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CONSISTENT CORRECTION OF CENSUS, VITAL REGISTRATION, AND MIGRATION DATA FOR ALL INDIA AND THE STATE OF KERALA 1971-81

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TABLE OF CONTENTS

	Page
Foreword	v
Acknowledgements	vii
I Introduction	1
II Methodology	3
III Principal Findings	13
Results for All India, 1971-81	13
Results for the State of Kerala, 1971-81	15
IV Conclusions	29
References	33
List of Tables	35
Tables 1—42	39—81
List of Appendices	83
Appendices A to J	87—147

FOREWORD

Under the agreement on Family Planning Communications and Marketing between the Government of India and the United States of America through the Agency for International Development (USAID), the Demographic Analysis Component has been assigned for execution to the office of the Registrar General, India. Activities under the component include training, workshops, conferences and research in collaboration with the institutions in the United States of America like the East-West Population Institute, Honolulu and the U.S. Bureau of the Census, Washington, D.C.

As a part of this agreement, a Workshop on Advanced Demographic Analysis was organized in New Delhi in the Office of the Registrar General, India from July 31 to August 11, 1989. Dr. Norman Y. Luther and Dr. J. R. Rele of the East-West Population Institute conducted the workshop, in which 15 officers from various states of India participated, including Shri K. Gopinathan from Kerala. The workshop discussed a number of advanced methods of demographic analysis, including the recently developed consistent correction method which has not hitherto been applied to India. A part of the work in the present study was carried out at the workshop to demonstrate the methodology. Dr. S. S. Srivastava and Shri V. S. Swami worked as resource persons on behalf of the Office of the Registrar General, India.

I thank the authors for the efforts put in by them and hope that this work will be of interest to data users. I also thank the United States Agency for International Development and the Population Institute of the East-West Center for making the research work possible.

Sd.

A. R. NANDA

Registrar General and Census Commissioner, India.

New Delhi,
November 9 1990.

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This study is the result of collaborative work between the Office of the Registrar General, India and the Population Institute of the East-West Center, Honolulu, Hawaii.

Under the joint collaboration, a Workshop on Advanced Demographic Analysis was held in New Delhi in the Office of the Registrar General, India from July 31 to August 11, 1989. The workshop was attended by 15 participants from various states of India, who were exposed to advanced methods of fertility and mortality analysis with the use of personal computers. A part of the work in the present study was carried out at the workshop to demonstrate the methodology. We are thankful to Dr. S. S. Srivastava, Joint Registrar General, Shri V. S. Swamy, Deputy Registrar General and their staff for their interest and excellent cooperation and assistance received during the workshop.

We would also like to thank Shri A. R. Nanda, Registrar General and Census Commissioner, India and Dr. Lee-Jay Cho, Director, Population Institute, East-West Center, for their support and encouragement. We are grateful for the opportunity to undertake this study under the co-operative agreement involving the Government of India, the Population Institute of the East-West Center and the United States Agency for International Development.

The views expressed in this study are those of the authors and not necessarily those of the organizations in which they work.

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July 5, 1990.

1. INTRODUCTION

This study is based on the application of a new procedure for the simultaneous, consistent correction of census, vital registration, and migration data to all India and the state of Kerala for the intercensal period 1971-81. More specifically, the new procedure provides estimates of (1) correction factors for intercensal registered births by 5-year time periods (1971-76 and 1976-81), (2) age-specific correction factors for intercensal registered deaths by 5-year time periods, (3) age-specific correction factors for intercensal net migration by 5-year time periods, (4) age-specific correction factors for the age distribution at each census and (5) life tables for each half of the intercensal period, such that the corrected registered births and deaths, the corrected net migration, the corrected census age distributions and the estimated life tables are mutually consistent. Consistency in this context means that a specified set of intercensal demographic balancing equations is exactly satisfied.

The methodology is an extension of an earlier procedure, developed by Luther and Retherford (1986, 1987a) for simultaneous, consistent correction of census and vital registration data in populations closed to migration. The procedure was subsequently applied to Thailand data for 1960-80 (Luther et al., 1986). The procedure was then extended to incorporate an option to include intercensal net migration among the quantities to be corrected when it is not negligible and the extended procedure was used to estimate net international migration for Sri Lanka, 1971-81 (Luther et al., 1987). Net migration was negligible for all India during the period 1971-81, but not for individual states, especially Kerala, so both forms of the procedure will be used here. Kerala has both internal (interstate) and external (international) migration. While usually the terms in-migration and out-migration are used for the former, immigration and emigration are used for the latter. However, henceforth the terms net migrants or net emigrants will be used to measure the net effect of all migration to and from the state; sometimes the same may also be referred to simply as migrants.

II. METHODOLOGY

The procedure may be applied simultaneously to any number of censuses and intercensal periods and is described here at this level of generality. It is convenient to begin by considering a set of age-specific intercensal population balancing equations for each intercensal period under consideration. Each such equation pertains to a particular birth cohort corresponding to a sequence of age groups in successive censuses (e.g., 15-19 in 1971 and 25-29 in 1981). For a given intercensal period, the cohort equations for the younger age groups, involving births, specify that population in an age group at the end of the intercensal period equals corresponding intercensal births minus intercensal deaths and migrants. The equations for later age groups, not involving births, specify that population in an age group at the end of the period equals population in the corresponding younger age group at the beginning of the period minus intercensal deaths and migrants

When available data are substituted into these equations, the equalities generally do not hold exactly, because of imperfections in the data. We therefore rewrite the equations by inserting a multiplicative correction factor as a prefix to each demographic quantity (population, births, deaths, or migrants). A set of multiplicative correction factors can be chosen so that the equations balance exactly. Such a set of correction factors will be referred to as a set of consistent correction factors.

In a particuar application of the correction procedure, there is an infinite number of possible sets of consistent correction factors. Identification of the "best" or optimal set requires specification of an optimization criterion. We adopt a minimum distance criterion that is conceptualized as follows:

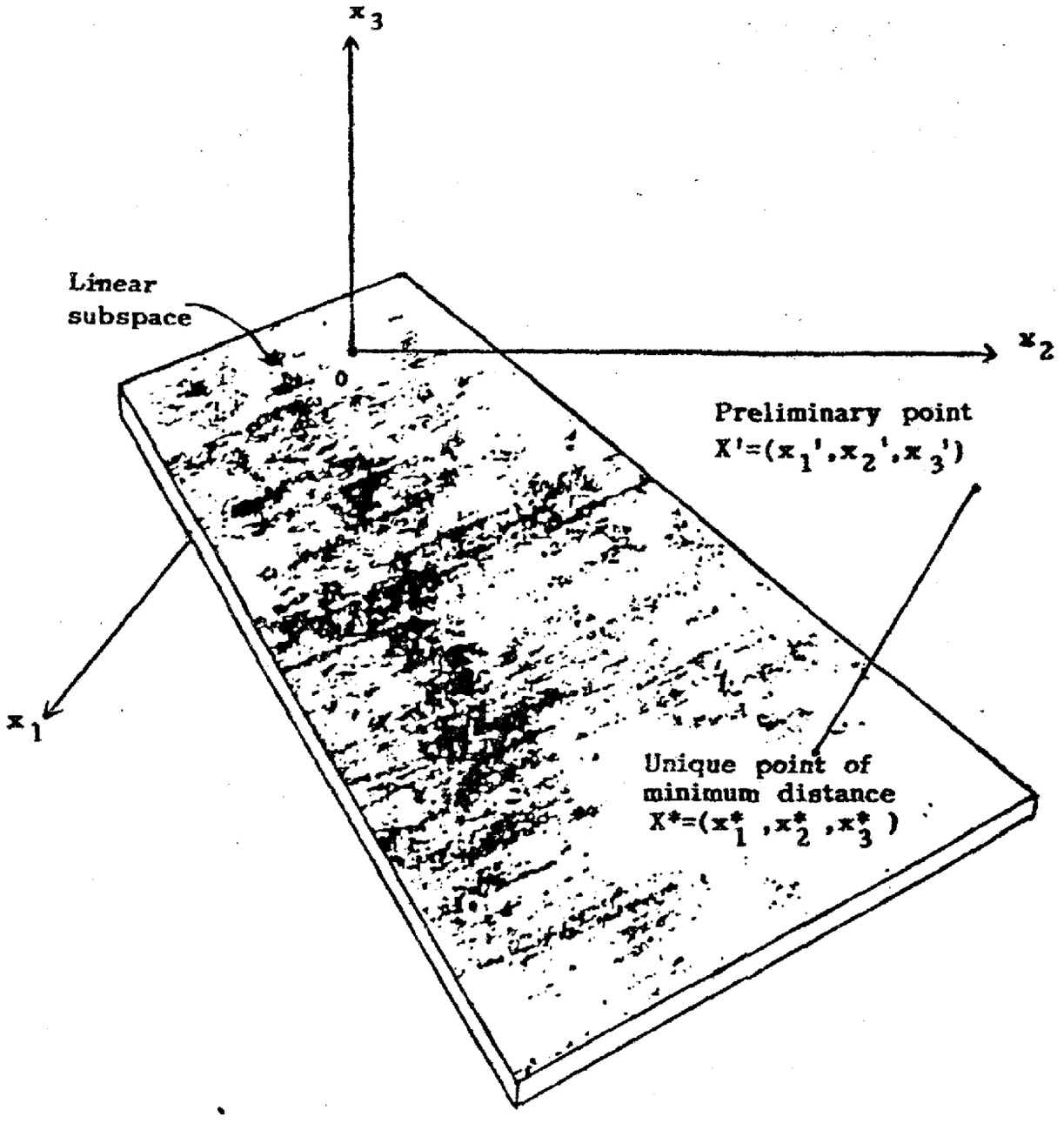
Suppose there are n correction factors n may equal the number of demographic quantities, or it may be less than the number of demographic quantities, if, for example, it is assumed that the subset of age-specific population correction factors is the same for two or more censuses. Suppose also that there are m linearly independent demographic balancing equations — i.e., m linearly independent constraints on the n correction factors — that are homogenous in the correction factors with $m < n$. We conceptualize any arbitrary set of n correction factors, whether consistent or not, as a point in an n-dimensional

vector space, where the coordinates of the point are the correction factors. The m demographic balancing equations then define a linear subspace of dimension n—m = q. Each of the infinite number of points in this q-dimensional subspace specifies a set of consistent correction factors. We shall refer to this subspace as the subspace of consistent correction factors.

Given this conceptual framework, the procedure in its simplest form takes as input the demographic data and a set of preliminary correction factors that are not necessarily consistent. The set of preliminary correction factors is derived by existing methods of demographic analysis and it is referred to as the "preliminary point". The "final point", representing the "best" or optimal set of final consistent correction factors, is defined as the point in the subspace of consistent correction factors that is "closest" to the preliminary point. (See Figure 1 for the simple case in which $n=3$, $m=1$). This optimization makes use of the principle, from the mathematics of finite-dimensional vector spaces, that there exists in a hyperplane a unique point of minimum distance from a fixed point not in the hyperplane. Effectively, the procedure complements existing estimation methods by yielding a comprehensive set of estimates that deviate as little as possible from the preliminary ones and at the same time ensure internal consistency.

Although the n-dimensional vector space may be conceptualized as ordinary Euclidean space, it is convenient to conceptualize it more generally as a Hilbert space so that distance may be defined more flexibly. In particular, it is convenient to define distance as weighted Euclidean distance, where the weights, which are positive, need only be specified in relative terms and need not add to unity. There is one weight associated with each correction factor. If each weight is chosen to be a common multiple of the corresponding demographic quantity being corrected, so that the weights are proportional to the corresponding input demographic quantities, then the weights are called "proportional weights". It can be shown that proportional weights tend to produce absolute changes between preliminary and final correction factors that are approximately the same for all correction factors. Making one of the weights larger than the proportional weight tends to reduce the change between preliminary and final correction factors for the corresponding quantity being corrected and to increase it for the other quantities, other things remaining equal. Thus, the overall weight corresponding to a given correction factor may be viewed as the product of a "proportional weight" and an additional

Figure 1: Finding the point in a 2-dimensional linear subspace of 3-dimensional space that has minimum distance from a preliminary point.



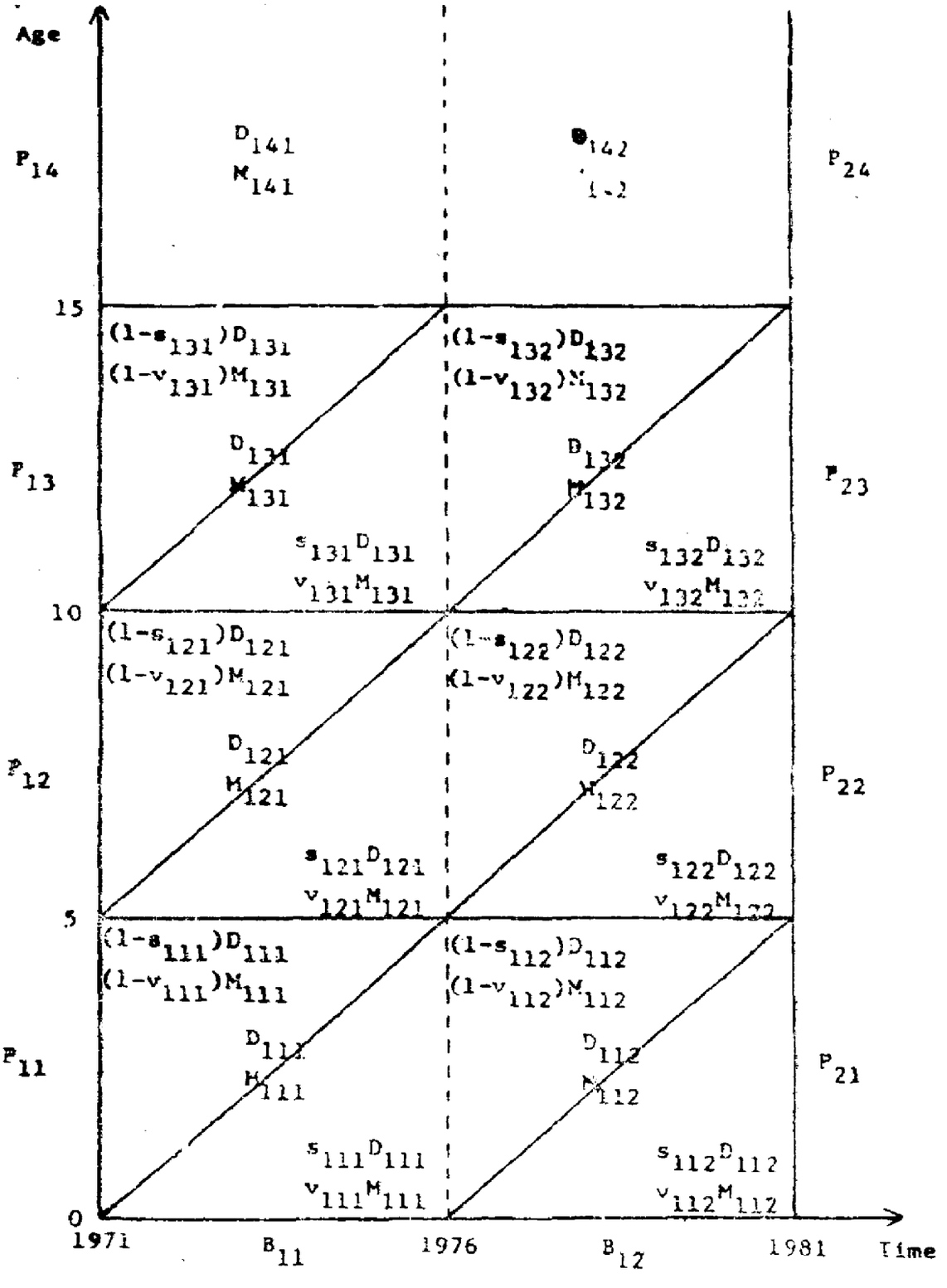
Note: The plane passes through the origin, labelled 0 in the diagram.

"confidence weight". The use of confidence weights justifies calling the factors correction factors rather than merely adjustment factors.

By considering single years of age and time, the procedure can be applied simultaneously to any finite number of censuses and intercensal periods, where the intercensal periods are of variable length. In the remainder of this section, however, we shall restrict consideration to the less general case where censuses are 10 years apart; ages are classified in 5-year age groups; and births, deaths and migrants are grouped into 5-year time periods within each intercensal period. Let P, B, D and M denote population, births, deaths and migrants (net emigrants), respectively. Let r denote the first or second half of an intercensal period (r = 1, 2). t the number of intercensal periods, g the number of age groups (including the open-ended age group), i the particular census under consideration (i = 1, 2, . . . , t + 1), and j the particular age group under consideration (j = 1, 2,....., g). Quantities to be corrected are P_{ij} , B_{ir} , D_{ijr}, and M_{ijr} where for births, deaths and migrants the subscript i denotes the ith intercensal period, which is defined as the intercensal period following the ith census. The respective correction factors for the four quantities are c_{ij} , k_{ir}, h_{ijr} , and z_{ijr} .

The demographic balancing equations require separation factors for deaths and migrants. Separation factors are used to apportion deaths or migrants from squares into triangles in the Lexis diagram, as shown illustratively in Figure 2a, which shows a simplified example where t=1 and g=4. The separation factors for deaths are denoted s_{ijr}. The separation factor s_{ijr} . when multiplied by deaths in the square corresponding to the ith intercensal period, jth age group and rth half of the intercensal period, yields deaths in the southeast triangle of the square. The separation factor yielding deaths in the northwest. triangle is $1 - s_{ijr}$. The separation factors for migrants are defined similarly and are denoted v_{ijr}.

Figure 2a : A simplified example of two censuses and intercensal births, deaths, and migration ; without correction factors.



