

Srirastava & Dasvarma

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castes and scheduled tribes of India
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SOME DEMOGRAPHIC ESTIMATES
FOR
THE SCHEDULED CASTES AND SCHEDULED TRIBES OF INDIA, 1951-61.

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Introduction

Various programmes meant for the social and economic development of India have paid special attention to the welfare of the scheduled castes and the scheduled tribes inhabiting the country. The Government of India is, in fact, constitutionally committed to provide additional facilities to these communities so that the gap that had been existing between the scheduled castes and tribes on one hand and other sections of the society on the other may be bridged. In this context a comparative study of social, economic and demographic characteristics of the scheduled communities in relation to others may be justified. The present paper, however, will be confined only to some aspects of demographic characteristics of these communities of India during the period 1951-61.

This attempt, in the view of authors, is the first of its kind and therefore it is hard to establish the reliability of the demographic estimates presented here. Also, it cannot be ignored that the disagreement between the theory that serves as a guide for the present estimates and the reality may directly affect the results. However, authors have tried to establish confidence in the methodology of present estimates by taking into account the data for the total population of India during the period considered.

Data used for the estimation

The basic data used for the estimation of the levels of demographic characteristics of specified communities are the distributions of population of these communities over age groups 0-14, 15-44 and 45+ years. Such data are available from the Census of India, 1961 publications. It would have been desirable to use the distributions of ages of populations over the age groups narrower than the preceding ones but unfortunately the available distributions for the three specified communities conformed only to the pattern considered here. For the total population of India, smoothed distribution of ages has been taken from the Age Tables, 1961 Census of India. Similar data for the three sections of the population considered here were, however, not available. Therefore, the observed distributions were smoothed by the following procedure.

It will be assumed here that the ratio of smoothed to observed proportions of total population of India in each of the three age-groups considered holds true for the age distributions in corresponding age groups of each of the three communities. These ratios, when multiplied with the observed numbers of persons in the relevant age groups yielded the adjusted age distributions for the three communities. The assumption implies that in each of the communities the pattern of error in age reporting is similar. This may not be true but in the absence of any other information on the differential pattern of error in age reporting of the communities and the unsuitability of mathematical methods for graduating the age distributions available in such broad age groups, the preceding method of smoothing was adopted. Authors are fully aware that this technique of smoothing may not give the true age distributions but they also feel that it might minimize the irregularities present in the data and thereby might reduce the distortion in the estimates of the demographic characteristics presented in this paper. The smoothed age distributions are shown in table 1.

Table 1

The adjusted age distributions (percent) of the Scheduled Castes, Scheduled Tribes and the Residual Population of India, 1961 along with the ratio of adjusted to recorded population in specified age groups for the Total Population of India, 1961.

Age groups Population	MALE			FEMALE		
	0-14	15-44	45+	0-14	15-44	45+
Scheduled Castes	41.10	43.96	14.94	40.33	44.33	14.84
Scheduled Tribes	42.16	44.22	13.62	42.34	44.19	13.47
Residual Population	40.43	44.38	15.19	41.75	43.46	14.79
Ratio of adjusted to recorded popula- tion for all India, 1961.	.9927	1.0326	.9321	1.0121	1.0093	.9423

Computed from: - Census of India, 1961, Special Tables for Scheduled Castes; Special Tables for Scheduled Tribes; Social and Cultural Tables; and Age Tables .

The Theory of Estimation.

The method of estimation is based on the Theory of Stable Populations and therefore it has been assumed that the age distributions of Scheduled Castes, Scheduled Tribes and the Residual Population are all stable.

In a stable population we write

$$c(x, x+n) = b \int_x^{x+n} e^{-rx} \cdot l_x \cdot d_x$$

$$\doteq b \cdot e^{-r(x+\frac{n}{2})} \cdot {}_nL_x \dots\dots\dots(1)$$

where, $c(x, x+n)$ is the proportion of population in the age group x to $x+n$ years, b is the intrinsic birth rate per head per annum, r is the intrinsic rate of population growth per head per annum and ${}_nL_x$ is the size of the stationary population in the age group x to $x+n$ years where the number of births is unity. The equation is valid for the two sexes separately as well as for persons.

