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Pattern of change in age reporting during 1961-71, Indian Census data

Introduction

A near-accurate age composition is desirable for many scientists including demographers, economists, *planners etc,. In particular, many* social relationships within a community are considerably affected by the relative numbers of each age. The importance of this basic variable is well known to all social scientists, particularly demographers who *consider* this variable as a starting variable while studying fertility, mortality, nuptialtty, migration and certain other related topics. It is required for population projections, projections of households, school enrolment, *labour fores,* health services, food, housing etc.

Through decinnial Censuses, this information, among others is collected from each, household in the country. It is observed that the ages are highly distorted because of mis-reporting of ages *owing to the* people's ignorance and illiteracy. This kind of age-distortions are prevalent in under-developed countries with poor literacy standard. It has been observed that the errors in the age data go on decreasing with time. It is in *this context, that an* attempt has been made in this paper to investigate the change, if any, in the quality of the Indian age data between 1961 and 1971. Several factors arising out of illiteracy are responsible for mis-statement of ages include; Ignorance of age, negligence in reckoning the precise age, deliberate mis-statement, and mis-understanding of the questions. If ages have been mis-stated mainly because of ignorance, the returns may nevertheless represent *a* fairly dose approximation to the true distribution of ages. If the ages are deliberately mis-stated there is a likelihood of having overstatement as well as understatement at some specified ages. In any

case, when single year age data are plotted on a graph paper, certain irregular fluctuations are observed. For example, the curve invariably peaks at ages ending in "0" and shows corresponding troughs at ages ending, particularly, in "9" and "1". Less marked concentrations are observed at ages terminating in 5 and also in "2" and "8", These are the primary indicators of biases in the age data.

Source of Information

Sex-wise distributions of populations of India according to single year as well as 5-year grouped age data have been collected from the relevant volumes of the two censuses.*

Methodology

The method [4] of test involves four steps; (1) Inspection of the data, (2) Comparison with an expected configuration, (3) Analysis of ratios computed from the data, and (4) Measurement of age accuracy by means of an index.

Some effects of age errors are readily apparent if single year of age data are examined while certain errors are observed when grouped data, preferably the conventional 5-year age group are used. We have therefore examined both the types by data.

Results

Inspection of the Data

From the examination of 1961 female population by single year age, it is clear that there are unusually large numbers at ages ending in digits "O" and "5" with an exception at the age 15. Similar patterns, with a less fluctuation, have been shown by ages terminating in digits "2" and "8". Ages terminating in odd digits like 1,3,7 and 9 show marked deficiencies with an exception of the age 3. Ages ending in digits "4" and "6" show deficiencies. Similar observations with a few exceptions are observed in male population. From the same figure it may be seen that although the fluctuations have been diminished by transforming the data into 5—year age group for both male and female, the figure shows no regular trend as it should be, had there been no age

*(i) Census of India, 1961, Vol. I. Part IIC (i)-Social and Cultural Tables.
(ii) Census of India, 1971, Series-1, Part IIC (ii)—Social and Cultural Tables.

error and under the assumption of closed population with respect to international migration, and no major mortality due to war in the recent past. From the 1971 data on single year population, it is observed that the females show similar pattern of age reporting as that of 1961. While studying the male population by both the grouped and single year age, the 1971 data show no improvement over 1961.

TABLE 1— POPULATION OF INDIA AT AGES 80 TO 90 COMPARED WITH 5-YEAR MOVING AVERAGES, 1961

(fig. in 000)

Age	Population		5-year moving average		Excess or deficit of nos.		Excess or deficit as percentage of moving average	
	male	female	male	female	male	female	male	female
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
75	74	71						
79	33	31						
80	615	733	161	182	+454	+551	+ 282.60	+ 302.94
81	33	31	149	170	-z116	-139	— 77.78	— 82.01
82	48	43	147	167	-99	-124	— 67.21	— 74.07
83	17	13	52	51	-35	-38	— 67.65	- 74.98
84	21	16	48	47	— 27	— 31	— 57.60	- 65.44
85	141	151	42	41	+ 99	+110	+240.78	+ 269.21
86	17	14	40	41	-23	— 27	— 58.94	— 65.65
87	12	10	38	39	-26	~ 29	— 68.95	— 73.52
88	12	12	35	40	-23	— 28	— 64.91	— 70.41
89	8	8	33	38	-25	— 30	— 74.62	— 77.97
90	126	156	33	38	+ 93	+118	+ 287.48	+ 305.92
91	7	7						
92	9	9						