Note : By migration is meant net emigration. In the Lexis diagram, vertical lines represent population by age at an exact time and horizontal lines represent population attaining an exact age during a time period. Individuals move through age and time along diagonal lines from lower left to upper right. Diagonal lines demarcate cohorts.

The demographic balancing equations for the case of any number of censuses ten years apart, ages classified in 5-year age groups. and intercensal events grouped in 5-year time periods are

$$c_{i+1,1}\ P_{i+1,1} = k_{i2}\ B_{i2} - s_{i12}\ h_{i12}\ D_{i12} - v_{i12}\ z_{i12}\ M_{i12} \quad (1)$$

$$\begin{aligned} c_{i+1,2}\ P_{i+1.2} = {} & k_{i1}\ B_{i1} - s_{i11}\ h_{i11}\ D_{i11} - v_{i11}\ z_{i11}\ M_{i11} \\ & - (1 - s_{i12})\ h_{i12}\ D_{i12} - (1 - v_{i12})\ z_{i12}\ M_{i12} \\ & - s_{i22}\ h_{i22}\ D_{i22} - v_{i22}\ z_{i22}\ M_{i22} \end{aligned} \quad (2)$$

$$\begin{aligned} c_{i+1,3}\ P_{i+1,3} = {} & c_{i1} - (1 - s_{i11}) h_{i11}\ D_{i11} \\ & - (1 - v_{i11})\ z_{i11}\ M_{i11} - s_{i21}\ h_{i21}\ D_{i21} - v_{i21}\ z_{i21}\ M_{i21} \\ & - (1 - s_{i22})\ h_{i22}\ D_{i22} - (1 - v_{i22})\ z_{i22}\ M_{i22} \\ & - s_{i32}\ h_{i32}\ D_{i32} - v_{i32}\ z_{i32}\ M_{i32} \end{aligned} \quad (3)$$

$$\begin{aligned} c_{i+1,\ j+2}\ P_{i+1.\ j+2} = {} & c_{ij}\ P_{ij} - (1 - s_{ij1})\ h_{ij1}\ D_{ij1} \\ & - (1 - v_{ij1})\ z_{ij1}\ M_{ij1} - s_{i,\ j+1,1}\ h_{i,\ j+1.1}\ D_{i,\ j+1,1} \\ & - v_{i,\ j+1,1}\ z_{i,\ j+1,1}\ M_{i,\ j+1,1} \\ & - (1 - s_{i,\ j+1,2})\ h_{i,\ j+1,2}\ D_{i,\ j+1,2} \end{aligned}$$

$$-\left(1-{}^{v}_{i,\,j+1,2}\right){}^{z}_{i,\,j+1,2}\,{}^{M}_{i,\,j+1,2}$$

$$-{}^{s}_{i,\,j+2,2}\;{}^{h}_{i,\,j+2,2}\;{}^{D}_{i,\,j+2,2}$$

$$-{}^{v}_{i,\,j+2,2}\;{}^{z}_{i,\,j+2,2}\;{}^{M}_{i,\,j+2,2} \qquad (4)$$

$${}^{c}_{i+1,g}\;{}^{P}_{i+1,g} = {}^{c}_{i,\,g-2}\,{}^{P}_{i,\,g-2} + {}^{c}_{i,\,g-1}\;{}^{P}_{i,\,g-1}$$

$$+\,{}^{c}_{i,\,g}\,{}^{P}_{i,\,g} - \left(1-{}^{s}_{i,\,g-2,1}\right){}^{h}_{i,g-2,1}\,{}^{D}_{i,\,g-2,1}$$

$$-\left(1-{}^{v}_{i,\,g-2,1}\right){}^{z}_{i,\,g-2,1}\,{}^{M}_{i,\,g-2,1}$$

$$-{}^{h}_{i,\,g-1,1}\;{}^{D}_{i,\,g-1,1} - {}^{z}_{i,\,g-1,1}\;{}^{M}_{i,\,g-1,1}$$

$$-\left(1-{}^{s}_{i,\,g-1,2}\right){}^{h}_{i,\,g-1,2}\,{}^{D}_{i,\,g-1,2}$$

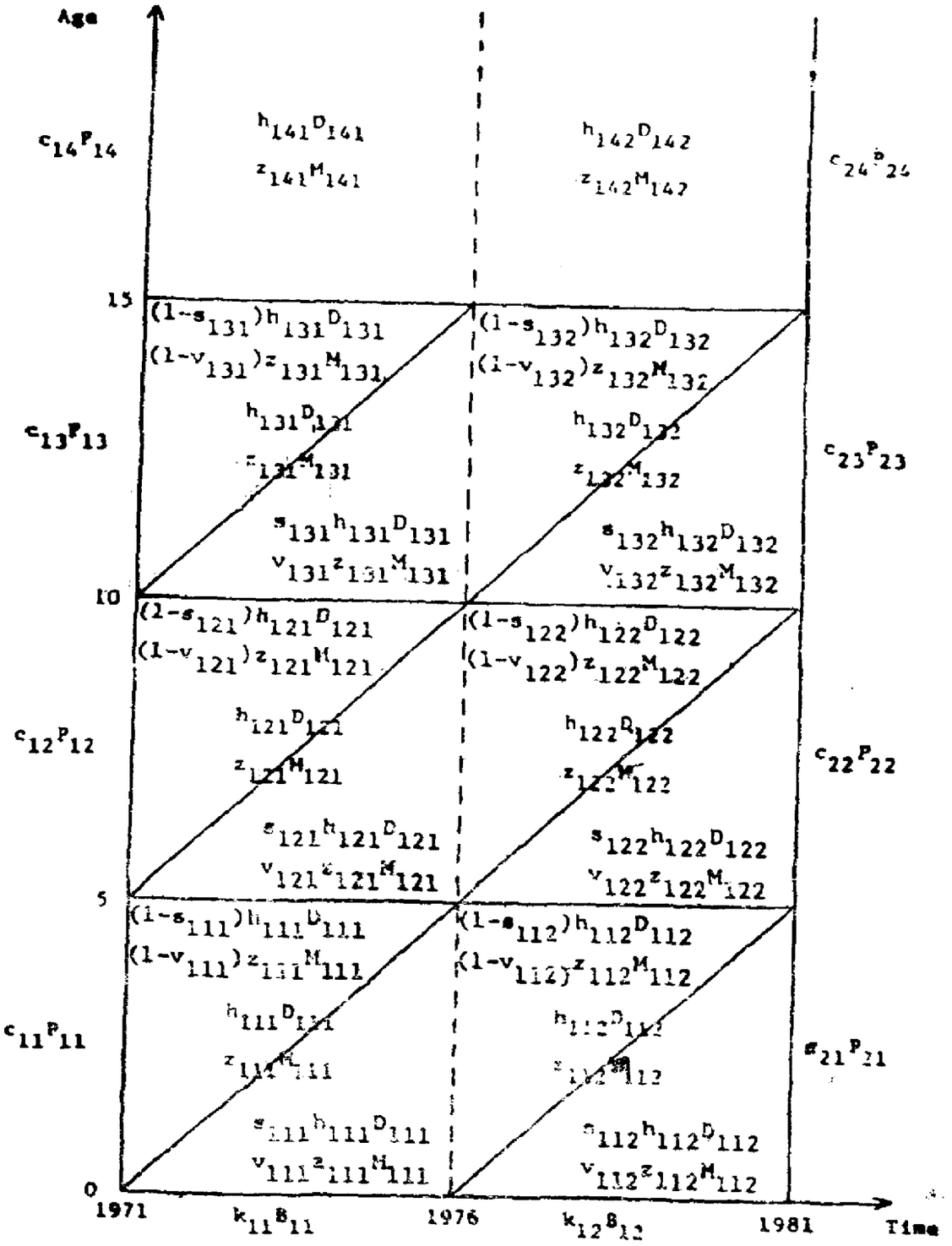
$$-\left(1-{}^{v}_{i,\,g-1,2}\right){}^{z}_{i,\,g-1,2}\,{}^{M}_{i,\,g-1,2}$$

$$-{}^{h}_{ig1}\,{}^{D}_{ig1} - {}^{z}_{ig1}\,{}^{M}_{ig1} - {}^{h}_{ig2}\,{}^{D}_{ig2} - {}^{z}_{ig2}\,{}^{M}_{ig2} \qquad (5)$$

where $i=1, \ldots, t$ and $j=2, \ldots, g-3$. Again, the illustrative example in Figures 2a and 2b, with correction factors included in the latter, helps to visualize geometrically the logic of these equations for the case where $t=1$ and $g=4$.

2—24 RGI/ND/90

Figure 2b : A simplified example of two censuses and intercensal births, deaths, and migration; with correction factors



Note : By migration is meant net emigration. In the Lexis diagram, vertical lines represent population by age at an exact time, and horizontal lines represent population attaining an exact age during a time period. Individuals move through age and time along diagonal lines from lower left to upper right. Diagonal lines demarcate cohorts.

The dimension of the total space of correction factors (equal to the total dimension of correction factors) is then $n = [(t+1)g + 4tg + 2t] = 2t + g(5t + 1)$, the number of constraining equations is $m = gt + t$ and the dimension of the subspace of consistent corrections is $n - m = q = t + 4gt + g$.

Given the demographic data, a set of weights specified in relative terms and a preliminary point of correction factors, the final point of consistent correction factors determined by the above procedure is unique. These correction factors derived from the preliminary correction factors are called the set of initial correction factors, to allow further adjustments. Adjustment of the initial correction factors by a common positive multiple is required under the usual assumption that the preliminary correction factors are specified only in relative terms (i.e., up to a common positive multiple) because under this assumption it can be shown that the final point is also specified only in relative terms.

This uniqueness of the initial correction factors in relative terms (only up to a common positive multiple) allows the option of adjusting the final results to a benchmark by multiplication by a common positive factor. For example, one might choose the benchmark to be the officially adjusted total population in the most recent census being corrected, in the event that this official estimate seems especially reliable. To adjust the output of the correction procedure to the benchmark, the initial correction factors are uniformly multiplied by a constant that is the ratio of benchmark total population to the initial estimate of final corrected total population. The end result is a new final point of consistent correction factors, called the set of final correction factors, yielding demographic estimates that are consistent with the benchmark. In the present analysis, we choose as our benchmark the total number of births for the intercensal period 1971-81 based on the preliminary correction factors for births; i.e., the sum of the preliminary-corrected births for 1971-76 and the preliminary-corrected births for 1976-81.

A final point concerns the sensitivity of the final point of consistent correction factors to variation in the preliminary correction factors. In general, the final correction factors are sensitive to variation in the preliminary correction factors, so that it is necessary to estimate the preliminary correction factors as accurately as possible. In the case of deaths, the sensitivity of the final correction factors to variation in the preliminary correction factors has been demonstrated previously (Luther and Retherford

1987a). The final migration correction factors are similarly sensitive, given that migration (net emigrants) enters the demographic balancing equations in the same way as deaths. However, to the extent that the confidence weights associated with the migration correction factors are reduced, the sensitivity of the final migration correction factors to variation in the preliminary migration correction factors is also reduced. In the extreme case where infinitesimally small weights are associated with the migration correction factors, all of the final corrections fall on the migration quantities and the final migration correction factors are affected not at all by the choice of preliminary migration correction factors.

For more detailed discussions of the mathematics underlying this methodology, see Luther and Retherford (1986, 1987a).

III. PRINCIPAL FINDINGS

The censuses of 1971 and 1981 were taken on April 1 and March 1 respectively. We assume that both the censuses took place on April 1; the errors caused by this assumption should be negligible. Consequently, whenever 1971, 1976 or 1981 is used as the beginning or end of a period, such as for the periods 1971-76, 1976-81 or 1971-81, it is understood to be April 1 of that year. For example, the period 1971-76 means April 1, 1971 to April 1, 1976.

Results for All India, 1971-81

All of the input data, excepting the weights, are given in Table 1 (Males) and Table 2 (Females). The sources of the input data are given in Appendix A. The calculation of the input births and deaths, based on results from the India Sample Registration System (SRS), is a bit tedious and is illustrated in detail for Males in Appendix B. The calculations for females are similar. It should be noted that, in those calculations, mid-year total populations for each calendar year between 1971 and 1981 are based on the total populations at the 1971 and 1981 censuses, assuming linear rather than exponential growth because birth rates were decreasing during the intercensal period. The unadjusted census age distributions that we used are listed in Tables 1 and 2. They are taken directly from the tabulations given in the sources listed in Appendix A. Using instead adjusted (i.e., smoothed) census age distributions given in these same sources, we obtained similar results (not given) to those reported here using the unadjusted census age distributions, a fact which adds strength to our results. Furthermore, this shows that the consistent correction procedure will smooth, if necessary, as it corrects.

The preliminary correction factors for the input demographic quantities are listed in Tables 1 and 2 in the following order: 1971-76 births, 1976-81 births, 1971 census age distribution from youngest to oldest age group, 1981 census age distribution from youngest to oldest age group, 1971-76 deaths age distribution from youngest to oldest age group, 1976-81 deaths age distribution from youngest to oldest age group. They are derived from net omission and under-registration rates found in the sources for preliminary correction factors given in Appendix A. For example, from p. 244 of the source given for the preliminary correction factors for births and deaths, the preliminary correction

factors for 1971-76 and 1976-81 births were calculated for the combined sexes to be 39.9/35.6=1.12079 and 34.6/33.4=1.03593 respectively, which were used for both males and females for lack of more detailed information; and from p. 1 of the same source, the preliminary correction factor for deaths of all ages for 1971-81 was calculated for the combined sexes to be 15.0/14.7=1.02041 which was used for each sex, each age group and each time period (1971-76 and 1976-81), again for lack of more detailed information. On the other hand, census net omission rates (from the sources for preliminary correction factors for censuses listed in Appendix A) are given separately for males and females and by (sometimes larger than 5-years age groups. For example, for age 5-14 males in the 1971 census the net omission rate listed is 15.19 per thousand, hence the preliminary correction factor is (1000+15.19)/1000=1.01519 which was used for both the 5-9 and 10-14 age groups, for lack of more detailed information.

The births preliminary correction factor for 1976-81 (1.03593) seems inordinately low compared to the one for 1971-76 (1.12079) and was found to imply some very implausible results—e.g., considerably less births for 1976-81 than for 1971-76. Thus, after experimenting with the various alternative values, the 1976-81 births preliminary correction factor was finally increased by .05 to 1.08593 which produced much more plausible results.

We experimented with several weighting schemes, all under the assumption that the India Sample Registration System (SRS) data on births and deaths by age were more reliable than the obviously-distorted census age distributions. For each sex, we finally settled on the scheme which weighted the preliminary correction factors for births and deaths ten times as heavily as those for the census age distributions on the basis that this gave quite plausible results. Of course, such a weighting scheme concentrates the brunt of the correction on the correction factors for the census age distributions.

As indicated earlier, we take as our benchmark the preliminary estimate of the total number of births for the intercensal period 1971-81; i.e., the total number of births for this period as adjusted by the preliminary correction factors for births. Thus in order to obtain all of the final correction factors, all initial correction factors (given for males in Table C1 of Appendix C, and for females in Table D1 of Appendix D) are multiplied by the common positive constant taken to be the ratio of the preliminarily-corrected total number of births for 1971-81 to the initially-corrected total number of births for 1971-81.

The results of applying the consistent correction procedure by sex, using the input data, weights and benchmark described, age given in Tables 3 through 10, Figures 3 and 5, and Tables C1 through C4 (in Appendix C) for males; and in Tables 11 through 18, Figures 4 and 6, and Tables D1 through D4 (in Appendix D for females[1]. For each sex, the results for the censuses indicate modest undercounts of the total population (between 2.2% and 2.7%), but extensive age-misreporting. Extreme under-reporting of ages 0-4 is accompanied by over-reporting of ages 5-9 and 10-14 which may be due in part to the tendency to round ages 4 and 9 upward to 5 and 10, respectively. There is also found to be a systematic under-reporting of the age 15-19 and 20-24 groups by both sexes in both censuses. Also of notice is the over-reporting of ages 25-29, 30-34, 60-64 and 65-69 by both sexes in the 1981 census.

