Gender Differential in Adult Mortality in India

An Assessment Accounting for Death Registration Completeness

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1. Background

In many developing nations, deaths are under-registered by a significant margin, which in turn may lead to biased estimates of the level of mortality (Bennett and Horiuchi, 1981). It is believed that, in India, more is known about the levels, trends and differentials of infant and child mortality compared to adult mortality and that is true almost universally. The need to obtain better information on adult mortality is indisputable. Measuring adult mortality is inherently more difficult than measuring child mortality. In part, this is due to less adult deaths, particularly, in the age (group) 15-60, compared to childhood or old ages. Thus to obtain precise measures of adult mortality requires large number of observations, typically covering long reference periods. However, it is also due to the fact that event histories that provide generally adequate and timely estimates of adult mortality have not been found, whereas mother's report of the survival of their children provides generally satisfactory estimates of child mortality. It is often difficult to identify the right informant to provide reliable information about deceased adults. So, as there is no single, universally suitable informant to provide data about adult deaths, problems of undercounting and multiple reporting are common. Also, accurate information on adult ages is also difficult to collect; older people are less likely to have birth certificates than the younger ones. Moreover, even if the person who died knew his/her own age, the informant who reports their death may not know about it (Timaeus and Garham, 1989). Levels of education decline rapidly with age in most of the developing countries. Thus, it is really difficult to obtain reliable data that can be used to study age-specific mortality in the developing world. Generally, death rates at older ages are widely suspected of being biased downwards in many developing countries as ages tend to be exaggerated and ages at death are exaggerated even more (Bhat 1987).

Adult mortality can be inferred from the following two sources: information on the distribution of registered deaths by age along with the census enumeration of persons by age

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and information on the distribution of persons by age alone. While dealing with the first type of information, the first attempt is to estimate completeness of death registration, which in turn, can be used to adjust the registered death rates beyond some childhood age. These adjusted death rates can be used to assess the adult mortality situation through life table technique.

Generally it has been observed that females live longer than their male counterparts in majority of the countries around the world. The unusual masculinity of India's population has been a matter of considerable debate for sometime. Then a consensus seems to have emerged that it is due to excess female mortality. But it is also to be remembering that a tendency to exaggerate male ages more than female's can lead to erroneous interpretation of sex-differential in mortality. Bhat (1987) has also shown that such age-misreporting tendencies do exist in the Indian subcontinent. Several south-Asian countries, particularly those belonging to Indian subcontinent show historically that males are in advantageous position in terms of life expectancy compared to females (El-Bardy, 1969; Jain, 1982; Vissaria, 1967). Several socio-economic and cultural factors such as relatively low status of women, preference for male-offspring, negligence of female folks etc. are put forward for plausible explanation (Lahiri, 1986). Before doing the present exercise of finding the gender-differentials in adult mortality, the idea was driven by the curiosity: what would be the real scenario of adult mortality if life expectancies are computed from completeness adjusted age-specific death rates rather than recorded SRS death rates only?

2. Importance of the study

Adult mortality remains poorly measured in many developing countries. The registration of deaths is often incomplete, and even when coverage is adequate; the information regarding age is frequently reported inaccurately. Bhat (1995) has shown the age misreporting and its impact on adult mortality estimates in south Asia. A relatively small number and smaller share by population of developing countries do have close to complete registration of adult deaths and population censuses of high quality.

Adult mortality estimates based upon registered deaths may not reflect the true picture, since the degree of completeness of registration of vital events is not taken into account. Over the last few years there has been a considerable amount of research on techniques to estimate the completeness of adult death registration in countries with incomplete or inaccurate data. This has resulted in a plethora of techniques each based on different assumptions and using somewhat dissimilar information (Palloni *et al.* 1984). The most basic assumption made by these analytical methods is that the level of under reporting of deaths is invariant of age.

However, it is generally agreed that this is unlikely to extend to child deaths and so the methods can only be applied to data on adult mortality.

