Morali Dhar Vemuri and A. P. Deshpande

Post-Child Mortality Estimates for the Major States of India 1971-1981[1]

WITH the availability of the 1981 census age-sex distributions for the states of India, there is *a* genera] interest in estimating mortality. Such information is useful for indicating regional mortality differences and trends. Additionally, the emerging pattern throws light on the 'nature of the data collected in the population censuses. Based on indirect estimates mortality data from other independent sources can afso be evaluated. In this paper we compute and examine male and female life expectancy at age five for the intercensal period 1971 to 1981 for India and its major states.[2]

Method and Data Used

Mortality estimates for the major states of India during 1971-1981 are derived utilising the intercensal survival method first described in Manual IV (United Nations, 1968) and recently in Manual X (United Nations, 1983). According to this method, the 1971 population (by five-year age groups) is projected forwatd to 1981 by applying the ten year survival probabilities which are calculated from model life tables.3 The projected population £is cumulated and compared with the cumulated census population of 1981 to obtain estimates of *el* for age segments over ten, over fifteen etc. The mean of the first

1. An earlier version of this paper was presented at the Annual Conference of Indian Association for the Study of Population held at Bangalore, 1985. The views expressed in this paper are those of tbe authors and not those of the Institute they are affiliated to.

2. States with an enumerated population of 10 million or more in 1971 and 1981 are referred to as major slates of India. The state of Assam is excluded from the computation* as a census was not conducted in 1981 in tbe state.

3. The survival probabilities are usually based on a family of model life tables that represents mortality pattern.

nine values is usually taken as indicating the mortality level.* For India Manual IV recommended the use of the female age distribution as there are smaller distortions in it than in the male age distribution. This method of estimating e_0 can similarly be applied to a backward projection of the latter (1981) census population.

The census survival ratio method for estimating mortality is particularly suited for a country like India. As fertility and mortality have not remained constant in the recent past, for indirectly estimating mortality it is important to employ a method that does not incorporate the assumption of stability. The interccmal survival method makes no such assumption. Another advantage of this method is its ability to yield robust estimates when there are errors due to age misreporting : age reporting errors arc partly mitigated by cumulation.

The basic data required are the conventional five year age distribution of the 1971 and 1981 populations, separately by sex, for the states. The data are available from the office of the Registrar General (1977, 1983a and 1984a). Before applying the above procedure it is essential to adjust the states' age distributions. Three adjustments are preformed to ensure that the data are as comparable as possible. First, the age distributions are corrected for omissions in 1971 and 1981, The extent of omission in these two censuses is published according to zones and broad age groups (Office of the Registrar General, 1975, 1983b). We have used the zonal level of omission for the states in the particular zone, and the level of a broad age group for the ages forming the broad age group. Moreover, because interstate migration during 1971-1981 may have altered the age distribution it is necessary to take migration into account. The number of male and female net migrants to the states in 1971 and 1981 is given in the Office of Registrar General (1983a). But as the conventional five year age distribution of interstate male and female net migrants is not known, we inferred the migrants' age distribution for 1971 from data presented by the Office of the Registrar General (1982). Here again, the distribution of migrants by broad age groups is taken to represent migrants comprising the broad age group. For 1981 the inter-state migrants are distributed in an analogous manner utilizing the 1971 age distribution of migrants. In spite of these corrections, migrants who have died during the intercensal period are not included. Farther, as it is difficult to obtain figures on emigrants we have not adjusted the age distributions for international migration (though in the majority of cases examined here the effect of international migration on the estimates is probably negligible). Finally, the length of intercensal period is adjusted so that it is exactly ten years.[1]

4. A detailed description of tbe method is given in *Manuals IV* and *X*.

5. No Adjustments are made for males and females whose ages are not known. Their proportion in the corresponding total population is very small, and therefore not importut for present considerations.