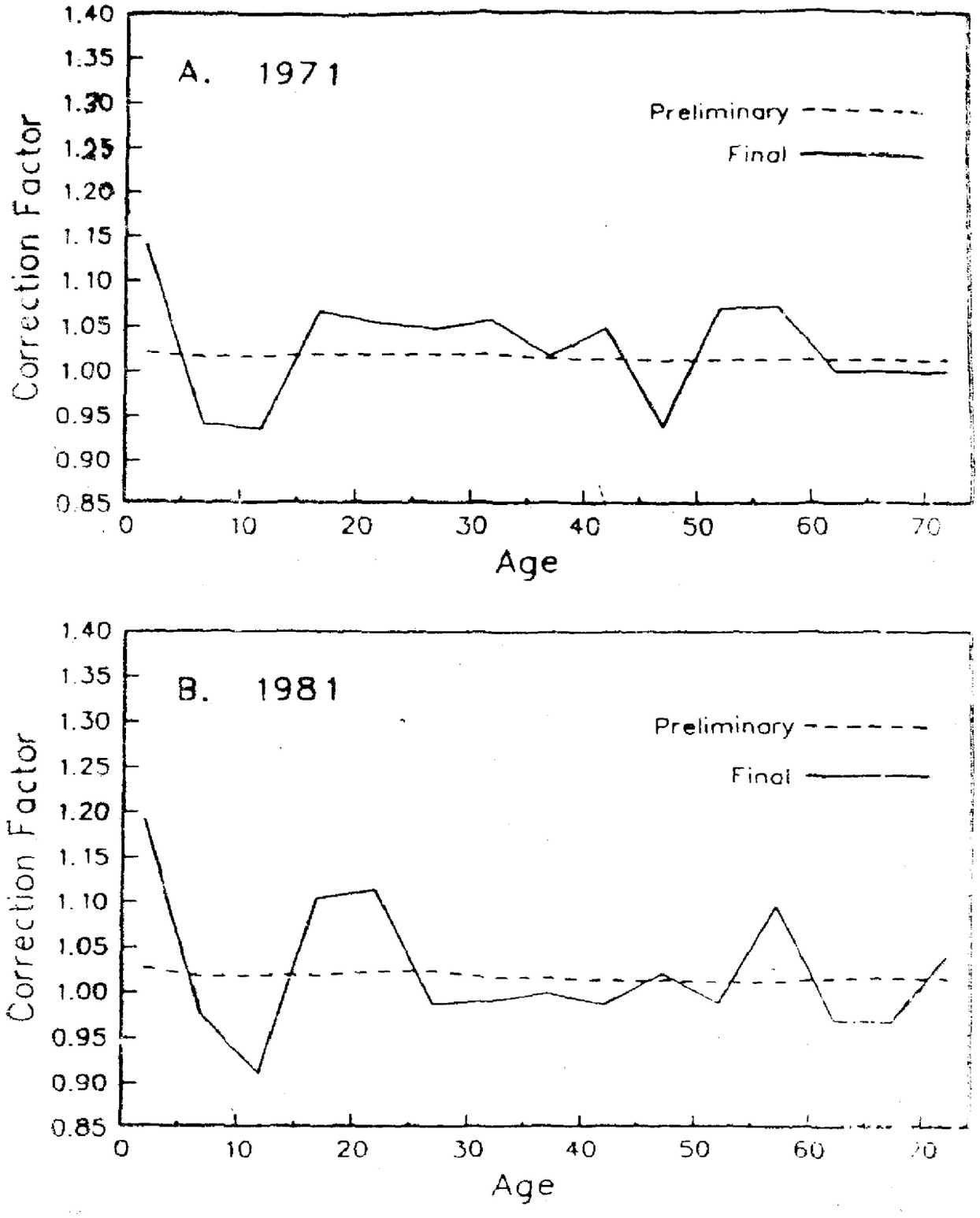
Some definite trends over the period 1971-81 are evident from the separate results for the periods 1971-76 and 1976-81 that are summarized in aggregate form in Table 19. These trends include a decline from 1971-76 to 1976-81 in (1) the average annual per cent growth rate (r) from 2.36 to 2.14 for males, from 2.36 to 2.20 for females and from 2.36 to 2.17 for combined sexes; (2) the crude birth rate (CBR) from 38.69 to 34.86 (per 1000) for males, from 39.64 to 35.75 for females and from 39.14 to 35.29 for combined sexes; and (3) the crude death rate (CDR) from 15.14 to 13.47 (per 1000) for males, from 16.05 to 13.80 for females and from 15.58 to 13.63 for combined sexes. At the same time, the life expectancy (e_0) for each sex increased considerably, although more so for females than for males. By 1976-81, female life expectancy had almost caught up to that of males, the life expectancies being 54.13 for males, 53.95 for females and 54.04 for combined sexes. The excess of female over male death rates at the prime childbearing ages due to maternity deaths diminished over the period 1971-1981 (see Tables 8 and 16), but this excess was still primarily responsible for the higher male life expectancy, although slightly higher female than male death rates at ages 0-14 also contributed.

Results for the State of Kerala, 1971-81

The state of Kerala presents an altogether different demographic picture than that of all India. Kerala is known to have the lowest birth and death rates of any state of India, and the

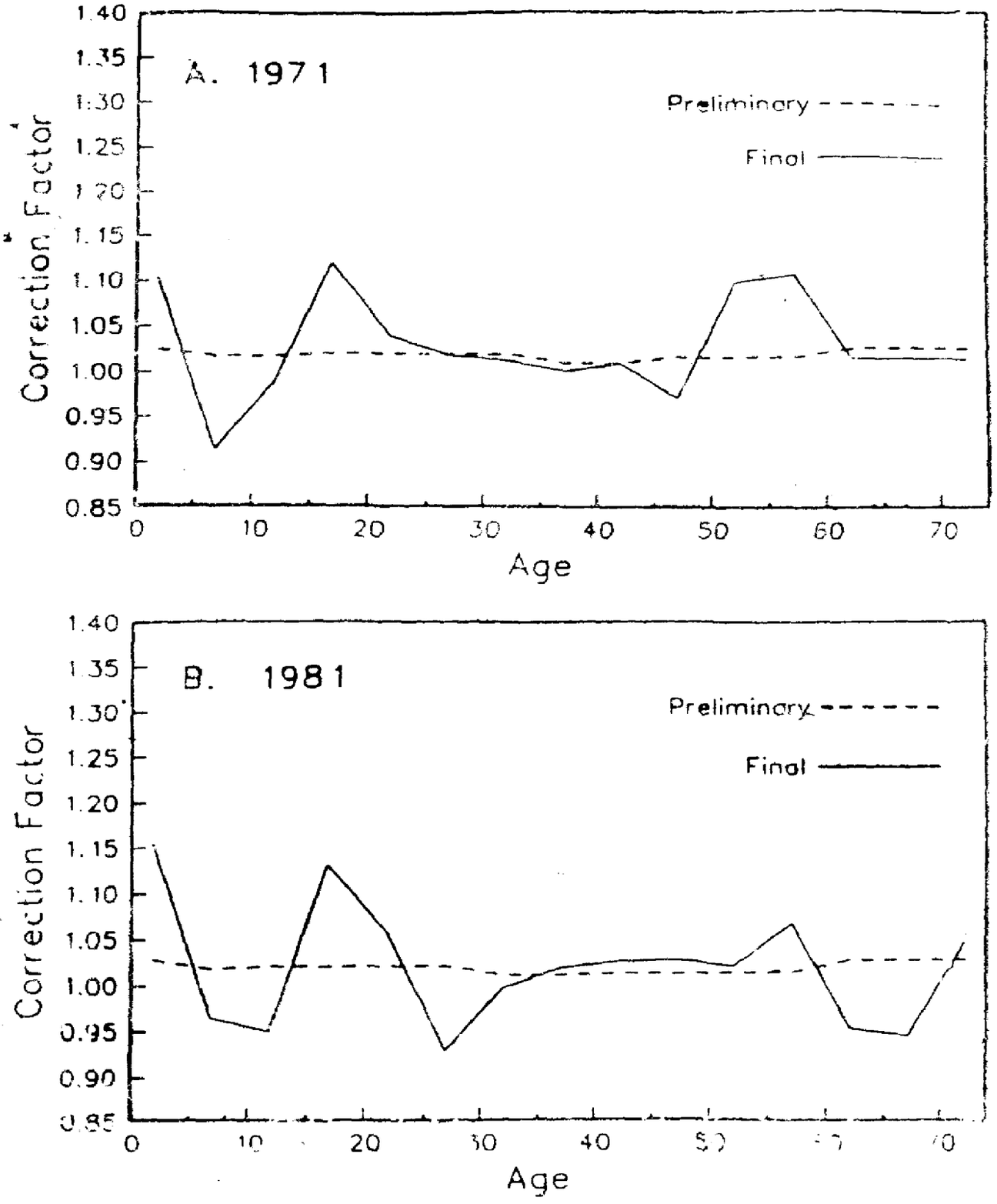
[1]The consistent correction procedure program for the personal computer, from which these results were obtained, is available from the First author, East-West Population Institute, East-West Center, 1777 East-West Road, Honolulu, HI 96848, U.S.A.

Figure 3 : Preliminary and final census correction factors by age for male : India, 1971 and 1981



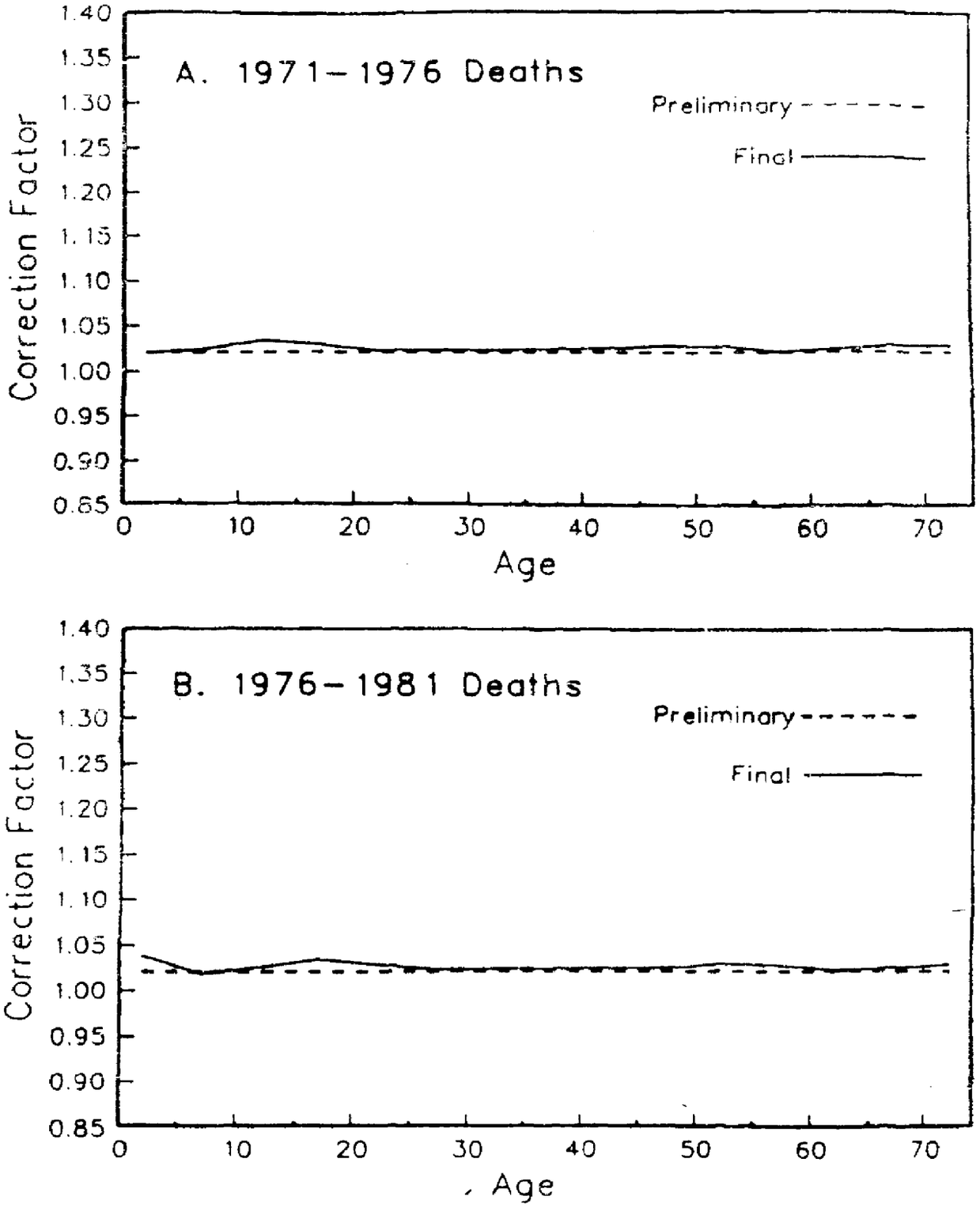
Note : *See* Tables 1 and 3.

Figure 4 : Preliminary and final census correction factors by age for females : India, 1971 and 1981.



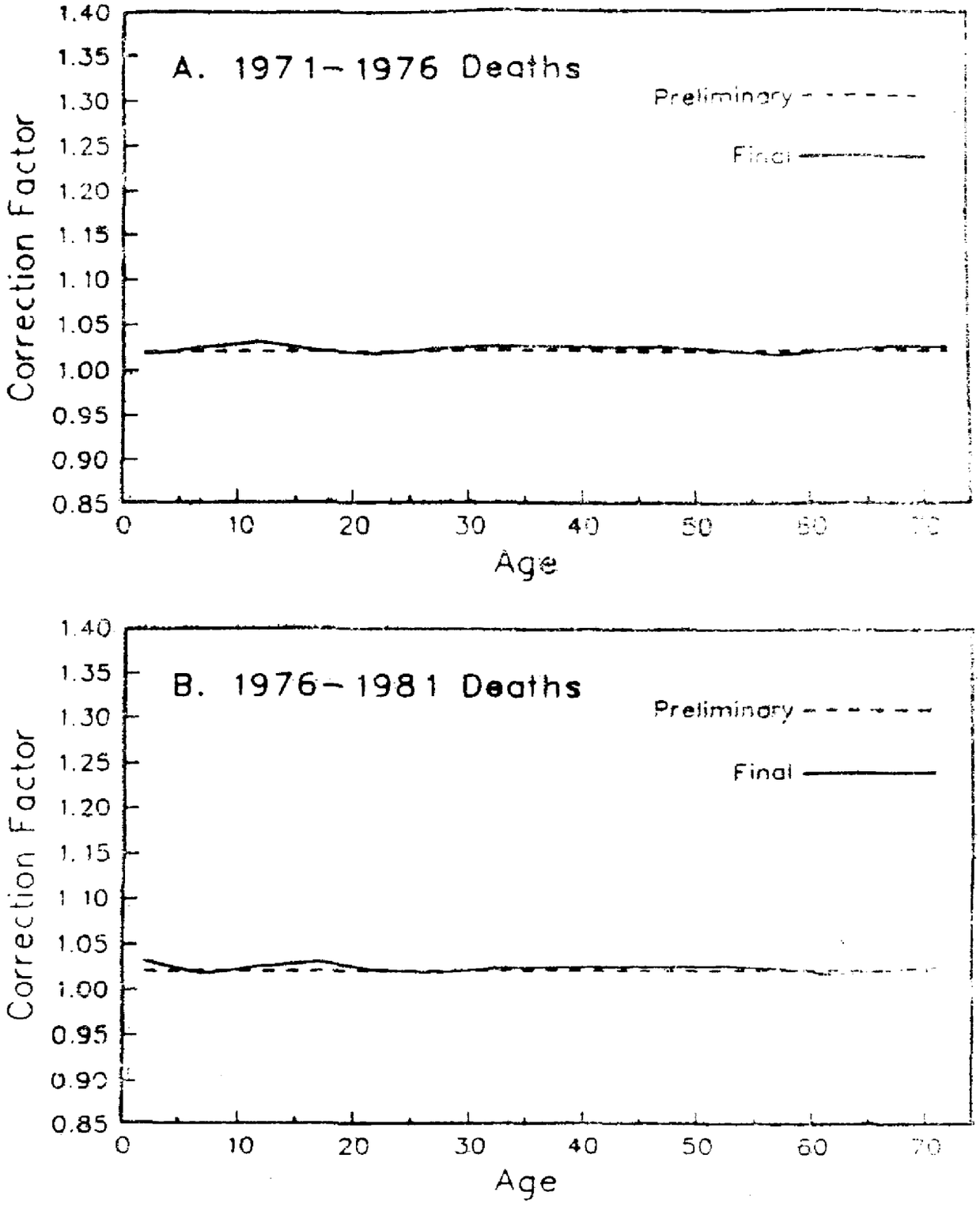
Note : *See* Tables 2 and 11.

Figure 5 : Preliminary and final correction factors by age for intercensal registered deaths for males : India, 1971-81.



Note : *See* Tables 1 and 3.

Figure 6 : Preliminary and final correction factors by age for intercensal registered deaths for females: India, 1971-81.



Note : *See* Tables 2 and 11.

differences from all India are indeed striking. Moreover, migration plays a primary role in the demographic picture of Kerala whereas it is negligible for all India.

Before detailing the results of applying the consistent correction procedure to the state of Kerala, we will describe the organization of the input data and derivation of the preliminary correction factors used in the procedure. These aspects are similar to those for all India except that migration is involved in the Kerala application. All of the input for Kerala, except the weights, are given in Table 20 (Males) and Table 21 (Females). The sources of the input data are given in Appendix E. The calculation of the input births and deaths, based on results from the SRS, is carried out exactly as illustrated for all India Males in Appendix B. Mid-year total populations for Kerala males and females for each calendar year between 1971 and 1981 are based on the total populations at the 1971 and 1981 censuses, again assuming linear rather than exponential growth because birth rates were decreasing during the intercensal period. The unadjusted census age distributions listed in Tables 20 and 21 are taken directly from the tabulations given in the sources listed in Appendix E. Finally, the calculation of the input net emigration data, based on limited information, is detailed in Appendix F.

The preliminary correction factors for the input demographic quantities are also listed in Tables 20 and 21. They are derived from net omission and under-registration rates found in the sources for preliminary correction factors given in Appendix E. For example, from the second source given for preliminary correction factors for births and deaths, the average crude birth rate for Kerala for 1971-76 based on the SRS is 29.017 whereas from the first source the preferred crude birth rate is 29.49. Hence we calculate the preliminary correction factor for 1971-76 births for the combined sexes to be $29.49/29.017 = 1.016$, which we used for both males and females for lack of more detailed information. Using the same rationale, births for 1976-81 estimated by the SRS were judged to be complete, or even a bit over-estimated and hence a preliminary correction factor of 1 was assigned to 1976-81 births for each sex. Furthermore, the third source gives the preliminary correction factor 1.0231 for Kerala deaths based on the SRS, which was used for each sex, each age group and each time period (1971-76 and 1976-81), again for lack of more detailed information. On the other hand, Kerala census net omission rates (from the sources for preliminary correction factors for censuses listed in Appendix E) are given separately for males and females and by (sometimes larger than 5-year) age groups. For

example, for 35-44 males in the 1971 census the net omission rate listed is 7.54 per thousand and hence the preliminary correction factor is $(1000+7.54)/1000=1.00754$ which was used for both the 35-39 and 40-44 age groups, for lack of more detailed information.