To get the real scenario of adult mortality situation, it is imperative to assess the completeness of death registration. Then adjusting the observed age-specific death rates due to the completeness of death registration will provide relatively accurate estimate about adult deaths and more specifically gender differential in adult deaths. A number of techniques have been developed over the past years in order to assess the completeness of registered death rates and thus to adjust data to make it of use. But no consensus has emerged how to estimate adult mortality in countries lacking complete registration of vital events. Another important issue is migration. While generalizing the Brass growth balance formula for any population open to migration (Bhat 2002a) and its subsequent development for estimating completeness of death registration, Bhat (2002b) showed that an estimate of completeness would be affected significantly if we fail to consider the migration factor. In an earlier investigation by Preston and Lahiri (1991), devoted to the development of the short-cut technique for estimating completeness of death registration of any population (closed or open), the authors showed while examining its sensitivity to various kinds of data errors that "…migration may not be a trivial problem if adjustments for it can not be made". Thus we are tempted to examine whether migration really affects significantly the estimates of death registration completeness (DRC) obtained through the application of Preston and Lahiri (1991) method and if so, to what extent.

3. Objectives

The specific objectives of this paper are to:

1. Estimate the completeness of death registration of India's Sample Registration System using the Preston and Lahiri method for India and two selected states over three periods of time 1971-80, 1981-90 and 1991-99.
2. Examine whether migration hamper the estimates of completeness of death registration assessed using the Preston-Lahiri Technique
3. Assess the adult mortality situation using the completeness adjusted age-specific death rates and also using recorded age specific death rates of Sample Registration System to find out the discrepancy (if exist) during the aforementioned period for India along with two selected states.
4. Examine the gender differential in adult mortality using the completeness adjusted death rates.

4. Data

The present study uses the data of Sample Registration System (SRS) and decennial censuses of India, since the civil registration system is deficient in India. Data has been taken for male and females both, starting from the year 1971 to 1999. The migration tables of respective censuses have been used to calculate migration rates. The analysis has been carried out for India and two major Indian states- Maharashtra and Uttar Pradesh, which are under different level of development. Also these two states are respectively high in-migration and out-migration states and thus it would be possible to check the effect of migration component in estimating the completeness of death registration and hence gender differential in adult mortality.

5. Methodology

In order to estimate the completeness of death registration of Sample Registration System in India and two major Indian states, the technique proposed by Preston and Lahiri (1991) has been used. Each and every existing method has its own advantage and disadvantage. The technique proposed by Preston and Lahiri (1991), which has been used in this study, deals with primarily in estimating true death rate of a population and hence the completeness of death records by comparing the estimated true death rate to the observed death rates. The technique is essentially based upon the three widely observed demographic parameters, viz. the population growth rate, its mean-age and the mean age at death. The procedure inherently assumes that the population under study is closed to migration. However, the proposed technique can be extended easily to an open population by adding *in* and *out* migration rates together with the mean ages of *in* and *out* migrants (Preston and Lahiri 1991).

The logics behind choosing the above technique are as follows. All the existing indirect methods of estimating completeness of death records assume that the completeness is invariant over ages whereas the Preston-Lahiri method assumes that the true mean age at death can be estimated reasonably well from the unadjusted death records[1]. Such an assumption which is less restrictive than the assumption made in the other methods seems not unjustified for the population where more than eighty percent deaths are recorded as in the case of population of India and its major states covered under the Indian Sample Registration Scheme. One of the main advantages of this method, in addition to its simplicity is that the method is robust enough in relation to the errors in various demographic parameters, including the migration factor, used

[1] Since generally it is believed that the census enumerations are of better quality than death registration statistics in most of the developing countries, one can obtain reasonably reliable estimate of the true mean age of the population under study.

in Preston-Lahiri method as indicated by the sensitivity analysis carried by Preston and Lahiri (1991). Further more, it is worthwhile to mention here that sufficient reliable statistic on the age distribution of in migrants and out migrants is rather rarely available particularly in developing countries.

The Preston-Lahiri method relies upon three elementary demographic functions – a population's growth rate, its mean age and the mean age at which deaths occur. The basic assumption in this method is that, mean age of population and mean age at death beyond some childhood age can be obtained reasonably well from the available data. And this is somewhat less restrictive assumption than the other methods. In a population in which there are no births, deaths or migrations, the mean age of the population will increase by one year during each calendar year of time. That means every member of the population will grow one year older and there will be no exits from or entrances into the population. Births and deaths oppose this tendency. Newborns always enter the population at age 0 and thereby depress the mean age. In most populations persons dying are on average older than the mean age of the population and there exit from the population makes it younger (Preston, et. al., 1989). They showed that the change in mean age of any population per unit of time could be expressed by the following identity:

$$\frac{dA_P(t)}{dt} = 1 - r(t)A_P(t) - d(t)A_D(t) \qquad \text{--------------(1)}$$

where, AP(t) = Mean age of the population at time 't'.