Taking into account the available form of the age distribution for the three communities we can write from (1)

$$c(0,14) = b \cdot e^{-r(7.5)} \cdot {}_{15}L_0 \dots\dots\dots(2)$$

$$c(15,44) = b \cdot e^{-r(30)} \cdot {}_{30}L_{15} \dots\dots\dots(3)$$

$$\text{and } c(45+) = b \cdot e^{-r(45+\frac{0}{2})} \cdot {}_{\infty}L_{45} \dots\dots\dots(4)$$

From (2), (3) and (4) we define

$$I_1 = \frac{c(0,14)}{c(15,44)} = e^{22.5r} \cdot \frac{15L_0}{30L_{15}} \dots\dots\dots (5)$$

$$\text{and } I_2 = \frac{c(0,14)}{c(45+)} = e^{(37.5 + e_{45}^0)r} \cdot \frac{15L_0}{L_{45}} \dots\dots (6)$$

Taking natural logarithms of (5) and (6) we get,

$$i_1 = \ln I_1 = 22.5r + \ln 15L_0 - \ln 30L_{15} \dots\dots (7)$$

$$\text{and } i_2 = \ln I_2 = 37.5r + e_{45}^0 r + \ln 15L_0 - \ln L_{45} \dots (8)$$

From (8) we get

$$r = \frac{i_2 - \ln 15L_0 + \ln L_{45}}{37.5 + e_{45}^0} \dots\dots\dots (9)$$

Combining (7) and (9) we get

$$i_1 = \frac{22.5 (\ln L_{45} - \ln 15L_0)}{37.5 + e_{45}^0} + \ln 15L_0 - \ln 30L_{15} \\ + \frac{22.5}{37.5 + e_{45}^0} \cdot i_2 \dots\dots\dots (10)$$

From (10) it is clear that the relationship between i_1 and i_2 for all stable populations experiencing the same mortality pattern depicted by a life table will be approximately linear and thus may be represented by

$$i_1 = a + b i_2 \dots\dots\dots (11)$$

where a and b depend upon the age distribution of the stationary

population and thus become constant as long as the stationary population remains unchanged. It may be noted that the form of the expression (11) will remain the same even if we work with common logarithms instead of natural logarithms. In the present paper we have worked with the common logarithm of $100 I_1$ and $100 I_2$. These have respectively been denoted by i_1 and i_2 .

The age distribution in a number of stable male and female populations separately corresponding to seven levels of fertility in terms of Gross Reproduction Rate (GRR) and six levels of mortality designated by the expectation of life at birth (e_0) constructed by Srivastava¹⁾ are used to arrive at the values of

- 1) M.L. Srivastava has constructed a number of stable male and female populations which involve the levels and patterns of fertility and mortality specified in the text. Some of the characteristics of these populations have been utilised in his earlier papers viz.,
 1. Srivastava, M.L. -"The Relationship between the Birth Rate and the Death Rate in Stable Populations with the same Fertility but different Mortality schedules". Eugenics quarterly, vol.13, No.3 September 1966.
 2. _____ "Some Comments on the Approximate Relationships between the Birth Rate and the Death Rate in Stable Populations". Patna University Journal, vol.21, No.4, Oct.1966.
 3. _____ "The Relationships between the Fertility and Mortality Characteristics in stable Female Populations". Eugenics quarterly, vol.14, No.3. September 1967.
 4. _____ "Age Distribution and Estimation of Mortality in India". Special Bulletin on Mortality Studies in India, Gandhigram Institute of Rural Health and Family Planning. (In press).