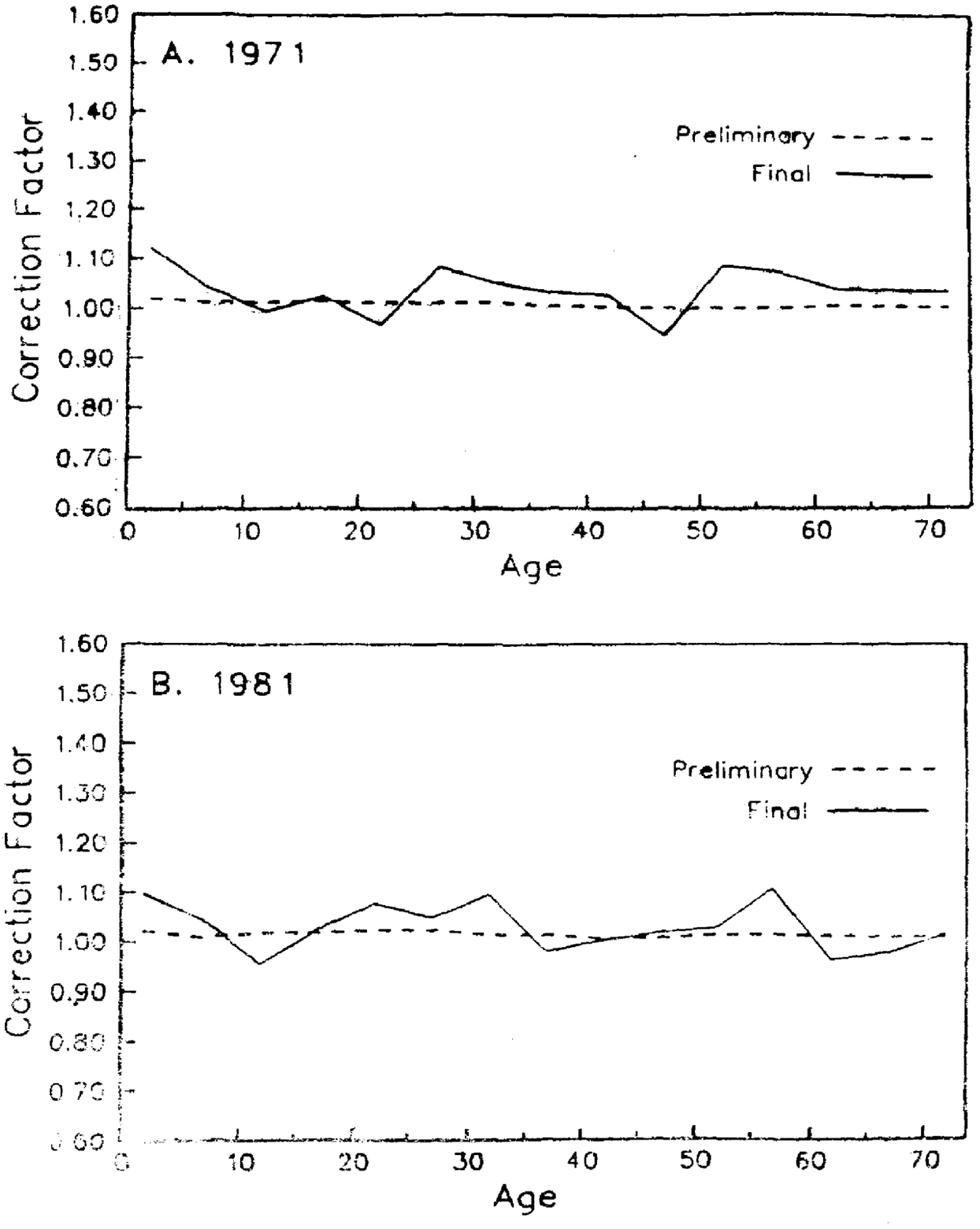
Finally, the preliminary correction factors for net emigration were all set equal to 1 for both time periods 1971-76 and 1976-81 and for all age groups, since the net emigrant totals, estimated in Appendix F, were deemed the best estimates possible given the sketchy information on migration.

With the limitations of the input net emigration estimates in mind, we experimented with several weighting schemes, all under the assumption that the India Sample Registration System (SRS) data on births and deaths by age were more reliable than the census age distributions which in turn were much more reliable than the net emigration data. For each sex, we finally settled on the scheme which weighted the preliminary correction factors for births and deaths twice as heavily as those for the census age distributions which in turn were weighted four times as heavily as the preliminary correction factors for the net emigration data, on the basis that this gave quite plausible results. Of course, such a weighting scheme concentrates the brunt of the correction on the correction factors for net emigration, with lesser amounts on those for the census age distributions and least on those for births and deaths.

Just as for the case of all India, we take as our benchmark for Kerala the preliminary estimate of the total number of births for the intercensal period 1971-81 based on the preliminary correction factors for births. Thus in order to obtain all of the final correction factors, all initial correction factors (given for males in Table G1 of Appendix G, and for females in Table H1 of Appendix H) are multiplied by the common positive constant taken to be the ratio of the preliminary-corrected total number of births for 1971-81 to the initially-corrected total number of births for 1971-81.

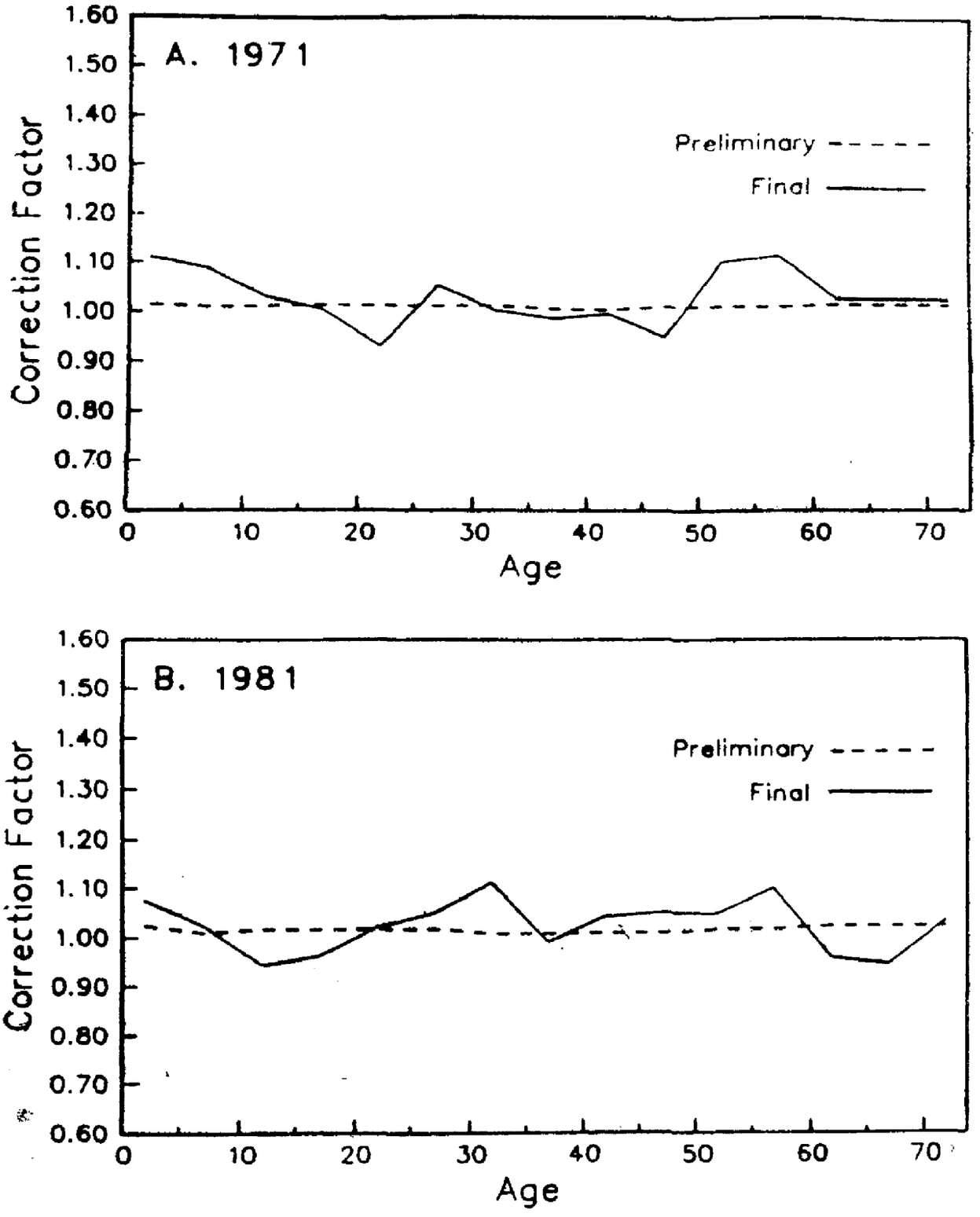
The results of applying the consistent correction procedure to the state of Kerala by sex, using the input data, weights, and benchmark described, are given in Tables 22 through 31, Figures 7, 9 and 11 and Tables G1 through G5 (in Appendix G) for males; and in Tables 32 through 41, Figures 8, 10 and 12, and Tables H1 through H5 (in Appendix H) for females. For each sex, the results for the Kerala censuses indicate modest undercounts of the total population (between 1.9% and 3.6%), but extensive age-misreporting, similar to all India. In particular

Figure 7: Preliminary and final census correction factors by age for males: Kerala, 1971 and 1981



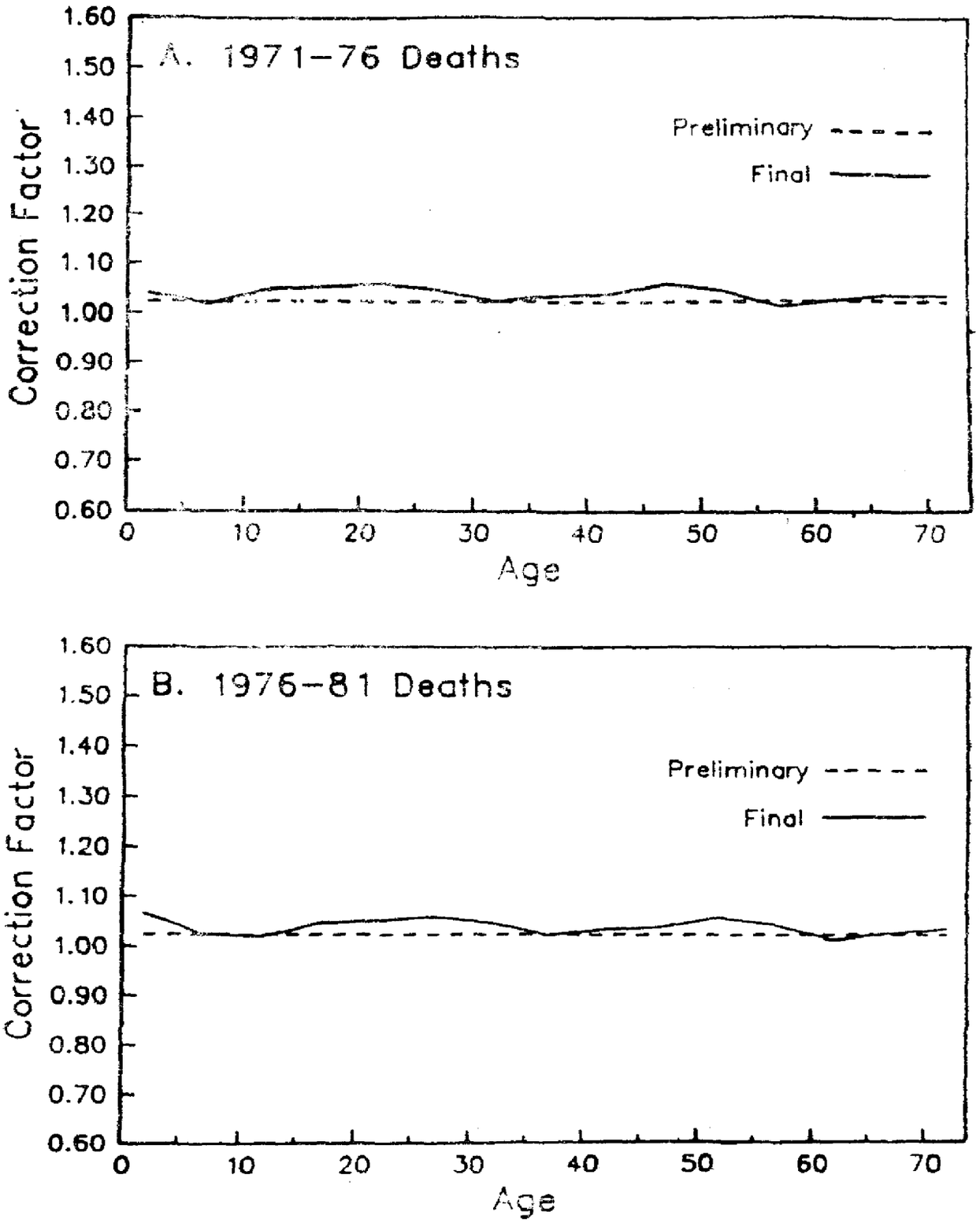
Not : *See* Tables 20 and 22. Note difference in scale from Figures 3—6.

Figure 8 : Preliminary and final census correction factors by age for females : Kerala, 1971 and 1981



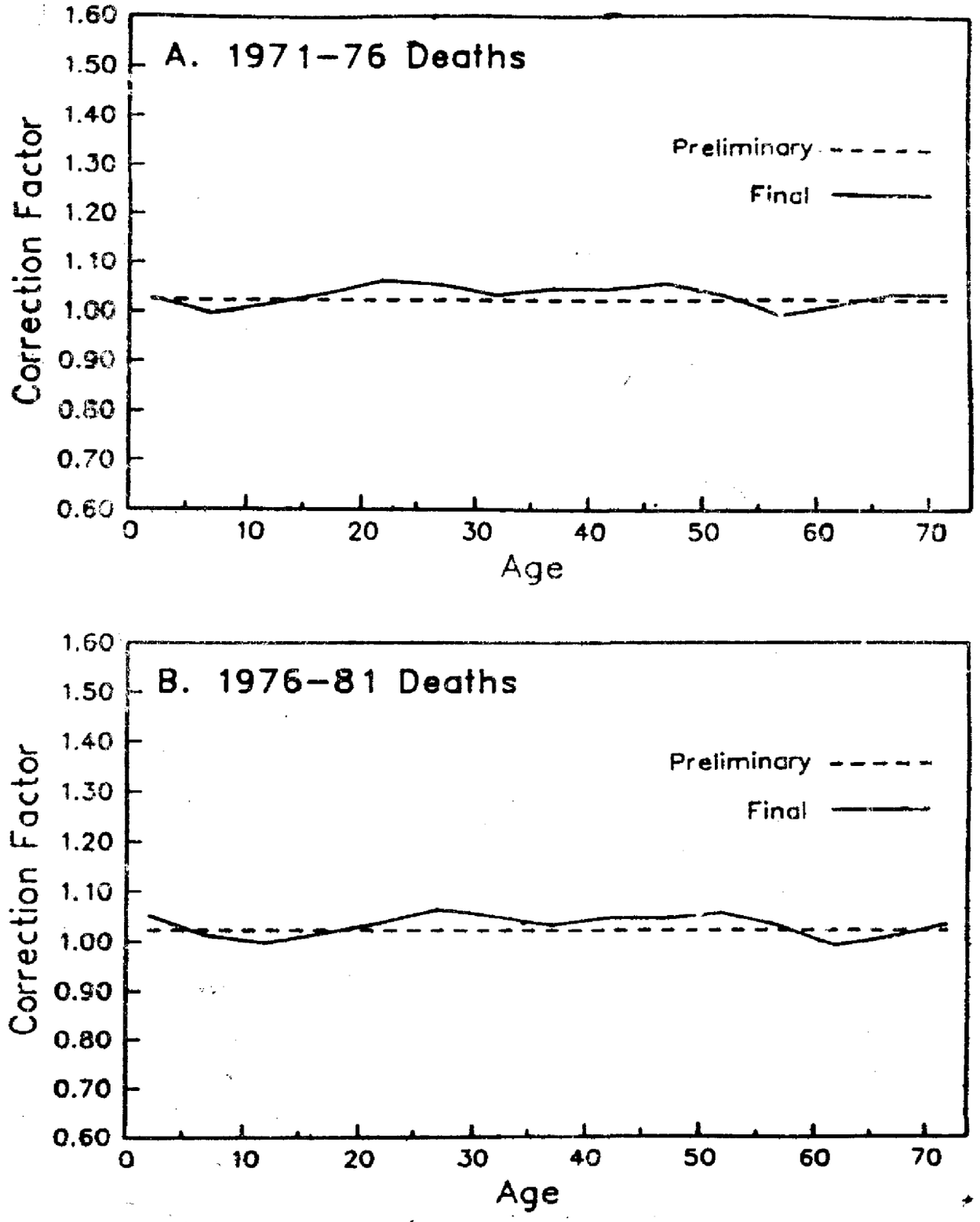
Note : *See* Tables 21 and 32. Note difference in scale from Figures 3—6.

Figure 9 : Preliminary and fina correction factors by age for intercensal registered deaths for males : Kerala, 1971-81.