AD(t) = Mean age at death at time 't'.

r(t) = Growth rate at time 't'.

d(t) = Death rate at time 't'.

The equation (1) can be extended to any sub-population aged x and above. Then the identity becomes

$$\frac{dA_{Px+}(t)}{dt} = 1 - r_{x+}(t)A_{Px+}(t) - d_{x+}(t)A_{Dx+}(t) \qquad \text{--------------(2)}$$

where $A_{Px+}(t)$ = mean age of population aged x and above minus age x at time 't'.

$A_{Dx+}(t)$ = mean age at death of persons aged x and above minus age x at time 't'.

$d_{x+}(t)$ = death rate of persons aged x and above at time 't'.

$r_{x+}(t)$ = growth rate of persons aged x and above at time 't'.

It is worth mentioning here that in a stationary or stable population the derivative term vanishes as mean age of persons remain unchanged over time. Now rearranging the terms, the above equation can be written as (dropping the 't' identifier).

$$d_{x+}(t) = \frac{1 - r_{x+} A_{P x+} - \dfrac{dA_{P x+}}{dt}}{A_{D x+}} \qquad \text{--------------(3)}$$

The above equation can be used to estimate true death rates beyond age x provided all the components in the right hand side of equation (3) are known accurately. If d^R_{x+} denotes registered death rate beyond age x, the completeness of death registration above age x (Cx+) is computed as

$$C_{x+} = \frac{d^R_{x+}}{d_{x+}} \qquad \text{-------------(4)}$$

The mean age of persons aged x and above is generally obtained as the weighted average of the mean ages of all the five-year age intervals, i.e., their mid-points2, together with an arbitrary fixed mean age of the open-ended terminal age interval, taking the respective population sizes in various age intervals (including the terminal age interval) as the weights.

In various demographic estimations, particularly for countries with limited and defective age data, the element of arbitrariness in locating the mean age of an open-ended terminal age interval is a vexing issue. To avoid ambiguity of arbitrarily fixing mean age of the terminal open-ended age interval, Preston and Lahiri (1991) proposed the following procedures.

$$A_{P_{x+}} = \frac{1 - (b_{x+} - r_{x+}) A_{D_{x+}}}{r_{x+}} \qquad \text{--------------(5)}$$

where, b_{x+} refers to the rate of arrival of people at age x and is sometimes called the "birthday rate at age x".

$$A_{D_{x+}} = \frac{\ln b_{x+} - \ln d_{x+}}{r_{x+}} - \frac{r_{x+}}{2}\sigma^2(D_{x+}) \qquad \text{--------------(6)}$$

Where $\sigma^2(D_{x+})$ is the variance in ages at death in the interval beginning with age x. A set of values of $\sigma^2(D_{x+})$ to serve this purpose was also given.

bx+ can be estimated by assuming that the age distribution changes exponentially between ages x-5 and x+5, as

[2] Under the assumption of uniform distribution of persons over the five-year age interval (x, x+5) the mean age of persons aged (x, x+5) can be assigned to its mid point, i.e. x+2.5.

$$b_{x+} = \frac{N(x)}{N(x+)} = \frac{1}{N(x+)}[\frac{{}_5\overline{N}_{x-5} * {}_5\overline{N}_x \ln({}_5\overline{N}_{x-5} / {}_5\overline{N}_x)}{5*({}_5\overline{N}_{x-5} - {}_5\overline{N}_x)}] \quad \text{--------------(7)}$$

where,

$${}_5\overline{N}_x = \frac{{}_5P_x^{t+m} - {}_5P_x^t}{m*{}_5\hat{r}_x} \quad \text{--------------(8)}$$

$$\overline{N}_{x+} = \frac{P_{x+}^{t+m} - P_{x+}^t}{m*\hat{r}_{x+}} \quad \text{--------------(9)}$$

$${}_5\hat{r}_x = \frac{1}{m}\ln({}_5P_x^{t+m} / {}_5P_x^t) \quad \text{-------------(10)}$$

$$\hat{r}_{x+} = \frac{1}{m}\ln(P_{x+}^{t+m} / P_{x+}^t) \quad \text{-------------(11)}$$

Where the symbol of "N" stands for average person-years lived in the age span during the period under study. ${}_5P_{x+}$ and …… denote the number of persons in the age group (x, x+5) enumerated in two censuses separated by n years. 5rx stands for the exponential growth rate of persons aged x to x+5.