Estimates of Post-Child Mortality

After preliminary adjustments of the data, female life expectancy at age five is derived for the major states by the forward projection method using the South family of model life tables (Coale and Demeny, 1983). These estimates for 197M981 as well as for 1961-1971 are presented in Table 1.[6] For India (excluding Assam), the female life expectation has increased by 6.7 years, from 53.2 years in 1961-1971 to 59.9 years in 1971-1981. A statewise comparison of the 1971-1981 results indicates that Haryana has the highest female e_{05}, of 67.3 years, and Orissathe lowest e_{05}, of 51.3 years. Haryana, which in 1961-1971 occupied the sixth highest rank for eg, has in 1971-1981 the largest absolute improvment' in post-child mortality : compared with the former decade, Haryana's eg has increased by 11.2 years during the latter decade, an average annual increase in e_{05} of more than a years.[8] The adjoining state of Punjab has recorded a similar life expectancy from age five of 67.1 years.

Two north-central states, Madhya Pradesh and Rajasthan, have displayed significant addditions to e_{05} For Madhya Pradesh, it has improved from 54.8 yearsduring1961-1971to63.2yearsduringI971-1981,andforRajasthan from 56.3 years to 65.2 years during the same periods. But for Bihar e_0^5 has registered a relatively modest increase of 4.1 years, from 51.6 years in 1961-1971 to 55.7 years in 1971-1981. However, for the state of Uttar Pradesh *4* has improved considerably, from 49.9 years in 1961-1971 to 60.3 years in 1971-1981, altering its relative position among the states from one with lowest e_{05} (rank 14) in 1961-1971 to one with intermediate e_{05} (rank 9) in 1971-1981. This impressive improvement in the post child mortality of Uttar Pradesh may be biased due to unaccounted differences in the censuses which are discussed in the next section,

In Table 1 a noticeable eg is that for Kerala. The life expectancy for Kerala has shown a marginal increase from 60.7 years in 1961-1971 to 63.2 years in 1971-1981. For Tamil Nadu there has in fact been a decline in the estimated female life expectancy at age five. For this state eg has decreased from 54.3 years in 1961 1971 to 53.2 years in 1971-1981. But for the other two southern states, Andhra Pradesh and Karnataka, e_{05} has significantly improved. Whereas

6. As mentioned in the source to the table the e05 estimates for 1961-1971 are taken from Dyson (1984). For obtaining those estimates Dyson generated life tables based upon the two parameter logit life table system which takes into account his derived estimates of child mortality. For details the reader is referred to his article.

7. In this paper we analyse the results in terms of absolute changes. Although the comparison of absolute differences in eg at various levels of $e_{05}$is not correct, we prefer it as the average anuual increase can readily be interpreted. Another reason for this preference is that our presentation is not affected as the ditfcrccc between absolute and relative change vis-a-vls the relative position of the stales is not much.