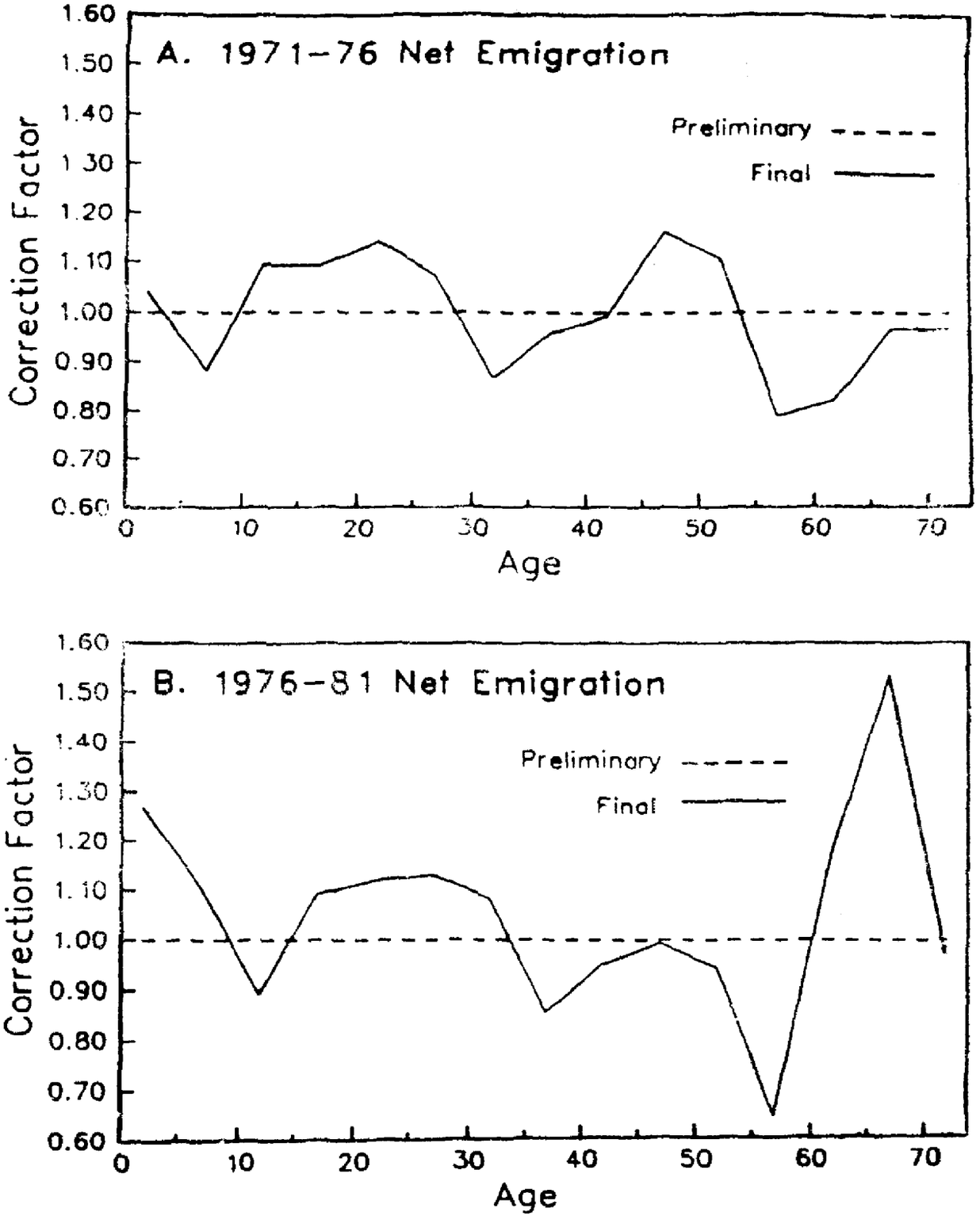
Notes : *See* Tables 20 and 22. Note difference in scale from Figures 3—6.

Figure 10 : Preliminary and final correction factors by age for intercensal registered deaths for females : Kerala, 1971-81



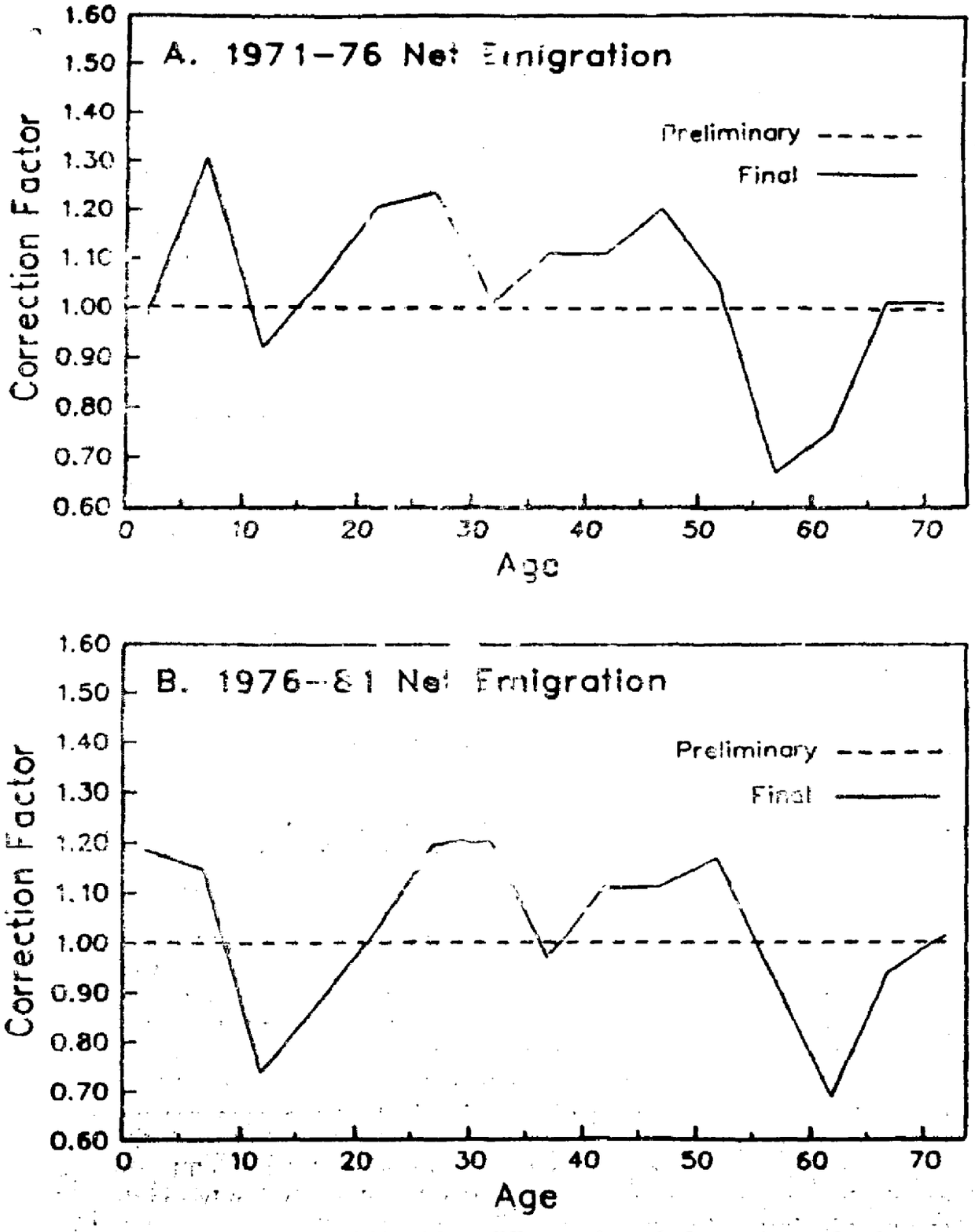
Notes : *See* Tables 21 and 32. Note difference in scale from Figures 3—6.

Figure 11 : Preliminary and final correction factors by age for intercensal net emigration for males : Kerala, 1971-81



Notes : *See* Tables 20 and 22 Note difference in scale from Figures 3—5.

Figure 12 : Preliminary and final correction factors by age for intercensal net emigration for females : Kerala, 1971-81



Notes : *See* Tables 21 and 32. Note difference in scale from Figures 3–6.

there is extreme under-reporting of ages 0-4, over-reporting of ages 10-14 in three of the four cases, and pronounced over-reporting of ages 60-64 and 65-69 for both sexes in the 1981 census, just as for all India. However, there are also some differences in the age-misreporting patterns; e.g., the age group 5-9 is under-enumerated in Kerala in all four cases whereas it is significantly over-enumerated in all India, as noted earlier.

While there are some similarities between the census reporting errors for Kerala and all India, it is hard to find similarities in the actual results. Perhaps this is best seen in Table 42 where the results are summarized in aggregate form. Not only is the life expectancy much higher, and the Crude Birth Rate (CBR) and Crude Death Rate (CDR) much lower, for the state of Kerala than for all India. Moreover, the differentials between males and females with regards to these measures are reversed (compare Tables 19 and 42).

Indeed, the death rates at almost all ages, including the prime child-bearing ages, are lower for Kerala females than males (compare Tables 28 and 38), which is just the opposite from the situation in all India. This is reflected in the life expectancy for Kerala females exceeding that for males by more than 3 years in 1971-76 and more than 5 years in 1976-81 (Table 42). In contrast, for all India, although female life expectancy was catching upto that of males during the period 1971-81, the male life expectancy was still greater than that of females in 1976-81.

Finally, we should comment on a result that may at the outset look suspicious. That is, the result of 101% completeness of registration of both male and female births for the period 1976-81. First of all, this becomes plausible when one recognizes that registered births have been estimated on the basis of a sample, namely that from the India Sample Registration System (SRS). In fact, we concluded earlier that births estimated this way may give over-estimates for both sexes for 1976-81, based on our calculations of the preliminary correction factors for births. Of course, the result depends on the benchmark we have chosen (described above). Any alternative benchmark that might be chosen to yield a lower completeness estimate of birth registration during 1976-81 would obviously imply corresponding lower completeness estimates for the other demographic quantities as well. However, our results already imply that the censuses were a bit less complete in Kerala than in all India in three of the four cases, excepting only the female census of 1981. Thus, in conclusion, we prefer to stay with the benchmark we have chosen and its implied results.

IV. CONCLUSIONS

Several attempts have been made in the past to make reliable estimates of birth and death rates in India in the absence of an adequate vital registration system. As a result, fairly reliable estimates of birth and death rates are now available at the national level. Moreover, the Sample Registration System (SRS) has become an important source of providing annual estimates of birth and death rates in India since 1971, for all India as well as for states.

While there are good estimates of fertility and mortality in India at the national level, mostly based on the census statistics, there is still a dearth of reliable estimates at the state level. This is because the methodologies available to produce sub-national estimates of fertility and mortality have been limited. However, two recent studies have given the methodologies and the levels and trends of fertility in India by state: the estimation of the Total Fertility Rate (TFR) by Rele (1987) and the estimation of the crude birth rate by Rao, Rele and Palmore (1987), the latter using the Palmore (1978) method. Such estimates are useful for providing an independent assessment of the state level estimates of SRS.

This paper gives yet another method which is capable of making both national and state level estimates of fertility, mortality and net migration. The method is based on consistent correction of the census, vital registration and migration data and has already been applied to Thailand, Sri Lanka and Korea (Luther, et al., 1986; Luther, et al., 1987; and Luther and Retherford, 1988). The advantage of this method is that it obtains correction factors for inter-related demographic data such that the corrected data are internally consistent, giving appropriate weights to different segments of data depending upon their quality and reliability. The method can be carried out on a personal computer, for which the *consistent correction procedure program is available.*

The method is applied here for all India and the state of Kerala, for the intercensal period between 1971 and 1981, divided into intervals 1971-76 and 1976-81. The state of Kerala is chosen because demographically it is quite different from all India. Kerala is known to have the lowest birth and death rates of any state of India. Moreover, migration plays a major

role in the demographic picture of Kerala, whereas in the analysis for all India migration can be assumed negligible. Similar analysis can be carried out for other states of India as well. To facilitate such computations for other states and to elaborate the methodology for applications in general, the details of input data and computations are shown in Appendices A to J.

The comparison of the present estimates of CBR, CDR and e_0 for all India and the state of Kerala with other estimates is shown in the accompanying summary table. The present estimates for all India are within reasonable range of the earlier estimates of the Panel on India (1984) and Rele (1987). They all indicate declining fertility from the period 1971-76 to 1976-81. The SRS estimates are a little lower than the other three fertility estimates for all India in both periods and indicate greater underregistration in SRS in 1971-76 than in 1976-81. This suggests improvement with time in the SRS registration of births. The estimate of underenumeration of births in the SRS in 1976-81 was 4.8 per cent from the present estimates, 2.3 per cent from Rele's estimate and 1.2 per cent from the Panel on India's estimate. This compares with an underenumeration of 3 per cent in both births and deaths for all India found by the SRS in an intensive enquiry conducted in a subsample of SRS units in 1980-81 (Census of India 1981, 1983). However, the estimates of CDR for all India in all three studies do not indicate any underestimation of the SRS death rate in 1976-81. Rather, there is an indication that the SRS death rate for all India in 1976-81 was fairly accurate. Similarly, the present estimates of CBR and CDR for Kerala are very supportive of the SRS estimates for the state.

SUMMARY TABLE

Comparison of the present estimates of the Crude Birth Rate (CBR), Crude Death Rate (CDR) and expectation of life at birth (e_0) with other estimates

Region/Measure	Present Estimate		Rele[1]		Panel on India[2]		SRS[3]	
	1971-76	1976-81	1971-76	1976-81	1971-76	1976-81	1971-75	1976-80
1	2	3	4	5	6	7	8	9
ALL INDIA								
CBR	39.14	35.29	39.3	34.4	37.9	34.0	35.6	33.6
CDR	15.58	13.63	17.1	13.8	15.5	13.4	15.5	13.9
e_0	50.81	54.04	..	..	50.7	53.4	49.7	52.3
KERALA								
CBR	28.79	25.12					28.8	26.0
CDR	8.52	7.21					8.4	7.1
e_0	63.31	67.12					62.0	65.5

Sources [1]Rele (1987).

[2]Panel on India of the Committee on Population and Demography, U.S. National Research Council. See Bhat, Preston and Dyson (1984:5).

[3]Census of India 1981 (1985:3); and Registrar General, India (1989:3, 10).

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LIST OF TABLES

Table 1. Input Data for All India Males, 1971-81.

Table 2. Input Data for All India Females, 1971-81.

Table 3. Final Correction Factors for All India Males, 1971-81.

Table 4. Reported and Final Corrected Intercensal Births for All India Males, 1971-81.

Table 5. Reported and Final Corrected Census Age Distributions for All India Males, 1971-81.

Table 6. Reported and Final Corrected Intercensal Deaths for All India Males, 1971-81.

Table 7. Life Table 5Lx Values for Periods between Censuses, and Average, All India Males, 1971-81.

Table 8. Life Table 1x & 5qx Values for Periods between Censuses, and Average, All India Males, 1971-81.

Table 9. Apportionment of Reported and Final Corrected Intercensal Deaths within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, All India Males, 1971-81.

Table 10. Estimated Age Distribution on April, 1, 1976, Midway between Censuses, Compared with Final Corrected Census Age Distributions, All India Males, 1971-81.

Table 11. Final Correction Factors for All India Females, 1971-81.

Table 12. Reported & Final Corrected Intercensal Births for All India Females, 1971-81.

Table 13. Reported and Final Corrected Census Age Distributions for All India Females, 1971-81.

Table 14. Reported and Final Corrected Intercensal Deaths for All India Females, 1971-81.

Table 15. Life Table 5Lx Values for Periods between Censuses, and Average, All India Females, 1971-81.

Table 16. Life Table 1x & 5qx Values for Periods between Censuses, and Average, All India Females, 1971-81.

Table 17. Apportionment of Reported & Final Corrected Intercensal Deaths within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, All India Females, 1971-81.

Table 18. Estimated Age Distribution on April 1, 1976, Midway between Censuses, Compared with Final Corrected Census Age Distributions, All India Females, 1971-81.

Table 19. Summary of Demographic Trends, Based on Consistently Corrected Data: All India, 1971-76 and 1976-81.

Table 20. Input Data for Kerala Males, 1971-81.

Table 21. Input Data for Kerala Females, 1971-81.

Table 22. Final Correction Factors for Kerala Males, 1971-81.

Table 23. Reported and Final Corrected Intercensal Births for Kerala Males, 1971-81.

Table 24. Reported and Final Corrected Census Age Distributions for Kerala Males, 1971-81.

Table 25. Reported and Final Corrected Intercensal Deaths for Kerala Males, 1971-81.

Table 26. Reported and Final Corrected Intercensal Net Emigrants for Kerala Males, 1971-81.

Table 27. Life Table 5Lx Values for Periods between Censuses, and Average, Kerala Males, 1971-81.

Table 28. Life Table 1x & 5qx Values for Periods between Censuses, and Average, Kerala Males, 1971-81.

Table 29. Apportionment of Reported and Final Corrected Intercensal Deaths within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, Kerala Males, 1971-81.

Table 30. Apportionment of Reported and Final Corrected Intercensal Net Emigrants within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, Kerala Males, 1971-81.

Table 31. Estimated Age Distribution on April 1, 1976, Midway between Censuses, Compared with Final Corrected Census Age Distributions, Kerala Males, 1971-81.

Table 32. Final Correction Factors for Kerala Females, 1971-81.

Table 33. Reported & Final Corrected Intercensal Births for Kerala Females, 1971-81.

Table 34. Reported and Final Corrected Census Age Distributions for Kerala Females, 1971-81.

Table 35. Reported and Final Corrected Intercensal Deaths for Kerala Females, 1971-81.

Table 36. Reported and Final Corrected Intercensal Net Emigrants for Kerala Females, 1971-81.

Table 37. Life Table 5Lx Values for Periods between Censuses, and Average, Kerala Females, 1971-81.

Table 38. Life Table 1x & 5qx Values for Periods between Censuses, and Average, Kerala Females, 1971-81.

Table 39. Apportionment of Reported & Final Corrected Intercensal Deaths within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, Kerala Females, 1971-81.

Table 40. Apportionment of Reported and Final Corrected Intercensal Net Emigrants within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, Kerala Females, 1971-81.