TABLE 2—POPULATION OF INDIA AT AGES 80 TO 90 COMPARED WITH 5-YEAR MOVING AVERAGES, 1971

(fig. in 000}

Age	Population		5-year moving average		Excess or deficit of reported nos,		Excess or deficit as percentage ofmoving average	
	male	female	male	female	male	female	male	female
(I)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
78	96	91						
79	36	31						
80	825	897	210	219	+615	+678	+292.19	+ 308,55
81	36	29	195	204	—159	-175	— 81.68	— 86.01
82	59	50	193	202	—134	—152	— 69.48	— 75.36
83	21	16	68	65	— 47	— 49	— 68.68	- 75.95
84	23	21	65	63	— 42	- 42	— 64.28	— 66.76
85	203	210	57	55	+146	+155	+ 254.95	+278.07
86	21	18	56	56	— 35	— 38	— 62.86	— 68.04
87	17	13	54	53	— 37	— 40	— 68.17	— 74.92
88	18	17	47	50	— 29	— 33	— 62.11	— 66.99
89	10	9	44	48	- 33	— 39	— 76.67	— 80.61
90	169	194	43	47	+125	+147	+289.91	+ 309.24
91	7	6						
92	13	11						

Comparison with Expected Configuration

It is well known that the people of older ages are, in general, ignorant about their ages causing, thereby, wider fluctuations at advanced ages with excess of

TABLE 3—COMPARISON OF INDIAN POPULATION, 1961 WITH STABLE POPULATION

(fig. in 00000)

Age	Census population		Stable population		Ratio = census / stable	
	male	female	male	female	male	female
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0- 4	332	329	310	285	1.07	1.16
5- 9	331	316	254	233	1.30	1.35
10-14	263	230	239	219	1.10	1.05
15-19	186	173	226	205	0.82	0.84
20-24	182	191	209	189	0.87	1.01
25-29	185	180	190	172	0.98	1.05
30-34	160	148	170	155	0.94	0.96
35-59	136	119	150	138	0.90	0.86
40-44	120	108	130	122	0.92	0.89
45-49	97	83	110	107	0.89	0.78
50-54	91	80	89	91	1.02	0.87
55-59	53	45	70	75	0.76	0.60
60-64	57	55	51	58	1.13	0.96
65-69	25	24	33	40	0.75	0.60
70+	42	44	30	40	1.40	1.11
Total	2261	2128	2261	2128		

TABLE 4—COMPARISON OF INDIAN CENSUS POPULATION, 1971 WITH STABLE POPULATION

(fig. **00000)**

Age	Census population		Stable population		Ratio = census / stable	
	male	female	male	female	male	female
(/)	(2)	(3)	(4)	(5)	(6)	(7)
0- 4	402	393	390	397	1.03	0.99
5-9	422	398	319	310	1.32	1.2S
10-14	365	323	301	2S6	1.21	1.13
15-19	252	222	283	264	0.89	0.84
20-24	216	215	262	240	0.82	0.90
25-29	203	205	238	214	0.85	0.96
30-34	183	179	214	189	0.86	0.94
35-39	172	157	189	165	0.91	0.95
40-44	151	132	163	142	0.92	0.93
45-49	125	104	137	121	0.91	0.86
50-54	111	94	112	101	0.99	0.93
55-59	69	59	87	SO	0.79	0.74
60-64	75	69	63	59	1.18	1.18
65-69	36	33	41	38	0.88	0.88
70+	57	56	37	33	1.53	1.70
Total	2840	2641	2840	2641		