Adjustment to Migration:

Keeping in mind the assumption regarding migration component, at the national level, the population may be assumed to be closed to migration, but at the state level this might not be logical. So in a population open to migration, equation (3) becomes

$$d_{x+} = \frac{1 - r_{x+}A_{P_{x+}} + i_{x+}A_{i_{x+}} - o_{x+}A_{o_{x+}} - \frac{dA_{P_{x+}}}{dt}}{A_{D_{x+}}} \quad \text{-------------(12)}$$

where, i_{x+}= rates of in-migration of persons aged x and above.

o_{x+}= rates of out-migration of persons aged x and above.

$A_{i_{x+}}$ = Mean age of in-migrants aged x and above.

$A_{o_{x+}}$ = Mean age of out-migrants aged x and above.

To understand the situation regarding the adult mortality, abridged life table has been constructed starting with age 5. At first to obtain true age-specific death rates, i.e., completeness adjusted death rates by sex in the conventional age-groups like 5-9,10-14,…., the recorded values of estimated ASDR given by SRS is multiplied by the inverse of the estimated value of death registration completeness. Using those values of ASDR, the entries for the pivot column of the life table i.e., ${}_nq_x$ values are computed by Greville's technique. By taking account of the non-linearity of l_x curve, Greville (1945) found the following relation:

$$ {}_nq_x = \frac{{}_nm_x}{\frac{1}{n} + {}_nm_x\{\frac{1}{2} + \frac{n}{12}({}_nm_x - \log_e C)\}} $$

where, the constant C may be estimated through the relation under the assumption that ${}_nm_x$ follows Gompertz law, ${}_nm_x = BC^x$, where B and C are constants.

$$ C = \left(\frac{{}_nm_{x+n}}{{}_nm_x}\right)^{\frac{1}{n}} $$

However, a convenient approximation for C may be taken as $\log_eC = 0.09$, since the values of $\log_eC$ mostly vary between 0.80 and 0.104.

The other columns of the life tables are constructed in usual manner.

$$ {}_nL_x = \frac{n}{2}(l_x + l_{x+n}) $$

For the open ended age-group,

$$ L_{70+} = \frac{{}_\infty d_{70}}{{}_\infty m_{70}} $$

The life expectancy at age five (e_5^0), has been used as a convenient index for adult mortality. With a view to compare the two types of estimates of e_5^0 based on unadjusted and adjusted ASDRs, percentage change in life expectancy at age five has been calculated over the period 1971-80, 1981-90 and 1991-99.

6. Findings

The application of the Preston and Lahiri method is illustrated with the data for Maharashtra females during the period 1981-90 and is given in Table 1. The second column of the table gives the growth rate of persons aged x and above derived through equation (11) where the calculated SRS age distributions of population are used. In order to obtain column 3 and 4, at first mean age population and mean age of death for the terminal open ended interval, in the case for age 70 is estimated through equation (5) and (6). The values for the other ages is computed in usual manner by simple multiplying the midpoint of each age group by corresponding population (or percentage of population) divided by the sum of population (or percentage of population) beyond that age. More clearly, for example mean age of population beyond age 5 ($A_{P_{5+}}$) is calculated as first multiplying the corresponding percent of population in each age interval by 2.5, 7.5, ……….. and then dividing the product by cumulative percent of population beyond age 5.The fourth column gives the change in the mean age of the population aged x and above and is estimated as:

$$\frac{dA_P(t)}{dt} = \frac{A_P(T_2) - A_P(T_1)}{T_2 - T_1} \quad \text{-------------(13)}$$

where, T_1 and T_2 are the two time points. The resulting value is thus the simple unweighted mean of the time derivative of $A_P(t)$ between T_1 and T_2.

In order to obtain in and out migration rate at age x and above it is necessary to have age-group wise in and out migration data. Using the data on place of last residence and duration of residence 0-9 years from the migration table of 1991 census, first the out migration is computed in the conventional five-year age interval for each state separately. Then using the average population of the decade aged x and over, in-migration and out-migration aged x and over the corresponding in and out migration rate at age x and above are calculated. The fifth and sixth column is calculated simply by multiplying the mean age of immigrants and mean age of out migrants by the corresponding in and out migration rate at age x and above. For the terminal open age interval, estimated mean age of population is used as mean age of in and out migrants.