Table 41. Estimated Age Distribution on April, 1, 1976, Midway between Censuses, Compared with Final Corrected Census Age Distributions, Kerala Females, 1971-81.

Table 42. Summary of Demographic Trends, Based on Consistently Corrected Data: Kerala, 1971-76 and 1976-81.

Table C1 Initial Correction Factors for All India Males, 1971-81.

Table C2. Reported and Initially Corrected Intercensal Births for All India Males, 1971-81.

Table C3. Reported and Initially Corrected Census Age Distributions for All India Males, 1971-81.

Table C4. Reported and Initially Corrected Intercensal Deaths for All India Males, 1971-81.

Table D1. Initial Correction Factors for All India Females, 1971-81.

Table D2. Reported and Initially Corrected Intercensal Births for All India Females, 1971-81.

Table D3. Reported and Initially Corrected Census Age Distributions for All India Females, 1971-81.

Table D4. Reported and Initially Corrected Intercensal Deaths for All India Females, 1971-81.

Table G1. Initial Correction Factors for Kerala Males, 1971-81.

Table G2. Reported and Initially Corrected Intercensal Births for Kerala Males, 1971-81.

Table G3. Reported and Initially Corrected Census Age Distributions for Kerala Males, 1971-81.

Table G4. Reported and Initially Corrected Intercensal Deaths for Kerala Males, 1971-81.

Table G5. Reported and Initially Corrected Intercensal Net Emigrants for Kerala Males, 1971-81.

Table H1. Initial Correction Factors for Kerala Females, 1971-81.

Table H2. Reported and Initially Corrected Intercensal Births for Kerala Females, 1971-81.

Table H3. Reported and Initially Corrected Census Age Distributions for Kerala Females, 1971-81.

Table H4. Reported and Initially Corrected Intercensal Deaths for Kerala Females, 1971-81.

Table H5. Reported and Initially Corrected Intercensal Net Emigrants for Kerala Females, 1971-81.

Table 1

Input Data for All India Males, 1971-81

Births

1971-76 : 52813695

1976-81 : 56001123

Census Age Distributions			Deaths			
			1971-76		1976-81	
Age	1971	1981	NW	SE	NW	SE
0	40211877	43711289	2318251	8529397	2072901	7860017
5	42219656	49743981	479413	464786	426481	388626
10	36500531	46579059	194033	202600	205444	186790
15	25226773	34933452	163340	182069	203501	190103
20	21577691	29856366	168278	171654	202023	198917
25	20343399	26543560	157149	159452	166456	158733
30	18324969	22265678	196261	197671	190012	185663
35	17239761	20540101	241810	263732	239666	237924
40	15061099	18599029	310492	325127	346516	317539
45	12469979	15878632	378207	425646	421969	387509
50	11118088	14257929	504244	477510	547200	514559
55	6877786	8780815	517991	603997	647317	604548
60	7486203	9666337	656953	642314	689408	707033
65	3645094	4930388	582441	662923	696760	689692
70+	5746370	8097684	1340423	1340423	1451460	1451460

Preliminary Correction Factors: 1.12079, 1.03593, 1.02061, 1.01519, 1.01519, 1.01751, 1.01751, 1.01751, 1.01751, 1.01209, 1.01209, 1.00936, 1.00936, 1.00936, 1.00832, 1.00832, 1.00832, 1.02626, 1.01664, 1.01805, 1.01805, 1.02190, 1.02190, 1.01424, 1.01424, 1.01105, 1.01105, 1.00924, 1.00924, 1.01273, 1.01273, 1.01273, 1.02041, 1.02041, 1.02041

Table 2

Input Data for All India Females, 1971-81

Births

1971-76 : 50298757

1976-81 : 53334402

Census Age Distributions			Deaths			
			1971-76		1976-81	
Age	1971	1981	NW	SE	NW	SE
0	39364546	42576102	2633042	8789639	2309585	8052876
5	39805222	46732010	510495	514187	477805	439013
10	32281867	41692643	198547	204200	199161	173279
15	22251511	31045215	220225	251342	248369	253385
20	21532829	29187053	265052	269628	274249	278736
25	20485735	25740574	233406	235590	250205	233743
30	17871138	21461821	265947	253293	217379	197055
35	15665514	19533138	236901	246415	224974	218689
40	13232875	16649963	238171	237644	237056	248145
45	10419641	14257671	262766	288718	268405	267357
50	9417177	11954085	349272	346124	343496	337914
55	5953318	8158841	357009	411010	423788	407000
60	6890877	9037497	551036	514514	547793	543595
65	3357640	4856104	518294	595851	598164	559120
70+	5580486	7891983	1282166	1282166	1382507	1382507

Preliminary Correction Factors: 1.12079, 1.03593, 1.02479, 1.01656, 1.01656, 1.01932, 1.01932, 1.01932, 1.01932, 1.00944, 1.00944, 1.01586, 1.01586, 1.01586, 1.02519, 1.02519, 1.02519, 1.02773, 1.01790, 1.02076, 1.02076, 1.02136, 1.02136, 1.01045, 1.01045, 1.01208, 1.01208, 1.01321, 1·01321, 1.02714, 1.02714, 1.02714, 1.02041, 1.020,41

Sources : Births and deaths are calculated exactly as for males. For remaining input data, see the text and the sources of input data listed in Appendix A.

Notes: (1) Under NW and SE are listed the numbers of deaths in the northwest (NW) and southeast (SE) triangles, respectively, of the Lexis diagram for the indicated 5-year age group and 5-year time period. (See Figure 2a.) For the 70+ age group, where there are no NW or SE triangles, tne total number of deaths is divided equally into the NW and SE columns simply for convenience.

(2) The preliminary correction factors for the input demographil quantities are listed in the same order as the quantities 1971-76 births, 1976-81 births, 1971 census age distribuion from youngest to oldest age group, 1981 census age distribution from youngest to oldest age group, 1971-76 deaths age distribution from youngest to oldest age group, 1976-81 deaths age distribution from youngest to oldest age group.

Table 3

Final Correction Factors for All India Males, 1971-81

Final Correction Factors for Intercensal Births

1971-76	1976-81
1.132	1.076

Final Correction Factors for Census Age Distributions and Intercensal Deaths

	Censuses		Deaths	
Age	1971	1981	1971-76	1976-81
0	1.140	1.192	1.020	1.038
5	.940	.975	1.024	1.018
10	.934	.910	1.034	1.025
15	1.065	1.104	1.029	1.034
20	1.053	1.114	1.022	1.028
25	1.046	.985	1.023	1.022
30	1.056	.989	1.023	1.023
35	1.015	.997	1.024	1.023
40	1.047	.984	1.025	1.024
45	.936	1.019	1.028	1.024
50	1.067	.985	1.027	1.029
55	1.069	1.094	1.021	1.027
60	.995	.966	1.024	1.021
65	.995	.964	1.028	1.024
70+	.995	1.037	1.028	1.028

Table 4

Reported and Final Corrected Intercensal Births for All India Males, 1971-81

Total Reported	Reported Births by 5-year Period	
1971-81	1971-76	1976-81
108814818	52813695	56001123
Total Final Corrected	**Final Corrected Births by 5-year Period**	
1971-81	1971-76	1976-81
120006361	59760070	60246291

Completeness of Births

Overall	Intercensal Births Completeness by 5-year Period	
1971-81	1971-76	1976-81
90.674	88.376	92.954

Notes: (1) The final corrected births are obtained by multiplying the reported births by the final correction factors for births that are contained in Table 3.

(2) Completeness of births for each period is obtained by dividing reported births by final corrected births and multiplying by 100.

Table 5

Reported and Final Corrected Census Age Distributions for All India Males, 1971-81

Age	Reported Census Age Distributions		Final Corrected Census Age Distributions	
	1971	1981	1971	1981
0	40211877	43711289	45839594	52090764
5	42219656	49743981	39684067	48515385
10	36500531	46579059	34077296	42373840
15	25226773	34933452	26868276	38576246
20	21577691	29856366	22726669	33274348
25	20343399	26543560	21276465	26154815
30	18324969	22265678	19342605	22031322
35	17239761	20540101	17506601	20475547
40	15061099	18599029	15766869	18301128
45	12469979	15878632	11667772	16173789
50	11118088	14257929	11860647	14049567
55	6877786	8780815	7350668	9604746
60	7486203	9666337	7451438	9339832
65	3645094	4930388	3628167	4754156
70	5746370	8097684	5719685	8394133
Total	284049276	354384300	290766819	364109618

Note : The final corrected census age distributions are obtained by multiplying the reported census age distributions by the final correction factors for census age distributions that are contained in Table 3.

Table 6

Reported and Final Corrected Intercensal Deaths for All India Males, 1971-81

Age	Reported Intercensal Deaths		Final Corrected Intercensal Deaths	
	1971-76	1976-81	1971-76	1976-81
0	10847648	9932918	11062499	10306362
5	944199	815107	967253	829561
10	396633	392234	410239	401933
15	345409	393604	355260	407113
20	339932	400940	347512	412215
25	316601	325189	323966	332447
30	393932	375675	403053	384417
35	505542	477590	517839	488646
40	635619	664055	651253	680307
45	803853	809478	826436	829304
50	981754	1061759	1008360	1092104
55	1121988	1251865	1145137	1285735
60	1299267	1396441	1330690	1425244
65	1245364	1386452	1279938	1419952
70+	2680846	2902919	2755271	2983510
Total	22858587	22586226	23384706	23278850

Completeness of Deaths

Overall	Intercensal Deaths Completeness by 5-year Perodi	
1971-81	1971-76	1976-81
97.388	97.750	97.025

Notes : (1) The final corrected intercensal deaths are obtained by multiplying the reported intercensal deaths by the final correction factors for intercensal deaths that are contained in Table 3.

(2) Completeness of deaths for each period is obtained by dividing total reported intercensal deaths by total final corrected intercensal deaths and multiplying by 100.

Table 7

Life Table $_5L_x$ Values for Periods between Censuses and Average, All India Males, 1971-81

Age	Average	1971-76	1976-81
0	429769	427223	432315
5	405561	400598	410523
10	399147	393616	404677
15	394767	389115	400419
20	389768	384111	395425
25	384232	378522	389942
30	377883	372015	383751
35	369360	363050	375669
40	357513	350937	364089
45	340781	333756	347805
50	316846	309145	324547
55	284322	278248	290396
60	242693	235453	249933
65	192710	188751	196669
70+	391930	337330	446530

Life Expectancies for Periods between Censuses & Average

Average	1971-76	1976-81
52.773	51.419	54.127

Note : For the method used to derive the life table contained here and in Table 8, see Appendix B, pp. 1362-63 of Luther et al. (1987). Net migration is assumed negligible in applying that method here.

Table 8

Life Table 1_x & $5q_x$ Values for Periods between Censuses and Average All India Males, 1971-81

Age	(1_x Values) Average	1971-76	1976-81
0	100000	100000	100000
5	81929	81038	82821
10	80240	79158	81322
15	79395	78271	80519
20	78481	77352	79610
25	77383	76262	78504
30	76283	75138	77427
35	74849	73646	76052
40	72880	71579	74182
45	70069	68781	71357
50	66124	64606	67642
55	60442	59098	61786
60	53152	51867	54437
65	43699	42633	44764
70+	33217	32021	34412

Age	($5q_x$ Values) Average	1971-76	1976-81
0	.18071	.18962	.17179
5	.02065	.02319	.01810
10	.01054	.01120	.00987
15	.01152	.01175	.01129
20	.01399	.01409	.01389
25	.01423	.01474	.01372
30	.01881	.01986	.01777
35	.02633	.02806	.02459
40	.03858	.03909	.03807
45	.05639	.06071	.05207
50	.08592	.08525	.08658
55	.12065	.12236	.11894
60	.17785	.17802	.17768
65	.24009	.24892	.23125
70+	1.00000	1.00000	1.00000

Note: See Note to Table 7.

Table 9

Apportionment of Reported and Final Corrected Intercensal Deaths within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, All India Males, 1971-81

Reported Intercensal Deaths

Age	1971-76		1976-81		Total
	NW	SE	NW	SE	
0	2318251	8529397	2072901	7860017	20780566
5	479413	464786	426481	388626	1759306
10	194033	202600	205444	186790	788867
15	163340	182069	203501	190103	739013
20	168278	171654	202023	198917	740872
25	157149	159452	166456	158733	641790
30	196261	197671	190012	185663	769607
35	241810	263732	239666	237924	983132
40	310492	325127	346516	317539	1299674
45	378207	425646	421969	387509	1613331
50	504244	477510	547200	514559	2043513
55	517991	603997	647317	604548	2373853
60	656953	642314	689408	707033	2695708
65	582441	662923	696760	689692	2631816
70+	1340423	1340423	1451460	1451460	5583765

Final Corrected Intercensal Deaths

Age	1971-76		1976-81		Total
	NW	SE	NW	SE	
0	2364167	8698332	2150835	815557	21368861
5	491119	461735	434044	395517	1796814
10	200689	209550	210524	191409	812172
15	167999	187262	210485	196628	762373
20	172031	175482	207704	204511	759727
25	160805	163161	170171	162276	656413
30	200805	202248	194434	189983	787470
35	247692	270147	245214	243432	1006485
40	318129	333124	354997	325310	1331560
45	388832	437604	432304	397000	1655740
50	517909	490451	562839	529265	2100464
55	528678	616459	664830	620904	2430872
60	672841	657848	703628	721616	2755934
65	598611	681327	713596	706357	2699890
70+	1377636	1377636	1491755	1491755	5738781

Notes: (1) The final corrected intercensal deaths by triangles of the Lexis Diagram are obtained by multiplying the reported intercensal deaths by triangles, listed in Table 1 and again here, by the final correction factors for intercensal deaths that are contained in Table 3.

(2) See Note (1) of Table 1.

Table 10

Estimated Age Distribution on April 1, 1976, Midway between Censuses, Compared with Final Corrected Census Age Distributions, All India Males, 1971-81

Age	1971	1976	1981
0	45839594	51061738	52090764
5	39684067	42999293	48515385
10	34077296	38983398	42373840
15	26868276	33689345	38576246
20	22726669	26524796	33274348
25	21276465	22391477	26154815
30	19342605	20913413	22031322
35	17506601	18871653	20475547
40	15766869	16925786	18301128
45	11667772	15011136	16173789
50	11860647	10788489	14049567
55	7350668	10726279	9604746
60	7451438	6164141	9339832
65	3628167	6097269	4754156
70+	5719685	5993969	8394133
Total	290766819	327142180	364109618

Note : The estimated age distribution midway between censuses is obtained from the final corrected census age distributions, intercensal births and deaths that are contained in Tables 4, 5 and 9.

Table 11

Final Correction Factors for All India Females, 1971-81

Final Correction Factors for Intercensal Births

1971-76	1976-81
1.130	1.077

Final Correction Factors for Census Age Distributions & Intercensal Deaths

	Censuses		Deaths	
Age	1971	1981	1971-76	1976-81
0	1.103	1.154	1.018	1.032
5	.913	.964	1.025	1.017
10	.987	.949	1.031	1.026
15	1.119	1.131	1.021	1.031
20	1.039	1.057	1.018	1.021
25	1.018	.928	1.023	1.018
30	1.012	.997	1.025	1.023
35	1.000	1.019	1.025	1.024
40	1.009	1.026	1.025	1.025
45	.969	1.028	1.026	1.025
50	1.099	1.020	1.022	1.026
55	1.107	1.067	1.015	1.022
60	1.013	.951	1.020	1.015
65	1.013	.943	1.025	1.020
70+	1.013	1.046	1.025	1.025

Table 12

Reported & Final Corrected Intercensal Births for All India Females, 1971-81

Total Reported	Reported Births by 5-year Period	
1971-81	1971-76	1976-81
103633159	50298757	53334402

Total Final Corrected	Final Corrected Births by 5-year Period	
1971-81	1971-76	1976-81
114291771	56842868	57448903

Completeness of Births

Overall	Intercensal Births Completeness by 5-year Period	
1971-81	1971-76	1976-81
90.674	88.487	92.838

Notes: (1) The final corrected births are obtained by multiplying the reported births by the final correction factors for births that are contained in Table 11.

(2) Completeness of births for each period is obtained by dividing reported births by final corrected births and multiplying by 100.

Table 13

Reported and Final Corrected Census Age Distributions for All India Females, 1971-81

Age	Reported Census Age Distributions		Final Corrected Census Age Distributions	
	1971	1981	1971	1981
0	39364546	42576102	43431354	49138200
5	39805222	46732010	36323688	45068357
10	32281867	41692643	31865196	39560995
15	22251511	31045215	24905330	35124286
20	21532829	29187053	22372438	30863449
25	20485735	25740574	20845224	23888109
30	17871138	21461821	18089154	21405173
35	15665514	19533138	15663207	19900445
40	13232875	16649963	13355049	17079341
45	10419641	14257671	10095541	14660066
50	9417177	11954085	10350104	12192890
55	5953318	8158841	6591008	8703485
60	6890877	9037497	6980160	8590674
65	3357640	4856104	3401144	4576928
70+	5580486	7891983	5652791	8255243
Total	264110376	330774700	269921388	339007641

Note : The final corrected census age distributions are obtained by multiplying the reported census age distributions by the final correction factors for census age distributions that are contained in Table 11.