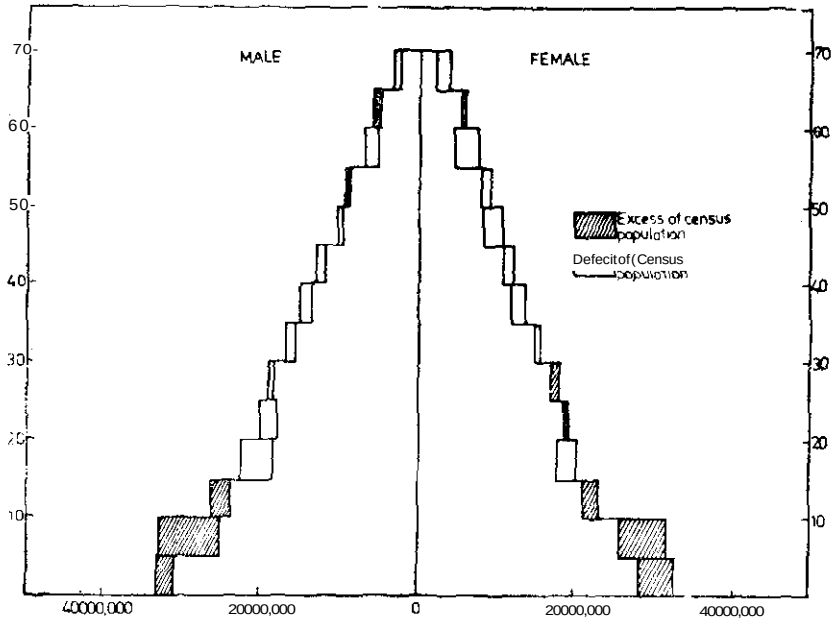

Fig. 1. Comparison of population of Indian Census, *1961* by sex and 5-year age groups with stable population.

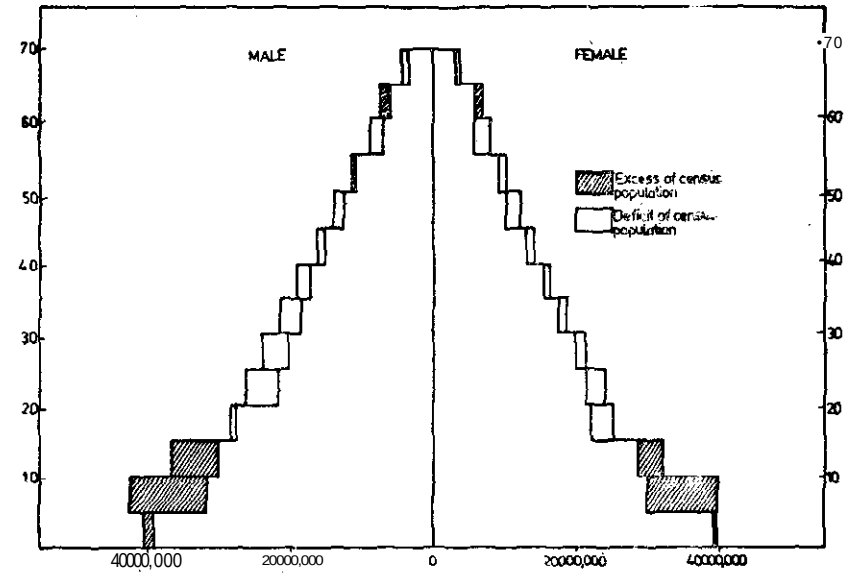

Fig. *2.* Comparison of population of Indian Census, 1971 by sex and 5-year age groups with stable population.

population at ages terminating in round figures like "0" and "5" and deficit at other ages. The extent of fluctuation can well be examined by using a suitable moving average method. A 5-year moving average method has been adopted here for examination as well as comparison purposes. A close examination of these data reveal that the digits "0" and "5" in the advanced ages show the greatest preferences for both male and female populations of 1961 and 1971 But the extent of fluctuation is wider in 1971 compared with 1961 data for both male as well as female.

A Census age structure can well be compared with the concept of stable population. The Stable population theory postulates that under constant or near-constant fertility and mortality in population closed with respect to migration, the age composition remains invariant.