The true death rate at age x and above without adjusting for migration is given in column 8 obtained through the equation (3). Similarly taking the migration component into consideration, using equation (12), column 9 gives the migration adjusted true death rate at age x and over. Column 10 shows the registered death rate at age x and over. Thus using equation (4), the estimated completeness of death registration at age x and over is given in the last two columns of the table, column 11 for without migration and column 12 for adjusting migration. The median of each of these two columns represents the overall completeness of death registration at age five and above. Thus without accounting for migration, the death registration completeness for females of Maharashtra for the decade 1981-90 comes out as 0.85 whereas adjusting for migration it is 0.84. Interestingly, it comes out that no significant difference is there even after adjusting for migration.

The completeness of death registration for the two selected states and India are presented in Table 2. The findings indicate that there do not exist much discrepancy between the two types of estimates of completeness of death registration, one adjusting for migration and another without adjusting migration. And this is true for both the selected states as well as

India as a whole. At all India level completeness of death registration is around 90 percent for males and there is not much change over time. Concentrating on the female population at the national level, the completeness estimates were 0.92, 0.87 and 0.90 during 1970s, 1980s and 1990s respectively indicating that around 10 to 13 percent deaths were missed in the SRS. At the state level, although during the period 1971-80, the estimates are quite high, the situation is not satisfactory during 1981-90. Nevertheless, improvement is noticed during the next period.

A convenient index for adult mortality is the expected number of years a child age five would live (e_5^0). Life expectancies at age 5 (e_5^0) by sex during the period 1971-80,1981-90 and 1991-99 for India and the two selected states are shown in Table 3. These are calculated separately once using the recorded age-specific death rates as given by SRS and again using the completeness adjusted age-specific death rates. It has been found that the values of e_5^0 estimated through the former death rates are quite high against the values of e_5^0 estimated through the later one. And this is true for males and females both in both the selected states including India as a whole during all the three taken time periods. So it may not be logical to ignore the completeness of death reporting and considering the life expectancy values obtained from the recorded death rates, draw any inference.

Looking at the adult mortality scenario over the periods, steady progress in gain in life expectancy at age five is observed in both the states. For the male population of Maharashtra, during 1971-80, the e_5^0 value is 58.5 and increases around one year with an e_5^0 value of 59.2 during 1981-90. During 1991-99, the e_5^0 value for male in Maharashtra is 62.8. In case of females also the same trend follows. Life expectancy at age five increases around one year from 1970s to 1980s and around three years from 1980s to 1990s. In Uttar Pradesh, the obtained e_5^0 values using completeness adjusted age specific death rates point out an increase of around three years for males and around five years for females from 1971-80 to 1991-99.

In order to make a comparison between the two types of estimates of e_5^0, percentage change in life expectancy at age five has been calculated over the period 1971-80 and 1981-90. In case of Maharashtra, there exists a large amount of disagreement between the two types of estimates for both males and females. For the male population of this state, the e_5^0 values, calculated through the former rates, indicate gain in life expectancy at age five in 1980s compare to 1970s and the percentage change in life expectancy is around five percent. But when the same is calculated using completeness adjusted death rates, the percentage change in e_5^0 is only around one percent. Similar result comes out for Maharashtra females. In Uttar

Pradesh also, the two types of estimates produces different situation. Considering the female population, it is seen that percentage change in life expectancies is more than four using unadjusted death rates and when completed adjusted death rates are used; the value becomes less than one.

It is seen from the table that at all-India level, e_5^0 values are always higher for females than males in all the three time-span taken. The gender difference in mortality can be well understood by the difference between female and male life expectancy at age 5 (i.e., $e_5^f - e_5^m$). In 1991-99, the sex-difference (female-male) in e_5^0 is more than two and half years. The similar story of advantageous gain in e_5^0 for females is true for Maharashtra. During the period 1981-90, Uttar Pradesh is showing a negative value in gender-gap indicating lower e_5^0 value of 57.6 for females compare to 58.1 of their male counterparts.

So far it is discussed about the relative change in life expectancy by sex for the selected states and India during 1971-99. One may be interested to know the speed of change in life expectancies by sex over the two periods 1971-80 and 1991-99. The relevant figures clearly indicate that the change in life expectancies between the two periods 1971-80 and 1991-99 is much faster among females compared to that among males.