8. The estimates for 1961-1971 and 1971-1981 are assumed to centre on 1966 and 1976.

LIFE EXPECTANCY AT AGE 5 FOR THE MAJOR STATES OF INDIA, 1961-1971 AND 1971-1981

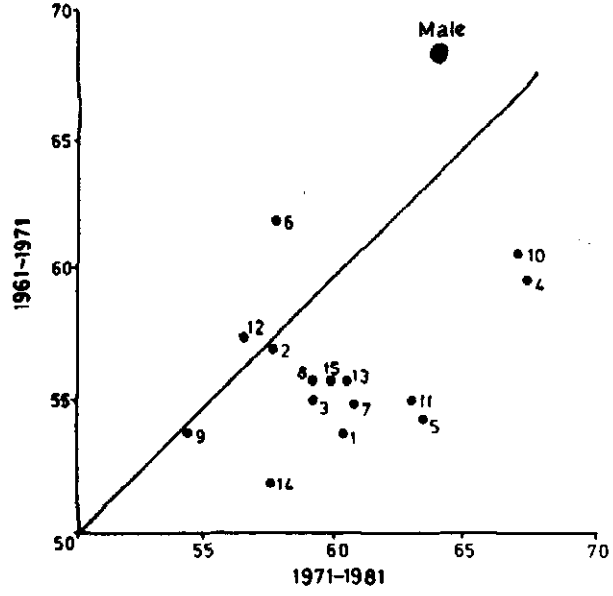

Fig. 1

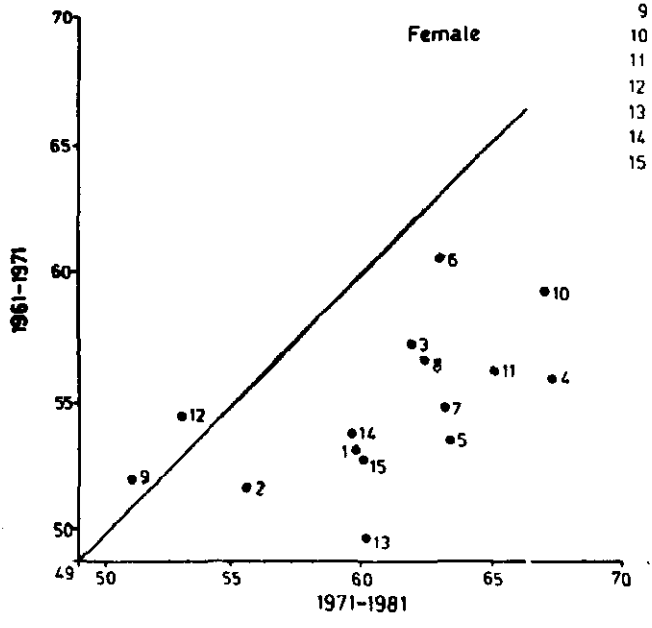

Fig. 2

1 ANDHRA PRADESH
2 BIHAR
3 GUJARAT
4 HARYANA
5 KARNATAKA
6 KERALA
7 MADHYA PRADESH
8 MAHARASHTRA
9 ORISSA
10 PUNJAB
11 RAJASTHAN
12 TAMIL NADU
13 UTTAR PRADESH
14 WEST BENGAL
15 INDIA

for Andhra Pradesh eg has increased from 53.3 years in 1961-1971 to 59.$ years in 1971-1981, the corresponding figures for Karnataka are 53.6 years and 63.5 years.

Among the remaining major states, the contiguous states of Gujarat and Maharashtra show similarity in their female post-child mortality. In Gujarat and Maharashtra eg has respectively increased from 57,3 and 56.7 years in 1961-1971 to 61.9 and 62,4 years in 1971-1931. The computations for West Bengal indicate that eg has climbed from 53.7 years in the sixties to 59.8 years in the seventies. In contrast to West Bengal, Orissa shows no improvement—indeed there is an indicated deterioration from 51.7 years in 1961-1971 by 0.4 years in 1971-1981.

The female life expectancy at age five has displayed a curious pattern and for some states it is difficult to infer their level of post-child mortality. Since the necessary data for males are available, we have also computed by forward projection 1971-1981 male eg for the states. Table 1 contains the estimates of male eg- Compared to the female estimates of eg, the male data show certain differences. For Kerala, life expectancy for males at age five has registered a fall from 61.8 years in the former decade to 58.1 years in the latter. A major contributing factor here is probably international migration for which we have not made any corrections. Just as for females, the male eg for Tamil Nadu has shown a deterioration. Orissa has recorded a trivial gain in male e_{05} On the other hand, male eg for Uttar Pradesh has increased from 55.9 years in 1961-1971 to 60.4 years id 1971-1981 and between the two intercensal periods the female increase in *el* is larger (10.4 years) than the male increase (4.5 years). For the other north-central states also the e_{05} show that female increases exceed male increases. There is an equal increase in male and female e_{05} in Andhra Pradesh, while the corresponding increase is more or less equal within Karnataka, Gujarat and West Bengal. For Haryana and Punjab the male and female e_{05} are not different,

Discussion

Although the intercensal forward projection method is useful for deriving the level of post-child mortality for India and its states, the accuracy of the estimates depends upon the input data.' As mentioned if iatercensal emigrants from a state are not included then the method underestimates the eg in the states.[1]* On the other hand, substantial immigrants between two censuses inflate estimates of post-child mortality. Dyson (1981b) observes the particularly

9. Manual IV(United Nations, 1968) demonstrates that there are minor differences in the estimate of e_{05} obtained from the four families of model life tables.