a and b in (11) by the method of least squares for the pairs of values of i_1 and i_2 . For each of the values of GRR ranging from 1.0 to 4.0 at an interval of 0.5 the age pattern of fertility was defined by the distribution of GRR over the age groups 15-19, 20-24, ,40-44 in the ratio 1:7:7:6:4:1. The mortality pattern was determined by the U.N. Model Life Tables at levels 0,20,40,60,80, and 100. The values of i_1 and i_2 in stable male and female populations with specified fertility and mortality levels are given in tables 2 and 3 respectively. In this manner six equations each for male and female populations were obtained. These equations along with the values of the square of the product moment correlation coefficient (r^2) for males and females are presented in table 4. It may be noted from the values of r^2 that at least 99.9 percent of the variability in i_1 is explained by the function $a+bi_2$, i.e. the relationship between i_1 and i_2 is almost linear. Also, it may be noted that as the mortality level increases from 0 to 100 the values of the constant a show an increasing trend for population of each sex. The other constant b exhibits an opposite trend. This implies that for each sex the set of six regression lines between i_1 and i_2 form a grid such that no straight line crosses over any of the remaining ones. This property of the segmentation of the regression lines is made use of in the estimation of the level of mortality in terms of e_0 in the population of the three communities where the value of i_1 and i_2 can be obtained from the observed age distribution. The method estimation is explained below.

Table - 2

Values of i_1 and i_2 corresponding to specified values of expectation of life at birth (e_0^0) and gross reproduction rate (GRR) for stable male populations.

GRR	e_0^0	19.80	29.57	39.24	48.72	58.82	68.56
1.0	i_1	1.51693	1.57978	1.61878	1.64914	1.67495	1.69425
	i_2	1.59770	1.62086	1.63124	1.64953	1.67459	1.69697
1.5	i_1	1.65600	1.71709	1.75572	1.78512	1.81043	1.82943
	i_2	1.90113	1.93927	1.94851	1.98137	2.00078	2.02617
2.0	i_1	1.75389	1.81325	1.85089	1.88018	1.90509	1.92392
	i_2	2.11760	2.15292	2.17298	2.19937	2.23083	2.25823
2.5	i_1	1.82808	1.88694	1.92412	1.95303	1.97763	1.99638
	i_2	2.28355	2.32269	2.34671	2.37557	2.40877	2.43747
3.0	i_1	1.88868	1.94680	1.98354	2.01220	2.03667	2.05519
	i_2	2.42053	2.46256	2.48904	2.51953	2.55404	2.58490
3.5	i_1	1.93952	1.99695	2.03334	2.06275	2.08604	2.10449
	i_2	2.53637	2.58083	2.60926	2.64120	2.67691	2.70737
4.0	i_1	1.98327	2.04013	2.07631	2.10445	2.12863	2.14687
	i_2	2.63697	2.68334	2.71356	2.74659	2.78316	2.81451

Table - 3

Values of i_1 and i_2 corresponding to specified values of expectation of life at birth (e_0^0) and gross reproduction rate (GRR) for stable female population

	e_0^0	20.20	30.40	40.74	51.31	62.05	71.80
GRR							
1.0	i_1	1.53517	1.58995	1.62325	1.64865	1.67201	1.69144
	i_2	1.55243	1.58377	1.59539	1.60821	1.63195	1.65706
1.5	i_1	1.67357	1.72705	1.75974	1.78469	1.80774	1.82672
	i_2	1.86243	1.89988	1.91730	1.93531	1.96322	1.99149
2.0	i_1	1.77085	1.82289	1.85516	1.87978	1.90271	1.92132
	i_2	2.08314	2.12359	2.14476	2.16613	2.19689	2.22688
2.5	i_1	1.84466	1.89631	1.92824	1.95270	1.97520	1.99379
	i_2	2.25234	2.29682	2.32073	2.34439	2.37691	2.40841
3.0	i_1	1.90493	1.95593	1.98762	2.01187	2.03415	2.05262
	i_2	2.39175	2.43864	2.46467	2.49020	2.52416	2.55671
3.5	i_1	1.95550	2.00595	2.03765	2.06145	2.08365	2.10199
	i_2	2.50961	2.55849	2.58622	2.61319	2.64829	2.68168
4.0	i_1	1.99900	2.04895	2.08019	2.10418	2.12626	2.14445
	i_2	2.61182	2.66238	2.69171	2.71975	2.75579	2.78995