The gender discrimination in adult mortality situation may also be realized by simply age-specific death rates. Two prime age group 15-29 and 30-44 has been taken into consideration as it covers the whole reproductive span of females. Thus the age-specific death rates of corresponding five-year age-intervals are collapsed into fifteen-year age groups, using appropriate population weights. It is worth mentioning here instead of using recorded ASDR data of SRS, completeness adjusted data are used for serving the purpose.

The sex ratio of mortality, defined by ($ASDR^f_{15\text{-}29}$ / $ASDR^m_{15\text{-}29}$) has been calculated for all India and the two selected states during the three periods. The results are presented in Table 4. Concentrating on the age group 15-29, for India as a whole, indicates that though there is decline in this ratio over the time, still in 1990s mortality rates for females are 24 percent higher than that of males. At the state level, Uttar Pradesh put it almost in the same place as India. In Maharashtra, the aforementioned percentage is slight lower around six percent than national level for the period of 1991-99. The gender ratio of mortality has reduced remarkably from 1.89 in 1970s to 1.27 in 1990s for Uttar Pradesh. The plausible explanation may be put for maternal mortality, as this age is the prime age for child bearing. Switching to the next age group 30-44, in 1980s Uttar Pradesh is showing a higher female mortality rate of seven percent than that of males.

7. Conclusion

The overall result depicts that death reporting is assessed to have been better during the 1970s and 1990s than in the 1980s in Maharashtra for both males and females. During 1981-90, female death reporting was much low compared to their male counterparts as indicated by the completeness estimates. The completeness of death registration has been assessed once without adjusting for migration and again adjusting for migration. Interestingly, not much difference is found between the two types of estimates. In that sense we can conclude that this method is less sensitive to migration and can be applicable even if migration data are not available. The results obtained for the two states and India support this statement.

To understand the adult mortality situation over time, life tables are constructed using the completeness adjusted death rates. Steady progress in gain in life expectancy at age 5 is observed. However in 1990s, the situation was little bit better than in 1980s. On the whole it may be concluded that there is not tremendous change in adult mortality situation over around last 30 years though slight gain in life expectancies is noticed.

The gender differential in mortality situation has been realized by the difference between the female and male life expectancies at age 5 (i.e., $e_5^f - e_5^m$). The speed of change in life expectancies by sex over the two periods 1971-80 and 1991-99 is also calculated. It comes out that the change in life expectancies is much faster among the females than that of males. Irrespective of any region, such a relative faster change in life expectancy with biased towards females, seems to be true for both the selected states.

The calculated figures of percentage change in life expectancy at age five over the selected time frame indicates that there is a considerable amount of discrepancy in adult mortality scenario when life expectancies are calculated using recorded age specific death rates of Sample Registration System and again using completeness adjusted death rates separately. That means, the life expectancies obtained through the recorded age specific death rates of Sample Registration System, conceal the true picture. Thus, the paper suggests for considering death registration completeness while estimating adult mortality situation or depicting gender differential in adult mortality of any area.

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Table 1: Calculation of completeness of death registration using the Preston and Lahiri method for Maharashtra females, during the period 1981-90.

r_{x+}	A_{Px+}	$\frac{d A_P(t)}{dt}$	A_{Dx+}	$i_{x+} A_{i_{x+}}$	$o_{x+} A_{o_{x+}}$	d_{x+}	d_{x+}(mig adj)	d^R_{x+}	C_{x+}	C_{x+}(mig adj)
(2)	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
0.0224	24.31	0.1055	51.01	0.0477	0.0281	0.0068	0.0072	0.0061	0.897	0.849
0.0235	22.74	0.0934	48.37	0.0432	0.0253	0.0077	0.0080	0.0068	0.883	0.843
0.0262	21.44	0.0461	44.55	0.0377	0.0220	0.0088	0.0091	0.0078	0.888	0.854
0.0290	20.04	-0.0084	41.27	0.0292	0.0169	0.0103	0.0106	0.0089	0.864	0.839
0.0290	18.69	-0.0095	38.51	0.0213	0.0123	0.0121	0.0124	0.0102	0.841	0.825
0.0280	17.22	0.0077	35.03	0.0162	0.0096	0.0146	0.0147	0.0119	0.819	0.809
0.0259	15.71	0.0480	31.14	0.0134	0.0080	0.0175	0.0177	0.0143	0.816	0.808
0.0259	14.19	0.0604	27.32	0.0118	0.0070	0.0209	0.0211	0.0173	0.827	0.820
0.0291	12.74	0.0300	23.83	0.0106	0.0062	0.0251	0.0253	0.0213	0.846	0.840
0.0317	11.30	0.0038	20.26	0.0096	0.0056	0.0315	0.0317	0.0269	0.853	0.848
0.0303	9.97	0.0231	16.87	0.0086	0.0049	0.0400	0.0402	0.0349	0.872	0.868
0.0313	8.30	0.0228	13.70	0.0072	0.0040	0.0524	0.0526	0.0448	0.855	0.851
0.0350	7.15	0.0012	11.35	0.0067	0.0037	0.0660	0.0662	0.0603	0.913	0.910
0.0352	6.14		9.65							
									Median 0.85	**0.84**