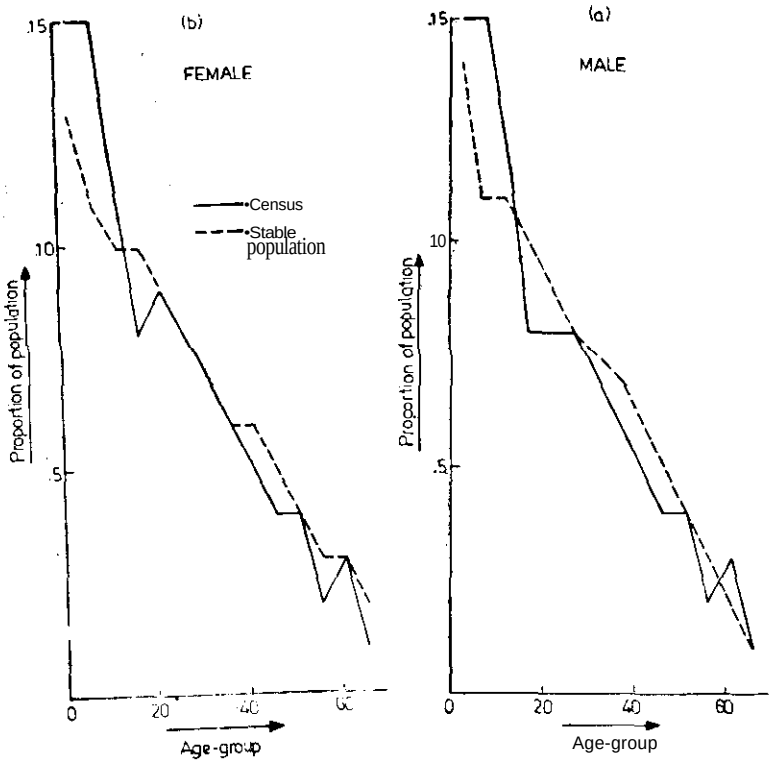

Fig. 3. Comparison of Indian Census population, 1961, **with** stable **population.**

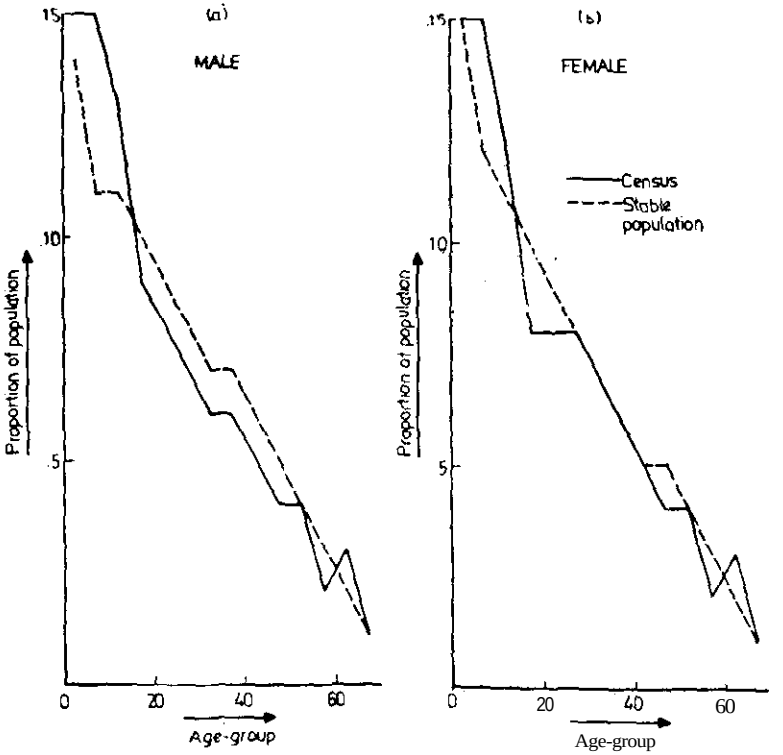

Fig. 4. Comparison of Indian Census population, 1971, with stable population.

Table 3 and Table 4 show the census population of 1961 and 1971 for each sex separately compared with stable populations. The stable populations given above have been obtained from the book of Coale and Demeny 'Regional Model Life Tables and Stable Populations' using West model. It is clear from tables and the figures (fig. 1 and fig. 2) that upto age 15 there are more or less excess of census population over stable population for both sexes with in and in 1961 and 1971. But the 1971 data shows greater fluctuation than 1961. And there are more or less, regular deficit of census population from the age **15 to** age 60, **At** the advanced ages i.e. in the age group 70 + there are excess of census population, over stable population for both male and female in 1961 and 1971. From the figures depicted in fig. 3 (a, b) and fig. 4 (a, b) in the later age groups there are invariably troughs and peaks for both male and female in 1961 and 1971 showing there by reporting errors in those ages more markedly than the other ages.