$$i_1 = \log 100 I_1$$

$$\text{where, } I_1 = \frac{\text{Population aged 0-14}}{\text{Population aged 15-44}}$$

$$i_2 = \log 100 I_2$$

$$I_2 = \frac{\text{Population aged 0-14}}{\text{Population aged 45 +}}$$

Table 4

Regression equations of i_1 on i_2 at each level of mortality and the values of the square of the correlation coefficient between i_1 and i_2 (r^2) for stable populations

Male

Mortality level	e_0^0	Regression equation	r^2
0	19.80	$i_1 = .80242 + .44853 i_2$	.999443
20	29.57	$i_1 = .87582 + .43459 i_2$	.999978
40	39.24	$i_1 = .93134 + .42255 i_2$	.999701
60	48.72	$i_1 = .96135 + .41689 i_2$	.999726
80	58.82	$i_1 = .99109 + .40920 i_2$	.999724
100	68.56	$i_1 = 1.00847 + .40490 i_2$	.999952

Female

0	20.20	$i_1 = .85731 + .43781 i_2$	.998959
20	30.40	$i_1 = .91784 + .42549 i_2$	.999667
40	40.74	$i_1 = .95983 + .41684 i_2$	.999923
60	51.31	$i_1 = .99093 + .40982 i_2$	.999544
80	62.05	$i_1 = 1.01374 + .40414 i_2$	.999839
100	71.80	$i_1 = 1.03152 + .39919 i_2$	.999867

Procedure of Estimation

Estimation of the expectation of life at birth (e_0^0)

To facilitate interpolation between regression lines it will be assumed that the relationship between i_1 and i_2 is perfectly linear, i.e.,

$$i_1 - a - bi_2 = 0$$

It will be assumed further that the pair of observed values of i_1 and i_2 in the population of specified sex designated by \hat{i}_1 and \hat{i}_2 (table 5) when substituted in the k^{th} regression equation for that sex gives

$$\hat{i}_1 - a_k - b_k \hat{i}_2 = E_k \dots\dots\dots(12)$$

where a_k and b_k are the values of the constants a and b for the k^{th} regression equation. In practice if E_k is evaluated for $k = 0, 1, \dots, 5$, it will be observed that either one of the E_k is zero or that two consecutive values of E_k are of opposite sign. Let us consider that E_k and E_{k+1} are of opposite sign. The corresponding values of the constants in the regression equations may be represented by a_k, a_{k+1} and b_k, b_{k+1} . We note that a unit change in k involves a change of 20 levels in mortality and therefore a_k, a_{k+1} and b_k, b_{k+1} are interpolated linearly to arrive at the values, say a_{k+x}, b_{k+x} , where the corresponding E_{k+x} is zero. Thus the estimate of the level of mortality in the observed

Table 5

values of \hat{i}_1 and \hat{i}_2 of the scheduled Castes, Scheduled Tribes, the Residual and the Total Population of India, by sex, 1961. (based on smoothed age distribution).

	Scheduled Castes		Scheduled Tribes		Residual Population		Total Population	
	Male	Female	Male	Female	Male	Female	Male	Female
\hat{i}_1	1.97077	1.96440	1.97928	1.98146	1.95952	1.98259	1.96213	1.98064
\hat{i}_2	2.43949	2.43995	2.49072	2.49747	2.42514	2.45070	2.42954	2.45281

Computed from: (i) Census of India 1961, Special Tables on Scheduled Castes,
(ii) Census of India 1961, Special Tables on Scheduled Tribes.
(iii) Census of India 1961, Social and Cultural Tables.

population will become 20 (k+x) and the corresponding value of the expectation of life at birth (e_0^0) may be obtained by interpolation.