10. The male estimates are more affected than the females if there is Sex-selecitive emigration as in Kera la. But when families move the relative effect on male and female estimates is difficult to infer.

high growth rates for 1971-1981 in the western districts of Rajasthan which border Pakistan and explains it as a remit of immigration from that country. In his analysis of data on religion, Bose (1985) also finds evidence of considerable illegal immigration from Pakistan to Rajasthan and Punjab. The extent of such influences on the estimates of these states is difficult to assess, but the high level of e_{05} for Rajsthan (relative to other states where health conditions arc known to be better) reinforces the explanation relating immigration to that state. Bose further mentions that in Bihar and West Bengal there are a large number of immigrants from Bangladesh. According to Elahi (1981), in 1971 there was an inflow of refugees from Bangladesh to Madhya Pradesh and Orissa, and he observes that since then some of them may have moved on to West Bengal. Mukerji (1982) argues that a large number of Bangladeshi migrants during 1971 to 1981 have settled in Bihar and eastern state of India. If this is so, the actual level of post-child mortality in these states will be lower than those in Table 1. In a similar manner, internal migration distorts the e_{05} estimates. In our computations, the age-sex distributions for the states are corrected for internal migration. However, defects in the migration data can still affect the estimated values of el for the states,

Another important and related reason for the possible bias in the estimates is omissions in the censuses. The 1971 and 1981 census data are adjusted for omissions detected by the respective post-enumeration surveys. But omissions in Indian censuses are probably significantly higher than census post-enumeration cheeks suggest (Visaria and Visaria, 1981; Dyson and Crook, 1984). Analyses of census data reveal that the 1971 census was especially poor in its coverage.11 After a thorough examination of the data, Visaria (1971) found that the 1971 census population coverage was deficient, and it seemed particularly evident lor three states, Bihar, Rajasthan and Uttar Pradesh. Preston et al. (1979) show that for 1971 females were undercounted more than males. Further, the uoderemuneration for ages 0-4 in 1971 might be as high as 10 to 12 percent (Ewbank, 1981). While comparing the 1971 census with other censuses, Dyson and Crook (1984 : 2) suspect that "it omitted a significantly higher proportion of the population than either the 1961 or 1981 census." An analysis of 1981 census data indicates that among the north-central states the census coverage perhaps improved for Bihar, Rajasthan and Uttar Pradesh (Dyson, 198la).

Improvement in the latter census count of population relative to the former census results in an over-estimate of post-child mortality. Higher than average omissions at ages 0-4 in 1971 add to t he overestimate of e_{05} Accordingly,

11. See Dyson (1981b).

12. Some of the omissions may be due to mis-statement of age and the extent of departure from the actual e_{05}depends upon the prop ortion of omissions in ages 0-4 that are included in ages 5-9.

the 1971-1981 estimates for India may well show an exaggerated improvement in eg. Among the states, because of the above stated reasons, the e_{05} during 1971-1981 are probably overestimated particularly for Bihar, Madhya Pradesh, Rajasthan and Uttar Pardesh. Moreover, as the 1971 census age distributions are employed for deriving e_{05} in 1961-1971, the estimates of 4 are, in a similar manner, probably underestimated. As a consequence, the combination of an underestimated *el* for 1961-1971 with an overestimated *el* for 1971-1981 produces a larger than actual differences between the two estimates.

The differences in the 1971 census count for the two sexes further magnify the improvement in *el.* For instance, in the case of Uttar Pradesh females the increase in e_{05} from 1961-1971 to 1971-1981 is 10.4 years but the corresponding increase for males is 4.5 years. We can thus surmise that differential 1971 and 1981 census count of population is, to a large extent, inflating the estimates of post-child mortality for Bihar, Rajasthan, Uttar Pradesh and most probably for Madhya Pradesh.[13] However, this is not to say that for other states there has been no improvement in 1981 census coverage. For these states more information is required relating to both the 1971 and 1981 censuses.

A third factor which may be generating distortions in the estimates is the age data. As is well known, misstatement of age is a pervasive phenomenon in Indian population data. A detailed analysis of the male and female age distributions shows a "smaller gross displacement in female than in male age distributions in the African-Southern Asian Countries" (United Nations, 1968 : 22). This occurs when enumerators supply a plausible figure for age; for females, age is estimated with reference to menarche, number and ages of children and menopause. But according to Zlotnik (1979) the female age distribution tends to be more distorted by misstatement of age than for the male population. An examination of the male and female e_{05} for the nine age segments reveals large variation in its value: for India, female e_{05} ranges from 55.5 years to 65.4 years and for males from 54.3 years to 64.9 years. Such a broad range suggests serious misreporting of ages for both sexes, and it is difficult to determine if the male or female age distribution is more distorted.