Table 14

Reported and Final Corrected Intercensal Deaths for All India Females, 1971-81

Age	Reported Intercensal Deaths		Final Corrected Intercensal Deaths	
	1971-76	1976-81	1971-76	1976-81
0	11422681	10362461	11623892	10694233
5	1024682	916818	1050599	932478
10	402747	372440	415142	382108
15	471567	501754	481447	517188
20	534680	552985	544323	564364
25	468996	483948	479853	492758
30	519240	414434	531962	424052
35	483316	443663	495341	454532
40	475815	485201	487489	497273
45	551484	535762	565986	548907
50	695396	681410	710839	699417
55	768019	830788	779811	849153
60	1065550	1091388	1087156	1108112
65	1114145	1157284	1142305	1180746
70+	2564332	2765014	2629146	2834900
Total	22562650	21595350	23025290	22180222

Completeness of Deaths

Overall	Intercensal Deaths Completeness by 5-year Period	
1971-81	1971-76	1976-81
97.683	97.991	97.363

Notes : (1) The final corrected intercensal deaths are obtained by multiplying the reported intercensal deaths by the final correction factors for intercensal deaths that are contained in Table 11.

(2) Completeness of deaths for each period is obtained by dividing total reported intercensal deaths by total final corrected intercensal deaths and multiplying by 100.

Table 15

Life Table 5Lx Values for Periods between Censuses, and Average, All India Females, 1971-81

Age	Average	1971-76	1976-81
0	424496	421323	427669
5	396105	390067	402144
10	388945	382275	395616
15	383602	376703	390502
20	376382	369155	383609
25	368148	360766	375530
30	359829	351948	367710
35	350728	341852	359604
40	340443	331132	349755
45	327644	317608	337679
50	309642	298556	320728
55	285375	275066	295685
60	251059	239632	262486
65	204823	195720	213926
70+	438778	364954	512602

Life Expectancies for Periods between Censuses & Average

Average	1971-76	1976-81
52.060	50.168	53.952

Note: For the method used to derive the life table contained here and in Table 16, see Appendix B, pp. 1362-63 of Luther et al. (1987). Net emigration is assumed negligible in applying that method here.

Table 16

Life Table 1x & 5qx Values for Periods between Censuses and Average, All India Females, 1971-81

Age	l_x Values		
	Average	1971-76	1976-81
0	100000	100000	100000
5	80172	79066	81277
10	78213	76919	79508
15	77336	75975	78698
20	76080	74679	77480
25	74425	72958	75892
30	72802	71336	74268
35	71073	69376	72770
40	69174	67333	71016
45	66956	65059	68854
50	64015	61890	66140
55	59760	57603	61917
60	54291	52162	56420
65	45881	43918	47844
70+	35800	33529	38071

Age	5qx Values		
	Average	1971-76	1976-81
0	.19828	.20934	.18723
5	.02447	.02716	.02177
10	.01123	.01226	.01019
15	.01627	.01706	.01547
20	.02177	.02305	.02050
25	.02182	.02224	.02140
30	.02381	.02747	.02016
35	.02678	.02946	.02411
40	.03211	.03377	.03045
45	.04406	.04871	.03941
50	.06656	.06926	.06385
55	.09162	.09446	.08879
60	.15502	.15804	.15200
65	.22041	.23656	.20427
70+	1.00000	1.00000	1.00000

Note : See note to Table 15.

Table 17

Apportionment of Reported & Final Corrected Intercensal Deaths within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, All India Females, 1971-81

	Reported Intercensal Deaths				
	1971-76		1976-81		
Age	NW	SE	NW	SE	Total
0	2633042	8789639	2309585	8052876	21785142
5	510495	514187	477805	439013	1941500
10	198547	204200	199161	173279	775187
15	220225	251342	248369	253385	973321
20	265052	269628	274249	278736	1087665
25	233406	235590	250205	233743	952944
30	265947	253293	217379	197055	933674
35	236901	246415	224974	218689	926979
40	238171	237644	237056	248145	961016
45	262766	288718	268405	267357	1087246
50	349272	346124	343496	337914	1376806
55	357009	411010	423788	407000	1598807
60	551036	514514	547793	543595	2156938
65	518294	595851	598164	559120	2271429
70+	1282166	1282166	1382507	1382507	5329346

	Final Corrected Intercensal Deaths				
	1971-76		1976-81		
Age	NW	SE	NW	SE	Total
0	2679423	8944469	2383530	8310703	2231825
5	523407	527192	485966	446511	1983076
10	204657	210484	204331	177777	797250
15	224839	256608	256009	261179	998636
20	269832	274491	279892	284472	1108687
25	238809	241044	254760	237998	972612
30	272463	259499	222424	201628	956014
35	242795	252546	230485	224046	949873
40	244015	243475	242954	254319	984763
45	269676	296310	274990	273917	1114893
50	357028	353810	352573	346844	1410255
55	362490	417321	433156	415997	1628964
60	562209	524947	556187	551925	2195268
65	531394	610911	610291	570455	2323051
70+	1314573	1314573	1417450	1417450	5464045

Notes : (1) The final corrected intercensal deaths by triangles of the Lexis Diagram are obtained by multiplying the reported intercensal deaths by triangles, listed in Table 2 and again here, by the final correction factors for intercensal deaths that are contained in Table 11.

(2) *See* Note (1) of Table 2.

Table 18

Estimated Age Distribution on April 1, 1976, Midway between Censuses Compared with Final Corrected Census Age Distributions, All India Females, 1971-81

Age	1971	1976	1981
0	43431354	47898399	49138200
5	36323688	40224738	45068357
10	31865196	35589797	39560995
15	24905330	31403930	35124286
20	22372438	24406000	30863449
25	20845224	21861562	23888109
30	18089154	20346916	21405173
35	15663207	17564145	19900445
40	13355049	15176937	17079341
45	10095541	12814724	14660066
50	10350104	9472055	12192890
55	6591008	9575755	8703485
60	6980160	5703571	8590674
65	3401144	5807040	4576928
70+	5652791	5893395	8255243
Total	269921388	303738963	339007641

Note : The estimated age distribution midway between censuses is obtained from the final corrected census age distributions, intercensal births and deaths that are contained in Tables 12, 13 and 17.

Table 19

Summary of Demographic Trends, Based on Consistently Corrected Data : All India 1971-76 and 1976-81

	Males		Females		Combined Sexes	
Measure	1971-76	1976-81	1971-76	1976-81	1971-76	1976-81
CBR	38.69	34.86	39.64	35.75	39.14	35.29
CDR	15.14	13.47	16.05	13.80	15.58	13.63
eo	51.42	54.13	50.17	53.95	50.81	54.04
r	2.36	2.14	2.36	2.20	2.36	2.17

Note : CBR denotes crude birth rate, CDR crude death rate, e_o life expectancy (in years), r average annual growth rate. CBR and CDR are rates per 1,000 and r is a rate per 100.

Table 20
Input Data for Kerala Males, 1971-81

Births

1971-76 : 1664896
1976-81 : 1636783

Age	Census Age Distributions		Deaths			
			1971-76		1976-81	
	1971	1981	NW	SE	NW	SE
0	1441829	1377732	28641	122522	20024	91543
5	1457676	1481291	9360	8725	5935	5524
10	1446125	1643310	3382	3444	2951	2715
15	1127154	1439602	3892	3185	3257	3994
20	977917	1256496	4784	5130	4698	4211
25	664398	1005975	3992	4780	4626	4420
30	587485	792216	5422	4565	4364	5258
35	617663	677212	5557	5440	5666	6043
40	497183	561905	7542	8139	7719	7936
45	498612	578138	10668	11245	10173	10095
50	351921	445637	11470	13237	13241	13799
55	288055	371895	14043	15429	17077	16504
60	234481	330500	15875	17205	18830	18877
65	165670	241273	19397	20985	20767	22006
70+	231682	324586	57842	57842	61602	61602

Age	Net Emigrants			
	1971-76		1976-81	
	NW	SE	NW	SE
0	998	7770	−917	7852
5	596	272	−1120	−1835
10	3815	2260	4548	1816
15	12248	7473	17793	10621
20	10158	14603	17855	28674
25	8390	11216	14814	25333
30	9200	10116	10477	15364
35	7673	8566	7591	11558
40	4432	5625	3430	6200
45	2652	2642	890	878
50	900	1502	−93	604
55	692	380	46	−433
60	29	389	−265	112
65	246	28	126	−189
70+	138	138	86	86

5—24 RGI/ND'90

Table 20 -(Contd.)

Input Data for Kerala Males, 1971-81

Preliminary Correction Factors

Births

1971-76 : 1.01600

1976-81 : 1.00000

	Census Age Distribution		Deaths		Net Emigration	
Age	1971	1981	1971-76	1976-81	1971-76	1976-81
0	1.01840	1.02148	1.02310	1.02310	1.00000	1.00000
5	1.01051	1.01004	1.02310	1.02310	1.00000	1.00000
10	1.01051	1.01886	1.02310	1.02310	1.00000	1.00000
15	1.01332	1.01886	1.02310	1.02310	1.00000	1.00000
20	1.01332	1.02392	1.02310	1.02310	1.00000	1.00000
25	1.01332	1.02392	1.02310	1.02310	1.00000	1.00000
30	1.01332	1.01390	1.02310	1.02310	1.00000	1.00000
35	1.00754	1.01390	1.02310	1.02310	1.00000	1.00000
40	1.00754	1.00816	1.02310	1.02310	1.00000	1.00000
45	1.00459	1.00816	1.02310	1.02310	1.00000	1.00000
50	1.00459	1.01374	1.02310	1.02310	1.00000	1.00000
55	1.00459	1.01374	1.02310	1.02310	1.00000	1.00000
60	1.00946	1.01030	1.02310	1.02310	1.00000	1.00000
65	1.00946	1.01030	1.02310	1.02310	1.00000	1.00000
70+	1.00946	1.01030	1.02310	1.02310	1.00000	1.00000

Sources : Births and deaths are calculated exactly as on the worksheets of Appendix B. See Appendix F for the calculation of net emigrants. For remaining input data, see the text and the sources of input data listed in Appendix E.

Note : Under NW and SE on the preceding page are listed the numbers of deaths or net emigrants in the northwest (NW) and southeast (SE) triangles, respectively, of the Lexis diagram for the indicated 5-year age group and 5-year time period. (See Figure 2a.) For the 70+ age group, where there are no NW or SE triangles, the total number of deaths or net emigrants is divided equally into the NW and SE columns simply for convenience.

Table 21
Input Data for Kerala Females, 1971-81

Births

1971-76 : 1585616
1976-81 : 1558841

Census Age Distributions			Deaths			
			1971-76		1976-81	
Age	1971	1981	NW	SE	NW	SE
0	1413696	1343258	28789	121624	17407	84337
5	1418419	1441091	9027	7608	6199	5362
10	1417882	1614922	2509	3146	3684	3169
15	1210250	1568161	3982	4381	3177	3031
20	1012068	1364158	5224	4807	4933	4860
25	723166	1082776	3651	4950	4074	3529
30	622147	789777	4856	3742	3688	3879
35	660668	727934	5502	4599	3439	3212
40	495941	569431	5529	4883	5333	4610
45	464720	595111	6739	5679	6069	5059
50	340457	445526	7418	7767	7075	6770
55	284192	370155	8843	8984	9961	9540
60	247435	348920	12017	12085	15772	13947
65	183856	277441	18401	17381	14779	17389
70+	264626	387253	58562	58562	61933	61933

	Net Emigrants			
	1971-76		1976-81	
Age	NW	SE	NW	SE
0	672	5774	—305	7305
5	—32	—24	—948	—1343
10	3214	1197	3247	692
15	10266	6378	14461	11700
20	6368	10367	14896	25987
25	1600	3605	9016	17336
30	1073	797	10210	17434
35	725	904	6817	12097
40	519	538	2042	3500
45	575	478	792	878
50	358	502	449	729
55	455	316	477	289
60	152	376	118	407
65	228	95	264	69
70+	175	175	173	173

Table 21—(Contd.)

Input Data for Kerala Females, 1971-81

Preliminary Correction Factors

Births

1971-76 : 1.01600

1976-81 : 1.00000

	Census Age Distributions		Deaths		Net Emigration	
Age	1971	1981	1971-76	1976-81	1971-76	1976-81
0	1.01369	1.02347	1.02310	1.02310	1.00000	1.00000
5	1.01055	1.00928	1.02310	1.02310	1.00000	1.00000
10	1.01055	1.01658	1.02310	1.02310	1.00000	1.00000
15	1.01455	1.01658	1.02310	1.02310	1.00000	1.00000
20	1.01455	1.01795	1.02310	1.02310	1.00000	1.00000
25	1.01455	1.01795	1.02310	1.02310	1.00000	1.00000
30	1.01455	1.00813	1.02310	1.02310	1.00000	1.00000
35	1.00746	1.00813	1.02310	1.02310	1.00000	1.00000
40	1.00746	1.01039	1.02310	1.02310	1.00000	1.00000
45	1.01414	1.01039	1.02310	1.02310	1.00000	1.00000
50	1.01414	1.01778	1.02310	1.02310	1.00000	1.00000
55	1.01414	1.01778	1.02310	1.02310	1.00000	1.00000
60	1.01874	1.02388	1.02310	1.02310	1.00000	1.00000
65	1.01874	1.02388	1.02310	1.02310	1.00000	1.00000
70+	1.01874	1.02388	1.02310	1.02310	1.00000	1.00000

Sources : Births, deaths, and net emigrants are calculated exactly as for Kerala males. (See Sources for Table 20). For remaining input data, see the text and the sources of input data listed in Appendix E.

Note : Under NW and SE on the preceding page are listed the numbers of deaths or net emigrants in the northwest (NW) and southeast (SE) triangles, respectively, of the Lexis diagram for the indicated 5-year age group and 5-year time period. (See Figure 2a.) For the 70+ age group, where there are no NW or SE triangles, the total number of deaths or net emigrants is divided into the NW and SE columns simply for convenience.

Table 22

Final Correction Factors for Kerala Males, 1971-81

Final Correction Factors for Intercensal Births

1971-76	1976-81
1.026	.990

Final Correction Factors for Census Age Distributions, Intercensal Deaths, and Intercensal Net Emigration

	Censuses		Deaths		Net Emigration	
Age	1971	1981	1971-76	1976-81	1971-76	1976-81
0	1.121	1.098	1.041	1.067	1.041	1.269
5	1.040	1.046	1.019	1.024	.882	1.103
10	.992	.954	1.048	1.019	1.094	.890
15	1.024	1.026	1.052	1.047	1.093	1.094
20	.968	1.079	1.059	1.053	1.142	1.121
25	1.086	1.050	1.047	1.060	1.073	1.132
30	1.053	1.097	1.024	1.047	.865	1.084
35	1.034	.979	1.035	1.023	.958	.855
40	1.030	1.005	1.039	1.035	.993	.952
45	.948	1.019	1.059	1.039	1.161	.994
50	1.090	1.028	1.046	1.059	1.105	.945
55	1.075	1.108	1.012	1.043	.790	.650
60	1.041	.961	1.025	1.012	.823	1.178
65	1.041	.977	1.036	1.026	.968	1.536
70+	1.041	1.016	1.036	1.036	.968	.968

Table 23

Reported and Final Corrected Intercensal Births for Kerala Males, 1971-81

Total Reported	Reported Births by 5-year Period	
1971-81	1971-76	1976-81
3301679	1664896	1636783

Total Final Corrected	Final Corrected Births by 5-year Period	
1971-81	1971-76	1976-81
3328317	1708413	1619904

Completeness of Births

Overall	Intercensal Births Completeness by 5-year Period	
1971-81	*1971-76*	*1976-81*
99.200	97.453	101.042

Notes: (1) The final corrected births are obtained by multiplying the reported births by the final correction factors for births that are contained in Table 22.

(2) Completeness of births for each period is obtained by dividing reported births by final corrected births and multiplying by 100.

Table 24

Reported and Final Corrected Census Age Distributions for Kerala Males, 1971-81

	Reported Census Age Distributions		Final Corrected Census Age Distributions	
	1971	1981	1971	1981
	1441829	1377732	1616363	1512263
	1457676	1481291	1516494	1548962
	1446125	1643310	1435046	1567158
	1127154	1439602	1154564	1477498
	977917	1256496	946388	1356373
	664398	1005975	721388	1056647
	587485	792216	618724	868844
	617663	677212	638703	662793
	497183	561905	512134	564976
	498612	578138	472643	588943
	351921	445637	383758	458277
	288055	371895	309547	411879
	234481	330500	244022	317763
	165670	241273	172411	235801
	231682	324586	241109	329844
	10587851	12527768	10983293	12958021

: The final corrected census age distributions are obtained by multiplying the reported census age distributions by the final correction factors for census age distributions that are contained in Table 22.

Table 25

Reported and Final Corrected Intercensal Deaths for Kerala Males, 1971-81

Age	Reported Intercensal Deaths		Final Corrected Intercensal Deaths	
	1971-76	1976-81	1971-76	1976-81
0	151163	111567	157342	119040
5	18085	11459	18424	11737
10	6826	5666	7155	5773
15	7077	7251	7447	7592
20	9914	8909	10503	9378
25	8772	9046	9186	9590
30	9987	9622	10225	10077
35	10997	11709	11378	11977
40	15681	15655	16290	16196
45	21913	20268	23210	21057
50	24707	27040	25853	28643
55	29472	33581	29825	35033
60	33080	37707	33922	38166
65	40382	42773	41818	43867
70+	115684	123204	119799	127586
Total	503740	475457	522377	495711

Completeness of Deaths

Overall	Intercensal Deaths Completeness by 5-year Period	
1971-81	1971-76	1976-81
96.180	96.432	95.914

Notes : (1) The final corrected intercensal deaths are obtained by multiplying the reported intercensal deaths by the final correction factors for intercensal deaths that are contained in Table 22.

(2) Completeness of deaths for each period is obtained by dividing total reported intercensal deaths by total final corrected intercensal deaths and multiplying by 100.