Estimation of Gross Reproduction Rate (GRR)

The estimated value of the expectation of life at birth of persons of specified sex can be used in table 2 (for males) and table 3 (for females) to interpolate the pairs of values of i_1 and i_2 referring to the estimated level of e_0^0 and various levels of the gross reproduction rate. The observed values of i_1 and the estimated value of e_0^0 can be used in these tables to obtain a value of GRR by interpolation (if necessary). Let us assume that this estimate is GRR(1). Similarly the observed value of i_2 and the estimated value of e_0^0 can be used in the same table to obtain the value of GRR. Let us assume the second estimate of GRR as GRR(2). In principle GRR(1) should be equal to GRR(2) but in practice because of the limitation of rounding effect of numerical values these may be slightly different. Therefore it is assumed that the estimate of the gross reproduction rate can be obtained as

$$GRR = \frac{GRR(1) + GRR(2)}{2}$$

Estimation of other Characteristics

The estimated values of the gross reproduction rate and the expectation of life at birth are used to interpolate (if necessary) the intrinsic birth, death and growth rates and the net reproduction rate from tables 6,7,8,9 and 10.

The Estimates of Demographic Characteristics of Specified Communities of India 1951-61.

The values of i_1 and i_2 for the three specified communities and the total population of India are given in table 6. The expectations of life at birth, the death, birth and growth rates per thousand persons per annum, the gross and net reproduction rates are estimated as described above and are presented in table 11.

Interpretation of the Estimates

The estimates in the present paper are based on the distributions of populations in broad age groups and therefore these will have to be taken and interpreted with caution. The nature of age grouping is such that it is difficult to identify a time period to which the estimates refer. We have, however, compared the demographic estimates for the total population of

Table 6

Values of birth rate per thousand per annum at specified levels of mortality and gross reproduction rate (GRR) for stable male populations.

Mortality level	0	20	40	60	80	100
e_0^0	19.80	29.57	39.24	48.72	58.82	68.56
GRR						
1.0	15.19	14.53	14.10	13.94	13.78	13.61
1.5	24.79	23.77	23.15	22.89	22.56	22.19
2.0	33.76	32.26	31.38	30.95	30.39	29.79
2.5	41.84	39.89	38.73	38.09	37.26	36.41
3.0	49.25	46.77	45.31	44.43	43.34	42.24
3.5	56.01	53.00	51.22	50.10	48.74	47.41
4.0	62.21	58.66	56.57	55.22	53.60	52.04

Table 7

Values of death rate per thousand per annum at specified levels of mortality and gross reproduction rate (GRR) for stable male population.

Mortality level	0	20	40	60	80	100
e_0^0	19.80	29.57	39.24	48.72	58.82	68.56
GRR						
1.0	54.37	40.20	31.11	24.64	19.43	15.45
1.5	50.10	35.49	26.18	19.57	14.16	9.95
2.0	49.04	33.93	24.34	17.53	11.85	7.38
2.5	49.34	33.69	23.78	16.74	10.78	6.04
3.0	50.29	34.07	23.83	16.54	10.29	5.28
3.5	51.55	34.75	24.18	16.63	10.10	4.84
4.0	52.95	35.59	24.68	16.89	10.08	4.58

Table 8

Values of birth rate per thousand per annum at specified level of mortality and gross reproduction rate (GRR) for stable female populations.

GRR	Mortality level	0	20	40	60	80	100
	e_0^o	20.20	30.40	40.74	51.31	62.05	71.80
1.0		14.45	13.84	13.37	13.08	12.98	12.96
1.5		23.96	22.95	22.25	21.80	21.58	21.46
2.0		32.88	31.35	30.37	29.72	29.30	29.03
2.5		40.92	38.91	37.62	36.74	36.11	35.64
3.0		48.28	45.73	44.11	43.00	42.13	41.47
3.5		54.97	51.88	49.94	48.59	47.50	46.64
4.0		61.10	57.47	55.23	53.63	52.31	51.27

Table 9

Values of death rate per thousand per annum at specified level of mortality and gross reproduction rate (GRR) for stable female populations