Because the forward projection method, that we have used for the process of cumulation, dampens age misreporting more for the later census than for the earlier census (United Nations, 1983), estimates of post-child mortality for the states have also been derived by the backward projection method. Although less-biased estimates are obtained by the backward projection method (Palloni and Komioski, 1984), our calculations show that these estimates are consistently higher than those in Table 1 with no change in the pattern of e_{05} in the states. The last age group for which 1981 data are available is 70 years

13. For Bihar, Madhya Pradesh and Rajasthan, 83 stated, an additional reason is immigration from neighbouring countries.

TABLE 1— MEAN LIFE EXPECTANCY AT AGE FIVE FOR MAJOR STATES OF INDIA BY SEX, 1961-1971 AND 1971-1981

State	Males			Females		
	1961-1971	1971-1981	Difference	1961-1971	1911-1981	Difference
(I)	(2)	(3)	(4) = (3)-(2)	(5)	(6)	(7)-(6)-(3)
1. Andhra Pradesh	58.9 (12)	60.4 (6)	6.5	53.3 01)	59.8 (10)	6.5
2. Bihar	57.0 (5)	57.6 (12)	0.6	51.6 (13)	55.7 (12)	4.1
3. Gujarat	55.2 (8)	59.3 (8)	4.1	57.3 (3)	61.9 (8)	4.6
4. Haryana	59.8 (3)	67.4 (1)	7.6	56.1 (6)	67.3 (1)	11.2
5. Karnataka	54.4 (11)	63.4 (3)	9.0	53.6 (10)	63.5 <4>	9.9
6. Kerala	61.8 (1)	58.1 (10)	-3.7	60.7 (1)	63.2 (5)	2.5
7. Madhya Pradcsh	54.9 (10)	60.9 (5)	6.0	54.8 (7)	63.2 (6)	8.4
8. Maharaahtra	55.9 (6)	59.3 (9)	3.4	56.7 (4)	62.4 (7)	5.7
9, Orissa	53,1 (13)	53.8 (14)	0.7	51.7 (12)	51.3 (14)	-0.4
10. Punjab	60.8 (2)	67.0 (2)	6.2	59.4 (2)	67.1 (2)	7.7
11. Rajasthan	55.2 (9)	63.1 (4)	7.9	56.3 (5)	65.2 (3)	8.9
12. Tamil Nadu	57.4 (4)	56.7 (13)	-0.7	54.3 (8)	53.2 (13)	-1.1
13. Uttar Pradesh	55.9 (7)	60.4 (7)	4.5	49.9 (14)	60.3 (9)	10.4
14. West Bengal	51.8 (14)	57.7 (11)	5.9	53.7 (9)	59.8 (11)	6.1
1 5. India (excluding Assam)	35.9	59.7	3.8	53.1	59.9	6.7

Note : The parenthesis gives the rank of the state for e^0_5- A state with the highest e^0_5 is given a rank of 1. In case of ties, these are ignored and the ranking of a state is done merely to indicate ill relative position.

SOURCE; Hyson(1934).