Table 2: Estimates of completeness of adult death registration through the application of Preston and Lahiri method for India and the two selected states over the period 1971-80, 1981-90 and 1991-99.

States	Completeness of Death Registration at age 5 years and above (Male)					
	1971-80		1981-90		1991-99	
	Mig adj	*Mig Unadj*	*Mig adj*	*Mig Unadj*	*Mig adj*	*Mig Unadj*
Maharashtra	0.97	1.00	0.81	0.84	0.96	0.96
Uttar Pradesh	0.88	0.86	0.91	0.87	0.83	0.81
India	0.89		0.91		0.91	

States	Completeness of Death Registration at age 5 years and above (Female)					
	1971-80		1981-90		1991-99	
	Mig adj	*Mig Unadj*	*Mig adj*	*Mig Unadj*	*Mig adj*	*Mig Unadj*
Maharashtra	0.96	0.97	0.84	0.85	0.94	0.97
Uttar Pradesh	0.99	0.99	0.87	0.86	0.93	0.91
India	0.92		0.87		0.90	

Table 3: Life Expectancies at age 5 by sex during the period 1971-80, 1981-90 and 1991-99 for India and two selected Indian States

States	**Reference Period**	**From Unadjusted Death Rates**			**From Adjusted Death Rates**		
		Male	**Female**	**Gender Diff(f-m)**	**Male**	**Female**	**Gender Diff(f-m)**
Maharashtra	1971-80	58.9	62.4	**3.5**	58.5	61.8	**3.3**
	1981-90	62.2	65.8	**3.6**	59.1	63.0	**3.9**
	1991-99	63.4	67.1	**3.7**	62.7	66.1	**3.4**
Uttar Pradesh	1971-80	58.2	57.5	**-0.7**	56.2	57.3	**1.1**
	1981-90	59.7	60.1	**0.4**	58.1	57.6	**-0.5**
	1991-99	62.0	63.4	**1.4**	59.0	62.1	**3.1**
India	1971-80	58.1	58.8	**0.7**	56.3	57.4	**1.1**
	1981-90	60.7	62.5	**1.8**	59.2	60.1	**0.9**
	1991-99	62.3	64.9	**2.6**	60.8	63.1	**2.3**

Table 4: Mortality differentials (ratios) in three broad age groups for the two selected states and India during 1971-99.

States	**Reference Period**	**Age Group(15- 29) ASDR**			**Age Group(30- 44) ASDR**		
		Male	**Female**	**SRM(f/m)**	**Male**	**Female**	**SRM(f/m)**
Maharashtra	1971-80	2.25	2.76	**1.23**	5.37	3.69	**0.69**
	1981-90	2.2	2.79	**1.27**	4.86	3.47	**0.71**
	1991-99	1.74	2.06	**1.18**	4.18	2.7	**0.65**
Uttar Pradesh	1971-80	2.66	5.02	**1.89**	6.14	5.95	**0.97**
	1981-90	2.65	4.57	**1.72**	5.31	5.68	**1.07**
	1991-99	2.83	3.58	**1.27**	5.22	4.41	**0.84**
India	1971-80	2.85	4.23	**1.48**	6.25	5.83	**0.93**
	1981-90	2.48	3.61	**1.46**	4.92	4.55	**0.92**
	1991-99	2.33	2.9	**1.24**	4.55	3.61	**0.79**