GRR	Mortality level	0	20	40	60	80	100
	e_0^o	20.20	30.40	40.74	51.31	62.05	71.80
1.0		53.63	39.50	30.39	23.78	18.63	14.80
1.5		49.26	34.67	25.28	18.48	13.17	9.21
2.0		48.16	33.03	23.32	16.30	10.77	6.62
2.5		48.42	32.71	22.67	15.40	9.63	5.27
3.0		49.32	33.02	22.64	15.11	9.08	4.51
3.5		50.51	33.63	22.91	15.12	8.85	4.07
4.0		51.84	34.39	23.33	15.30	8.78	3.80

Table 10

Values of Net Reproduction Rate at specified levels of mortality and Gross Reproduction Rate for stable female populations.

GRR	Mortality level						
	0	20	40	60	80	100	
e_0	20.20	30.40	40.74	51.31	62.05	71.80	
1.0	.323699	.476682	.611126	.733305	.848803	.947991	
1.5	.485601	.715077	.916731	1.099990	1.273224	1.421997	
2.0	.647480	.953447	1.222317	1.466659	1.697633	1.895995	
2.5	.809174	1.191556	1.527579	1.832949	2.121613	2.369519	
3.0	.971225	1.430175	1.833480	2.199993	2.546455	2.843997	
3.5	1.133081	1.668523	2.139049	2.566652	2.970857	3.317992	
4.0	1.294960	1.906895	2.444635	2.933320	3.395263	3.791992	

Table- 11

Estimated values of expectation of life at birth (e_0), intrinsic death rate (D.R.), intrinsic birth rate (B.R.), intrinsic rate of growth (r), gross reproduction rate (GRR) and net reproduction rate (NRR) of the Scheduled Castes, Scheduled Tribes, Residual Population and the Total Population of India, 1951-61 for males and females.

Community.	MALES				FEMALES				GRR	NRR	Birth rate of total population.
	e_0	D.R	B.R	r	e_0	D.R	B.R	r			
Sch. Castes.	44.28	19.99	41.87	21.88	34.55	28.84	44.68	15.84	2.97	1.576	41.89
Sch. Tribes.	37.53	25.66	45.81	20.15	30.89	32.81	48.60	15.79	3.24	1.565	45.83
Resid. Pop.	41.24	22.30	41.86	19.56	41.66	21.99	43.23	21.24	2.94	1.828	41.87
Tot:1 Pop.	41.68	21.96	41.96	20.00	39.93	23.45	43.72	20.27	2.96	1.778	41.98

Note : The intrinsic birth and death rates and the intrinsic rate of growth are expressed per thousand population per annum.

India as derived in the present paper with those given by the Census Actuary for India, and have found that the estimates of the expectation of life at birth suggest that the reference period for our estimates may be put as 1951-61. In this context it may be noted that our estimates of the expectation of life at birth for males and females in the general population of India during the reference period are respectively 41.68 and 39.93 years. The corresponding values of the expectation of life at birth for males and females given by the Census Actuary for India are 41.90 and 40.60 years respectively. The close agreement has been considered as a guide for assigning the period 1951-61 to the present estimates. This may be justifiable, because taking into account the form of age distributions employed in the present paper and those used by the Census Actuary it is difficult to establish agreement between our and Census Actuary's estimates of each characteristic. It may also be mentioned that the broad age groupings may mask some of the differences between the estimates of levels of various characteristics in populations of specified communities. In addition, the differential pattern of error in age reporting is likely to affect the present estimates. It is difficult at this stage and with the available data to delineate the precise effect of these limitations of data on the estimates. In spite of these limitations the estimates given in the present paper are considered to reveal the differences between the levels of demographic characteristics in the selected communities.