TABLE 2- MEDIAN LIFE EXPECTANCY AT AGE FIVE FOR MAJOR STATES OF INDIA BY SEX, 1961-1971 AND 1971-1981

State	Malts			Females		
	1961-1971	1971-1981	Difference	1961-1971	1971-1981	Difference
(1)	(2)	(3)	(4) = (3)-(2)	(5)	(6)	(7) = (6) − (5)
1. Andhra Pradesh	54.6 (12)	60.5 (5)	5.9	51.1 (10)	58.7 (11)	7.6
2. Bihar	57.7 (5)	56.5 (13)	—1-2	48.0 (14)	54.0 (12)	6.0
3. Gujarat	56.8 (6)	59.2 (9)	2.4	56.1 (2)	60.3 (8)	4.2
4. Haryana	58.7 (3)	70.6 (1)	11.9	54.0 (5)	70.7 (1)	16.7
5. Karnataka	54.7 (11)	63.4 (3)	8,7	52.6 (8)	63.3 (5)	10.7
6. Kerala	59.6 (2)	60.2 (7)	0.6	60.3 (I)	64.0 (4)	3.7
7. Madhya Pradesh	55.9 (10)	59.7 (8)	3.8	53.7 (7)	63.3 (6)	9.6
8. Maharashtra	56.0 (9)	59.1 (10)	3.1	53.8 (6)	61.9 (7)	8.1
9. Orissa	53.8 (13)	52.8 (14)	-1.0	50.4 (12)	50.8 (14)	0.4
10. Punjab	62.2 (1)	69.1 (2)	6.9	55.4 (4)	68.2 (2)	12.8
11. Rajasthan	56,7 (7)	62.6 (4)	5.9	56.0 (3)	65.2 (3)	9.2
12. Tamil Nadu	56.6 (8)	57.1 (11)	0.5	50.7 (11)	51.5 (13)	0.8
13. Uttar Pradesh	58.0 (4)	60.3 (6)	2.3	49.7 (13)	58.8 (10)	9.1
14. West Bengal	49.8 (14)	56.9 (12)	7.1	51.8 (9)	59.1 (8)	7.3
15. India (excluding Assam)	55.7	595	3.8	52.5	59-6	7.1

Note : See note to Table 1.
SOURCE: Padmanabha(1979).

and over and consequently the population estimate for 60 years and over in 1971 is higher than that when more detailed age data are used, egs for some of the age segments fall beyond the limit of the model life table and we prefer the estimates derived by the forward projection method.

In addition to Dyson's post-child mortality "estimates, Padmanabha (1970) has worked out 1961-1971 median estimates of eg for major states using the forward survival method[14]. These e_{05} figures for 1961-1971 and our median estimates for 1971-1981 are presented in Table 2. There are minor divergences between Tables 1 and 2. Preston and Bennett (1983) have developed an intercensal growth rate method for estimating adult mortality. They mention that their method is less sensitive to errors in census data. Again, the estimates of e_{05} derived from the Preston and Bennet technique and the forward survival method are similar (estimates not given). Table 3 assembles eбb} estimates for the 1971 and 1981 intercensal period. While the derived intercensal female e_{05} is close to the Sample Registration System (SRS) female estimate for 1976-1980 the intercensal male e_{05} is almost a year more than the SRS's male estimate for 1976-1980. The implications af Table 3 are not clear. Padmanabha (1982) mentions a possible deterioration in SRS.[15] But e_{05} for 1971-1981 do not indicate incompleteness of deaths in SRS. It is not unlikely that relative underenumeration in the censuses is more than omission of deaths in SRS.

TABLE 3-LIFE EXPECTANCY AT AGE FIVE FOR INDIA BY SEX, 1970 to 1981

Period	*Data*	*Male*	*Female*	*Total*
1970-1975	SRS	57.5	57.7	57.5
1976-1980	SRS	58.8	60.2	59.4
1971-1981	Census	59.7	59.9	60.2

Note : The 1971-1981 data exclude Assam. The total e_{05} it taken from Preston and Mari Bhat (1984) who **use** the Preston and Bennett (1983) method for estimating it.
SOURCE : Office of the Registrar General (1982b, 1984b); **Prcston** and Mari Bhat (1984).

Acknowledgements

The authors are grateful to Dr. K. Srinivasan and Dr. Tim Dyson for their suggestion?. Their thanks are also to Mr. R. T. Deshpande for his computer assistance.

14. For the calculation of $H_5^?$ West model life tables have been used and the data has been adjusted for internal migration.

15. According to Padmanabha, "in spite of ... built-in checks, both the enumerators and investigators sometimes fail to net a few events" (1982 : 48) and he lists "several steps that have been taken for improvement in the quality of data" (1982 : 49).

