khamti[2]	0.124	0.116	0.254	0.043	0.124	0.116	0.306	Gogoi, 2016
Khamti[1]	0.388	0.398	0.934	-	-	-	-	Choudhary et al., 1994
Gallong	0.750	0.180	1.070	-	-	-	-	Chakravarty and Ahmed, 1989
Muklom	0.107	0.188	0.315	0.021	0.107	0.188	0.342	Sarkar, 1997
Minyong	0.288	0.108	0.427	0.152	0.288	0.108	0.644	Sarma, 2013
Digaru Mishmi	0.814	0.265	1.294	0.274	0.814	0.265	1.922	Kotal and Baruah, 2004

contd. table 3

MANIPUR								
Hmar	0.072	0.250	0.340	0.028	0.072	0.250	0.379	Varte, 1998
Purum-I/Chote	0.198	0.095	0.312	-	-	-	-	Dasgupta et al., 1985
Purum-II/Chote	0.227	0.122	0.377	-	-	-	-	
Vaiphei	0.052	0.249	0.315	0.220	0.052	0.249	0.344	Varte, 2005
MEGHALAYA								
Hajong	0.443	0.131	0.631	0.032	0.443	0.131	0.684	Baruah, 1983
Jaintia	0.456	0.125	0.638	0.107	0.456	0.125	0.814	Deka, 1989
War Khasi (Christian)	0.147	0.185	0.359	0.093	0.144	0.185	0.486	Khongsdier, 1994
War Khasi (Non Christian)	0.180	0.223	0.446	0.084	0.180	0.223	0.568	
Pnar	0.236	0.134	0.401	0.202	0.236	0.134	0.681	Khongsdier, 1990
Pnar[1]	0.106	0.281	0.416	0.127	0.106	0.281	0.596	Banerjee et al., 1994
Pnar[2]	0.161	0.146	0.331	0.079	0.161	0.146	0.434	Kropi, 2018
Dalu	0.500	0.232	0.847	0.032	0.500	0.232	0.897	Patra and Kapoor, 1997
Sankar Koch	0.262	0.070	0.351	0.038	0.262	0.070	0.403	Kotal and Sengupta, 2003
Panjabi Sonar	0.050	0.054	0.107	-	-	-	-	Jaswal and Dutta Chaudhury, 1989
Sakachep	0.120	0.123	0.257	0.106	0.120	0.123	0.391	Kropi, 2018
MIZORAM								
Hmar	0.085	0.250	0.375	-	-	-	-	Varte and Varte, 2006
NAGALAND								
Kheza/Chakesang	0.244	0.164	0.449	0.177	0.244	0.164	0.707	Devi et. al, 1998
Chakhesang	0.076	0.143	0.233	0.285	0.076	0.143	0.345	Chanu and Varte, 2009

In the area wherefrom the present sample has been collected, in general, the medical institutions are situated nearby. Among them most of the women are literate. This may help in reducing the incidence of mortality and embryonic wastage among them. Nevertheless, no attempt has been made to draw a conclusion based on inferential statistics. Roy Baruah and Dutta Das (2018, 69-78) also inferred about the better living condition, a better health care system, and very good communication facilities to seek health care facilities among the Mog population of Assam and consequently have a positive impact on the lower contribution of mortality among them.

Varte and Varte (2006, 213-4) observed higher values of mortality components and index opportunity for selection among the Hmar of Mizoram than the Hmar of Manipur (Varte 1998, 513-4). They inferred that the presence of less equipped medical facilities, poor socio-economic conditions, and rural-urban residence of the population may be reasons for this variation as there are no physical and environmental variations among themselves. In the study of Ahmed Das and Sikdar (2010, 61-6) a high index of postnatal mortality and prenatal mortality was observed among the Deori and Oraon populations of Assam respectively. They mentioned that relatively poor medical and healthcare facilities may be the reason for the high prenatal and postnatal mortality among these two population groups. Sarma (2013, 159-64) reported the cause behind a higher level of embryonic death among the Mishing of Assam due to biological factors whereas, a higher proportion of child deaths among the Minyong of Arunachal Pradesh to socio-cultural factors. Among the Rengma Naga of Assam, the researcher (Rengma 2017, 145-8) observed a relatively higher index of pre-natal and post-natal mortality and mentioned the probable cause as the improper concept of having family welfare or deficiencies and child nutrition behind it.

Conclusion and Recommendation

It can be concluded from the foregoing discussion that the comparatively higher contribution of differential fertility is found to operate amongst the Sonowal Kachari population. However, the 'I' value is found to incline more towards the lower level compared to the range displayed by the Northeast Indian populations. Better living conditions and a better health care system among the Sonowal Kacharis may have a positive effect on the decreased mortality contribution to the evolution mechanism through natural selection. A marked decline in the mortality index has also been observed among several population groups of Northeast India with improved medical facilities and socio-economic development over the past few decades. Contrary to it, the underprivileged still face issues of fitness of the population. Hence, the concept of health promotion, health education etc. should be emphasized among the communities in question to address issues with reproduction.

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