Analysis of Ratios from the Data

Ratios like, sex-ratio and age-ratio are useful measures for determining inaccuracies in the reporting of ages. **If** the ratios are computed on single year age returns, under the assumption of no migration and either no change or very small and gradual change in fertility and mortality, the sex-ratio should change very gradually from one age to another, as they are determined mainly by the sex-ratio of births and sex differences in mortality at various ages. Similarly age ratios should deviate very little from 100.

Sex-ratio has been defined, here as the number of males per 100 females in the same age class. And the age ratio has been defined as 100 times the number of persons in a given age class divided by the arithmetic average of numbers in the two adjoining age classes. From the study of sex ratios computed from single year age returns it is observed that the *two* censuses show no significant differences. But from the study of single year age-ratios, a marked differences between the two populations have been observed, Age ratios, in general, reflect the relative power of attraction in ages terminating with some preferred digits over some non-preferred digits. The male population in 1971 shows greater attraction for the digits '0' compared with their counterparts in 1961 as the 1971 data shows wider fluctuations between the digit '0' with the two adjoining digits '1' and '9'. At the age 20 the 1961 data shows an attractive force more than what has been observed in 1971. Exactly similar results have been observed for females also. So far as the attractions for the digit '2' over the two adjoining digits '1' and '3' are concerned, the 197J male population shows greater attractions for this digit as compared with the 1961 data. Females show similar pattern. The digit '8' shows much wider variations of figures in more number of cases than the two adjoining digits '7' and '9' in 1971 compared with the 1961 data. Females show the similar trend. The digit '5' shows the similar pattern as the digit '8'. People tend to report their ages as ending in certain digits. On the contrary, there are some other digits particularly like 1, 3, 7 and 9 which are avoided by the people, while reporting their ages. In the 1971 population, both the male and female age distribution show much wider fluctuations in the negative direction with respect to digits adjoining the preferred digits as compared to the corresponding position in the 1961 population.

Measurement of Age Accuracy by Means of an Index

For the purpose of comparison between two or more age data for different censuses in respect of age reporting an age accuracy index is useful. Myres' Blended Method has been adopted here for the same purpose. This index reflects preferences or dislikes on an average for each of the ten digits from 0 to 9.

TABLE 5—APPLICATION OF MYRES' BLENDED METHOD TO AGE DATA FOR MALE AND FEMALE POPULATION ACCORDING TO 1961 CENSUS

Terminal digit	Population wish terminaldigita Starting at age 10+a Male	Female	Starting at age 20 -r a Male	Female	Weights for col's I & 2	col's 3 & 4	Blended Population Male	Female	Percent distri-bution M	F	Deviation from 10 percent M	F~
(1)	(2)	(3)	CO	<5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
0	43943	43968	36336	37138	1	9	371417	376210	26.8	34.3	+ 16.8	+ 14.3
I	9007	7871	5347	440$	2	8	6.0790	51016	*4.4*	4.6	-5.6	- 5.4
2	18852	16287	11815	1057(5	3	7	139261	122893	0.0	11.2	00	+ 1.2
3	8640	7498	4967	5236	4	6	64362	55408	4.6	5.0	— 5.4	— 5.0
4	')	8948	563!	5187	5	5	78050	70675	5.6	6.4	— *4.4*	— 3.6
5	32726	30308	28148	26469	6	4	*386948*	124060	22.3	11.3	+12-3	+ 1.3
6	11027	9653	6799	5684	*7*	3	97586	73258	3.0	6.6	— 3.0	— 3.4
7	9636	59(3	4553	3646	8	2	86194	54596	62	4.9	— 3.8	— 5.1
8	13228	12909	SOS9	7809	9	1	J27141	123990	9,2	11.3	— 0.8	+ 1.3
9	5393	4772	3123	2663	10	0	53930	47720	3.9	4.3	— 6.1	— 5,7
Total							1387679	1101826	100.0	100.0	58.2	46.3