References

1. Bose, A., 1985, Demography and religion : Evidence of illegal immigration, The Statesman (Calcutta), February 13.
2. Coale, A. J. and Demeoy, P., 1983, Regional Model Life Tables and Stable Populations, New York, Academic Press.
3. Dyson.T., 1981a, Preliminary demography of 1981 Census, Economic and Political Weekly, 14 (33): 13491356.
4. ___, 1981b, India's demographic transition—AD appraisal of the provisional 1981 Census results, in K, Srinivasan and S. Mukerji (Eds.), Dynamics of Population and Family Welfare 1931, Bombay, Himalaya publishing House.
5. ____, 1914, India's regional demography, World Health Statistics Quarterly 37 (2); 200-231.
6. Dyson, T. and Crook, N., 1984, Issues in India's demography, in : Tim Dyson and Nigcl Crook (Eds.), India's Demography : Essay* on the Contemporary Population, New Delhi, South Asian Publishers Pvt. Ltd.,
7. Elahi, K. M., 1981, Refugees in Dandakaranya. International Migration Review 15 (1) : 219-225.
8. Ewbank, D. C., l981,Age Misreporting and Age.selective Underenumeration : Sources, Patterns and Consequences for Demographic Analysis, Washington D. C., National Academy Press.
9. Mukerji, S., 1932, Population scene after 1981 Census, Economic and Political Weekly, 17(30) : 1208-1209-
10. Office of the Registrar General, 1966, Social and Cultural Tables—Census of India, 1961, Vol, Part Il-C (/), New Delhi, Union Publications.
11. ____,1975, General Population Tables-Census of India, 1971, Series 1, Part II-A (/), New Delhi, Controller of Publications.
12. ____, 1977, *Soda!* and Cultural Tables. Census of India, 1971, Series 1, Part II-C (»'), New Delhi, Controller of Publications.
13. ____, 1*982a*, Migration Tables, Census of India, 1971, Series 1, Part Il-D (//), New Delhi, Controller of Publications.
14. „___, 1982b, Sample Registration Bulletin, 16 (•
15. ____, 1983a, Key Population Statistics Based on 5 per cent Sample Data, Census o± India 1981, Series I, Paper 2 of 1983, New Delhi, Controller of Publications.
16. ____, 1983b, Report on Post Enumeration Check, Census of India I981, Series 1, Paper 4 of 1982t New Delhi, Controller of Publications.
17. ____, 1984a, Registrar General's News Letter, 15 (J): 4-7.
18. ____, 1984b, Sample Registration Bulletin, 18 (1).
19. Padmanabha, P., 1979, Estimates of ike Expectation of Life at Birth and the Vital Rates—An Analysis of the 1971 Census Data, Paper presented to a meeting of India Panel, Committee on Population and Demography, National Academy of Sciences, Washington D. C.
20. ___, 1982, Sample Registration System in India, Sample Registration Bulletin, 16(2) : 45-50,
21. Palloni, A. and Kominslti, R., 1984, Estim ation of adult mortality using forward and backward projection, Population Studies, 38 (3) : 479-493.
22. Preston, S, H-, Chen, Nancy and Hobcraft, John, 1979, Preliminary Report on Application of Techniques for Estimating Death Registration Completeness to data from the Indian Sample Registration System, Paper Presented to a Meeting of India Panel, Committee on Population and Demography, National Academy of Sciences, Washington D. C.

23. ___, and Banaett, N. J., 1983, A census-based method for estimating adult mortality, Population Studies 37 (1) : 91-104
24. ___, and Mari Bhat, P. N., 1984, New evidence on fertility mortality trends in India, Population and Development Review, < 0 (3): 481-503.
25. United Nations, I96g, Methods of Estimating Basic Demographic Measures from Incomplete Data Manual IV, New York, United Nations.
26. ___,, 1983, Indirect Techniques for Demographic Estimation. Manual X, New York, United Nations.
27. Visaria, P., 1971, Provisional popuiaiion totals of the 1971 Census : Some questions and research issues, Economicand Political Weekly, 6 (29): 1459-1465.
28. .___ , and Visaria, L., 1981, Indian population scene after 1981 Census, Economic and Political Weekly, 16 (44-46) : 1727-1780.
29. Zlotnik, H-, 1979, A Note on the Quality of Age Reporting in the Indian Censuses, Paper Presented to a Meeting of India Panel, Committee on Population and Demography, National Academy of Sciences, Washington D. C.