Mortality

Table 11 shows that the expectation of life at birth for males belonging to scheduled castes is highest (44.28 years). This exceeds the expectation of life at birth for the general population by 2.60 years and that for the residual population by 3.04 years. This observation may be contradictory to the general impression that mortality level among scheduled castes may be higher than that among the general or the residual population. At this stage the statistics are insufficient to either support or contradict this general impression but it is stressed that the study of differences between mortality experiences of males belonging to the communities considered here may constitute a useful area for further investigation. On the other hand the expectation of life at birth for males belonging to scheduled tribes (37.53 years) is respectively 4.15 and 3.71 years lower than that for males in the general and residual populations. Thus it may be noted that the expectation of life at birth for males is highest in the scheduled castes which is followed by the residual population and the scheduled tribes in that order.

The trend of the expectation of life at birth for females belonging to these three communities is somewhat different. Females belonging to residual population experienced the highest expectation of life at birth (41.66 years). They are followed by

* This is under investigation

those belonging to scheduled castes (34.55 years) and scheduled tribes (30.29 years) in that order.

The differences between the expectations of life at birth for males and females show that the expected life span for males of scheduled castes and scheduled tribes were respectively 9.73 and 6.64 years longer than those for females of those communities. This trend is reversed for the residual population where females outlive males by a margin of 0.42 years.

The intrinsic death rates given in table 11 exhibit a trend consistent with that shown by the expectation of life at birth for the two sexes in the selected communities.

A simple average of the intrinsic death rates of total male and female populations obtained as 22.7 per thousand persons per annum is very near to the estimate (22.8) of the death rate of the total population of India provided by the Census Actuary for the period 1951-60.

Fertility

The intrinsic birth rate for the total population computed by the formula.

$$B.R. = \frac{u}{b_m} + \frac{1}{b_f}$$

where, B.R = intrinsic birth rate per thousand population
per annum,

u = sex-ratio at birth (male/female) taken as 105
male births per 100 female births,

b_m = intrinsic male birth rate per 1000 male births
per annum,

and b_f = intrinsic female birth rate per 1000 female births
per annum.

are given in table 11. These values indicate that the intrinsic birth rate of population belonging to scheduled castes and residual population are equal (41.9) whereas that of the population belonging to scheduled tribes is about 4 points higher. These estimates are consistent with the trend shown by the estimates of the gross reproduction rate in these communities. The estimate of the gross reproduction rate in the populations of scheduled castes, scheduled tribes and residual population were respectively 2.97, 3.24 and 2.97. Our estimate of the intrinsic birth rate per thousand persons per year (42.0) is slightly higher than that (41.7) given by Census Actuary for the total population of India. The estimates of the gross reproduction rate also show a trend similar to that shown by the intrinsic birth rate. The estimate of the gross reproduction rate for the total population in the present method (3.0) is slightly higher than that (2.7) given by the Census Actuary.

The Growth Rate

The differences between our and the Census Actuary's estimates of the death and birth rates for the total population of India have given rise to differences between the two estimates of the rate of growth for the total population of the country. The present estimate of the rate of population growth (19.3 per thousand population per year) is slightly higher than that given by the Census Actuary (18.7). The intrinsic rates of growth of the male populations of scheduled castes and scheduled tribes are respectively 6.04 and 4.36 points (per 1000 persons of the same sex) higher than those for female populations of these communities. By contrast, the intrinsic rate of growth for males of the residual population was 1.68 points (per 1000 persons of the same sex) lower than that for females belonging to that group. The marked unbalanced growth of the two sexes in the scheduled communities appears to be a transitory phenomenon because it cannot be sustained over a long period of time by the population. Here it would have been desirable to estimate a rate of growth adjusted for the differences between the observed and the stable age distributions but availability of observed age distribution in very broad age groups makes such adjustment practically impossible.

The values of the net reproduction rate given in table 11 suggest that the replacement potentials of the scheduled castes

and scheduled tribes are lower than that of the residual population. In this context it may be noted that the estimates of the gross reproduction rate show that the scheduled castes and the residual population have the same level of fertility, and therefore the lower potential of scheduled castes for replacement of population is mainly due to the difference between the mortality experiences of the communities. The scheduled castes and tribes have almost the same potential for their replacement. This implies that the higher level of fertility experienced by the latter is balanced by a somewhat higher level of mortality that prevailed in this community.

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