Myres' Index for male ; 58,2
Myre's index for female : 46.3

TABLE 6—APPLICATION OF MYRES' BLENDED METHOD TO AGE DATA FOR MALE AND FEMALE POPULATION ACCORDING TO 1971 CENSUS

Terminal digit	Population with terminal digita: Starting at age 10 + a — Male	Starting at age 10 + a — Female	Starting at age 20 + a — Mule	Starting at age 20 + a — Female	Weights for col's 1 & 2	Col's 3& 4	Blended Population — Male	Blended Population — Female	Percent distri-button — M	Percent distri-button — F	Deviation from 10 percent — M	Deviation from 10 percent — F
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
0	56132	54230	5717	44795	1	9	467585	457385	27.6	29.3	+17.6	+19.3
1	10955	9417	6053	4803	2	8	70334		4.1	3.7	— 5.9	— 6.3
2	23470	20362	13S59	12408	3	7	167423	147942	9.9	9.5	— 0.1	— 0.5
3	11228	10010	5951	5208	4	6	$0618	71288	4.8	4.6	— 5,2	— 5.4
4	12458	11235	6170	4765	5	5	93140	80000	5.5	5-1	— 4.5	— 4.9
5	42412	38845	35917	33509	6	4	398140	367106	23.5	23.5	+ 13.5	+13.5
6	13299	11638	7580	6532	7	3	115833	101062	6.8	6.5	— 3,2	— 3.5
7	S650	7403	5205	4340	8	2	78810	67944	4-6	4.3	– 5.4	— 5 .7
8	16737	16137	10005	9:189	9	1	160638	155222	9.5	9.9	— 0.5	— 0.1
9	6278	5518	3348	2930	10	0	62780	55180	3.7	3.5	— 6.3	— 6.5
Total							1695301	I560387			62.2	65.7

Myres' index for male : 62.2
Myres' index for female : 65,7

From Table 5 and Table 6, it may be observed that the digit '0' shows on average the greatest preference in respect of male age reporting followed by '5' in both 1961 and 1971- The digits '8' and '2' show lesser heaping both in 1961 and 1971. The digit'9' shows the greatest dislike both in 1961 and 1971 followed by the digit '1'. The Myres* index for male data has been found to be 58.2 in 1961 where as it is 62.2 in 1971. When the female data is examined it is found that the digit '0' and '5' show the same pattern as that of male age data with respect to their order of preference. The digits '2' and '8' show some preferences in 1961 data although the deviations are small from 10% whereas the 1971 data show deviations in the negative direction. The extent of variations are very small. In respect of dislike for the digits it has been found that the digit '9' tops the list both in 1961 and 1971 followed by the digits '1', '7, '3' etc. The Myres' index for 1971 is much higher (65.7) than the 1961 data (46,3).

Conclusion

If it is assumed that the age biases are a consequence of people's ignorance and illiteracy it may be expected that the quality of age data would be better according to as the people become more and more literate over time. Mukherjee, 1971, while studying the age composition of the population in the districts of West Bengal during the period 1872-1962 found that the age biases went on decreasing from census to census. In the present study an attempt has been made to see whether or not there is any change of quality of Indian age data from 1961 to 1971 keeping in view the fact that there was an increase of literacy status of Indian people from 1961 to 1971.

Both the 1961 and 1971 data on age show irregular fluctuations with excess of population at ages ending in digits like '0' and '5' particularly, and deficit of population at ages terminating in digits like 1, 3, 7 and 9. The fluctuations are more prominent in 1971 data for males as well as females particularly at advanced ages. Similar observations have been obtained while comparing the two censuses with stable populations. Upto age 15 there is an excess of census population over stable population for both sexes in 1961 as well as in 1971. But *the* extent of fluctuationsis wider in 1971 than in 1961. From the study of sex-ratios of the two censuses no definite conclusion emerges in respect of their relative accuracy. But the comparison of age-ratios provide a clear indication of more age biases in the 197l than in the 1961 data. Myres' indexes have been found to have higher values in 1971 data for both sexes, than those of 1961 data. On the whole, the 1971 data shows no betterment of age reporting than the 1961 data. There my be several factors behind this finding. For example, variation in the type of question asked on age, variations in efficiency on the part of interviewers, as well as respondents, political disturbances prevailing over different

parts of the country etc. So far as the type of question asked on age, the two censuses did not have much variation in the type of questions asked. In 1961, age last birth day was recorded, while in 1971 total years completed last birth day was adopted. The only important thing remains to be investigated is whether or not there was any variation in age reporting from place of disturbing areas to the one which was more or less quite at the time of census operations.

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