Table 26

Reported and Final Corrected Intercensal Net Emigrants for Kerala Males, 1971-81

Age	Reported Intercensal Net Emigrants		Final Corrected Intercensal Net Emigrants	
	1971-76	1976-81	1971-76	1976-81
0	8768	6935	9125	8802
5	868	—2955	766	—3260
10	6075	6364	6646	5666
15	19721	28414	21556	31073
20	24761	46529	28270	52144
25	19606	40147	21040	45462
30	19316	25841	16712	28005
35	16239	19149	15565	16368
40	10057	9630	9991	9171
45	5294	1768	6146	1758
50	2402	511	2655	483
55	1072	—387	847	—252
60	418	—153	344	—180
65	274	—63	265	—97
70+	276	172	267	166
Total	135147	181902	140192	195310

Completeness of Net Emigration (Assuming Total Preliminary Corrected Births Equal Total Finally Corrected Births)

Overall	Intercensal Net Emigration Completeness by 5-year Period	
1971-81	1971-76	1976-81
94.500	96.401	93.135

Notes : (1) The final corrected intercensal net emigrants are obtained by multiplying the reported intercensal net emigrants by the final correction factors for intercensal net emigration that are contained in Table 22.

(2) Completeness of net emigration for each period is obtained by dividing total reported intercensal net emigrants by total final corrected intercensal net emigrants and multiplying by 100.

Table 27

Life Table $_5L_x$ Values for periods between Censuses and Average, Kerala Males, 1971-81

Age	Average	1971-76	1976-81
0	466199	462612	469786
5	456609	451471	461748
10	453391	447631	459151
15	451172	445321	457023
20	447952	441679	454226
25	443606	436946	450266
30	438204	431268	445140
35	430916	423720	438112
40	420913	413947	427879
45	406177	398095	414258
50	384957	376721	393194
55	356955	349364	364546
60	319915	313252	326579
65	270724	263833	277615
70+	565526	515648	615405

Life Expectancies for Periods between Censuses & Average

Average	1971-76	1976-81
63.132	61.715	64.549

Note : For the method used to derive the life table contained here and in Table 28, see Appendix B, pp. 1362-63 of Luther *et al.* (1987).

Table 28

Life Table l_x & $5q_x$ Values for Periods between Censuses and Average. Kerala Males, 1971-81

Age	l_x Values		
	Average	1971-76	1976-81
0	100000	100000	100000
5	91757	90821	92693
10	90871	89743	91999
15	90479	89306	91652
20	89974	88777	91171
25	89175	87875	90474
30	88243	86890	89596
35	86992	85535	88449
40	85373	83968	86777
45	82991	81557	84426
50	79419	77698	81140
55	74567	72989	76146
60	68058	66699	69417
65	59753	58525	60981
70+	48323	46762	49883

Age	$5q_x$ Values		
	Average	1971-76	1976-81
0	.08243	.09179	.07307
5	.00967	.01186	.00748
10	.00432	.00487	.00377
15	.00559	.00592	.00525
20	.00890	.01016	.00765
25	.01046	.01121	.00971
30	.01420	.01560	.01281
35	.01861	.01831	.01890
40	.02791	.02872	.02710
45	.04312	.04731	.03892
50	.06108	.06061	.06155
55	.08727	.08618	.08836
60	.12204	.12254	.12154
65	.19149	.20099	.18198
70+	1.00000	1.00000	1.00000

Note : *See* Note to Table 27.

Table 29

Apportionment of Reported and Final Corrected Intercensal Deaths within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, Kerala Males, 1971-81

	Reported Intercensal Deaths				
	1971-76		1976-81		Total
Age	NW	SE	NW	SE	
0	28641	122522	20024	91543	262730
5	9360	8725	5935	5524	29544
10	3382	3444	2951	2715	12492
15	3892	3185	3257	3994	14328
20	4784	5130	4698	4211	18823
25	3992	4780	4626	4420	17818
30	5422	4565	4364	5258	19609
35	5557	5440	5666	6043	22706
40	7542	8139	7719	7936	31336
45	10668	11245	10173	10095	42181
50	11470	13237	13241	13799	51747
55	14043	15429	17077	16504	63053
60	15875	17205	18830	18877	70787
65	19397	20985	20767	22006	83155
70+	57842	57842	61602	61602	238888

	Final Corrected Intercensal Deaths				
	1971-76		1976-81		Total
Age	NW	SE	NW	SE	
0	29812	127530	21365	97675	276382
5	9535	8889	6079	5658	30161
10	3545	3610	3007	2766	12928
15	4095	3351	3410	4182	15039
20	5068	5435	4945	4433	19880
25	4180	5005	4904	4686	18776
30	5551	4674	4570	5506	20302
35	5749	5628	5796	6181	23355
40	7835	8455	7986	8210	32486
45	11299	11910	10569	10488	44266
50	12002	13851	14026	14617	54496
55	14211	15614	17815	17217	64858
60	16279	17643	19059	19107	72088
65	20087	21731	21298	22569	85685
70+	59899	59899	63793	63793	247385

Notes: (1) The final corrected intercensal deaths by triangles of the Lexis Diagram are obtained by multiplying the reported intercensal deaths by triangles, listed in Table 20 and again here by the final correction factors for intercensal deaths that are contained in Table 22.

(2) *See* Notes of Table 20.

Table 30

Apportionment of Reported and Final Corrected Intercensal Net Emigrants within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, Kerala Males, 1971-81

Age	Reported Intercensal Net Emigrants				
	1971-76		1976-81		Total
	NW	SE	NW	SE	
0	998	7770	— 917	7852	15703
5	596	272	— 1120	— 1835	— 2087
10	3815	2260	4548	1816	12439
15	12248	7473	17793	10621	48135
20	10158	14603	17855	28674	71290
25	8390	11216	14814	25333	59753
30	9200	10116	10477	15364	45157
35	7673	8566	7591	11558	35388
40	4432	5625	3430	6200	19687
45	2552	2642	890	878	7062
50	900	1502	— 93	604	2913
55	692	380	46	— 433	685
60	29	389	— 265	112	265
65	246	28	126	—189	211
70+	138	138	86	86	448

Age	Final Corrected Intercensal Net Emigrants				
	1971-76		1976-81		Total
	NW	SE	NW	SE	
0	1039	8086	—1164	9966	17927
5	526	240	—1236	—2024	—2494
10	4173	2472	4049	1617	12312
15	13387	8168	19458	11615	52629
20	11597	16672	20010	32134	80414
25	9003	12036	16775	28687	66501
30	7960	8752	11354	16651	44717
35	7354	8210	6488	9879	31932
40	4403	5588	3266	5904	19161
45	3079	3067	885	873	7904
50	995	1660	—88	571	3138
55	546	300	30	—281	595
60	24	320	—312	132	164
65	238	27	193	—290	168
70+	134	134	83	83	434

Notes : (1) The final corrected intercensal net emigrants by triangles of the Lexis Diagram are obtained by multiplying the reported intercensal net emigrants by triangles, listed in Table 20 and again here, by the final correction factors for intercensal net emigration that are contained in Table 22.

(2) *See* Notes of Table 20.

Table 31

Estimated Age Distribution on April 1, 1976, Midway between Censuses, Compared with Final Corrected Census Age Distributions, Kerala Males, 1971-81

Age	1971	1976	1981
0	1616363	1572797	1512263
5	1516494	1576384	1548962
10	1435046	1500351	1567158
15	1154564	1415808	1477498
20	946388	1114974	1356373
25	721388	912681	1056647
30	618724	694778	868844
35	638703	591375	662793
40	512134	611556	564976
45	472643	484919	588943
50	383758	442753	458277
55	309547	354847	411879
60	244022	276826	317763
65	172411	205960	235801
70+	241109	273129	329844
Total	10983293	12029138	12958021

Note : The estimated age distribution midway between censuses is obtained from the final corrected census age distributions, intercensal births, deaths and net emigrants that are contained in Tables 23, 24, 29 and 30.

Table 32
Final Correction Factors for Kerala Females, 1971-81

Final Correction Factors for Intercensal Births

1971-76	1976-81
1.026	.990

Final Correction Factors for Census Age Distributions, Intercensal Deaths and Intercensal Net Emigration

Age	Censuses		Deaths		Net Emigration	
	1971	1981	1971-76	1976-81	1971-76	1976-81
0	1.110	1.076	1.027	1.052	.985	1.185
5	1.087	1.023	.997	1.012	1.306	1.146
10	1.029	.943	1.015	.997	.919	.736
15	1.004	.962	1.037	1.017	1.053	.878
20	.931	1.022	1.064	1.038	1.208	1.024
25	1.055	1.051	1.055	1.065	1.237	1.197
30	1.004	1.113	1.034	1.051	1.011	1.206
35	.988	.990	1.048	1.033	1.113	.968
40	.999	1.043	1.047	1.048	1.112	1.111
45	.952	1.052	1.059	1.047	1.206	1.113
50	1.104	1.049	1.034	1.058	1.051	1.171
55	1.116	1.102	.992	1.032	.669	.926
60	1.029	.957	1.012	.992	.755	.686
65	1.029	.945	1.035	1.010	1.015	.939
70+	1.029	1.036	1.035	1.035	1.015	1.015

Table 33

Reported & Final Corrected Intercensal Births for Kerala Females, 1971-81

Total Reported	Reported Births by 5-year Period	
1971-81	1971-76	1976-81
3144457	1585616	1558841
Total Final Corrected	**Final Corrected Births by 5-year Period**	
1971-81	1971-76	1976-81
3169827	1626531	1543296

Completeness of Births		
Overall	Intercensal Births	Completeness by 5-year Period
1971-81	1971-76	1976-81
99.200	97.485	101.007

Notes : (1) The final corrected births are obtained by multiplying the reported births by the final correction factors for births that are contained in Table 32.

(2) Completeness of births for each period is obtained by dividing reported births by final corrected births and multiplying by 100.

Table 34

Reported and Final Corrected Census Age Distributions for Kerala Females, 1971-81

Age	Reported Census Age Distributions		Final Corrected Census Age Distributions	
	1971	1981	1971	1981
0	1413696	1343258	1568931	1445934
5	1418419	1441091	1541748	1474079
10	1417882	1614922	1458523	1522286
15	1210250	1568161	1215072	1509077
20	1012068	1364158	942566	1394160
25	723166	1082776	762380	1137690
30	622147	789777	624694	879374
35	660668	727934	652560	720852
40	495941	569431	495354	593896
45	464720	595111	442440	626153
50	340457	445526	375769	467153
55	284192	370155	317040	407932
60	247435	348920	254597	333764
65	183856	277441	189177	262097
70+	264626	387253	272285	401189
Total	10759523	12925914	11113336	13175636

Note : The final corrected census age distributions are obtained by multiplying the reported census age distributions by the final correction factors for census age distributions that are contained in Table 32.

Table 35

Reported and Final Corrected Intercensal Deaths for Kerala Females, 1971-81

Age	Reported Intercensal Deaths		Final Corrected Intercensal Deaths	
	1971-76	1976-81	1971-76	1976-81
0	150413	101744	154502	107016
5	16635	11561	16587	11701
10	5655	6853	5737	6833
15	8273	6208	8583	6310
20	10031	9793	10673	10165
25	8601	7603	9076	8094
30	8598	7567	8891	7956
35	10101	6651	10581	6870
40	10412	9943	10898	10415
45	12418	11128	13146	11647
50	15185	13845	15698	14645
55	17827	19501	17686	20127
60	24102	29719	24388	29478
65	35782	32168	37025	32492
70+	117124	123866	121193	128169
Total	451157	398150	464664	411916

Completeness of Deaths

Overall	Intercensal Deaths Completeness by 5-year Period	
1971-81	1971-76	1976-81
96·889	97·093	96·658

Notes : (1) The final corrected intercensal deaths are obtained by multiplying the reported intercensal deaths by the final correction factors for intercensal deaths that are contained in Table 32.

(2) Completeness of deaths for each period is obtained by dividing total reported intercensal deaths by total final corrected intercensal deaths and multiplying by 100.

Table 36

Reported and Final Corrected Intercensal Net Emigrants for Kerala Females, 1971-81

Age	Reported Intercensal Net Emigrants		Final Corrected Intercensal Net Emigrants	
	1971-76	1976-81	1971-76	1976-81
0	6446	7000	6348	8294
5	—56	—2291	—73	—2625
10	4411	3939	4055	2898
15	16644	26161	17534	22979
20	16753	40883	20243	41884
25	5205	26352	6437	31542
30	1870	27644	1891	33343
35	1629	18914	1814	18311
40	1057	5542	1175	6155
45	1053	1670	1270	1858
50	860	1178	904	1380
55	771	766	516	709
60	528	525	398	360
65	323	333	328	313
70+	350	346	355	351
Total	57844	158962	63195	167752

Completeness of Net Emigration (Assuming Total Preliminary Corrected Births Equal Total Finally Corrected Births).

Overall	Intercensal Net Emigration Completeness by 5-year Period	
1971-81	1971-76	1976-81
93.877	91.533	94.760

Notes : (1) The final corrected intercensal net emigrants are obtained by multiplying the reported intercensal net emigrants by the final correction factors for intercensal net emigration that are contained in Table 32.

(2) Completeness of net emigration for each period is obtained by dividing total reported intercensal net emigrants by total final corrected intercensal net emigrants and multiplying by 100.

Table 37

Life Table $5L_x$ Values for Periods between Censuses and Average, Kerala Females, 1971-81

Age	Average	1971-76	1976-81
0	466376	461548	471204
5	457115	450518	463711
10	453991	447115	460866
15	451850	444863	458838
20	448694	441291	456097
25	444524	436500	452549
30	440052	431628	448476
35	434554	425057	444051
40	427821	417633	438009
45	418856	407676	430035
50	406098	393925	418270
55	388679	376389	400969
60	362136	351063	373208
65	320304	308196	332413
70+	819073	705394	932751

Life Expectancies for Periods between Censuses, & Average.

Average	1971-76	1976-81
67.4[⊃	64.988	69.814

Note : For the method used to derive the life table contained here and in Table 38, see Appendix B, pp. 1362-63 of Luther et al. (1987).

Table 38

Life Table l_x & 5 q_x Values for Periods between Censuses and Average, Kerala Females, 1971-81

Age	l_x Values		
	Average	1971-76	1976-81
0	100000	100000	100000
5	91834	90574	93095
10	90987	89601	92373
15	90609	89258	91960
20	90123	88680	91567
25	89312	87779	90845
30	88483	86843	90122
35	87476	85704	89248
40	86306	84285	88328
45	84747	82640	86854
50	82649	80306	84991
55	79726	77213	82239
60	75626	73254	77997
65	68958	66985	70930
70+	58905	55765	62045

Age	$5q_x$ Values		
	Average	1971-76	1976-81
0	.08166	.09426	.06905
5	.00925	.01074	.00775
10	.00415	.00383	.00447
15	.00538	.00647	.00428
20	.00902	.01016	.00789
25	.00931	.01066	.00796
30	.01141	.01312	.00970
35	.01344	.01656	.01031
40	.01810	.01951	.01668
45	.02484	.02824	.02145
50	.03545	.03852	.03238
55	.05142	.05127	.05158
60	.08809	.08558	.09061
65	.14639	.16751	.12526
70+	1.00000	1.00000	1.00000

Note : *See* note to Table 37.

Table 39

Apportionment of Reported & Final Corrected Intercensal Deaths within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, Kerala Females, 1971-81

Reported Intercensal Deaths

Age	1971-76		1976-81		Total
	NW	SE	NW	SE	
0	28789	121624	17407	84337	252157
5	9027	7608	6199	5362	28196
10	2509	3146	3684	3169	12508
15	3892	4381	3177	3031	14481
20	5224	4807	4933	4860	19824
25	3651	4950	4074	3529	16204
30	4856	3742	3688	3879	16165
35	5502	4599	3439	3212	16752
40	5529	4883	5333	4610	20355
45	6739	5679	6069	5059	23546
50	7418	7767	7075	6770	29030
55	8843	8984	9961	9540	37328
60	12017	12085	15772	13947	53821
65	18401	17381	14779	17389	67950
70+	58562	58562	61933	61933	240990

Final Corrected Intercensal Deaths

Age	1971-76		1976-81		Total
	NW	SE	NW	SE	
0	29572	124930	18309	88707	261517
5	9001	7586	6274	5427	28287
10	2545	3192	3673	3160	12570
15	4038	4545	3229	3081	14894
20	5558	5115	5120	5045	20838
25	3853	5224	4337	3757	17170
30	5021	3870	3878	4078	16847
35	5764	4818	3552	3318	17451
40	5787	5111	5586	4829	21314
45	7134	6012	6352	5295	24793
50	7669	8030	7484	7161	30343
55	8773	8913	10281	9846	37813
60	12159	12228	15644	13834	53865
65	19040	17985	14928	17564	69517
70+	60596	60596	64084	64084	249361

Notes : (1) The final corrected intercensal deaths by triangles of the Lexis Diagram are obtained by multiplying the reported intercensal deaths by triangles, listed in Table 21 and again here, by the final correction factors for intercensal deaths that are contained in Table 32.

(2) *See* Notes of Table 21.

Table 40

Apportionment of Reported and Final Corrected Intercensal Net Emigrants within Each Age Group into the Northwest (NW) and Southeast (SE) Triangles of the Lexis Diagram, Kerala Females, 1971-81.

Age	Reported Intercensal Net Emigrants				Total
	1971-76		1976-81		
	NW	SE	NW	SE	
0	672	5774	—305	7305	13446
5	— 32	— 24	— 948	—1343	—2347
10	3214	1197	3247	692	8350
15	10266	6378	14461	11700	42805
20	6386	10367	14896	25987	57636
25	1600	3605	9016	17336	31557
30	1073	797	10210	17434	29514
35	725	904	6817	12097	20543
40	519	538	2042	3500	6599
45	575	478	792	878	2723
50	358	502	449	729	2038
55	455	316	477	289	1537
60	152	376	118	407	1053
65	228	95	264	69	656
70+	175	175	173	173	696

Age	Final Corrected Intercensal Net Emigrants				Total
	1971-76		1976-81		
	NW	SE	NW	SE	
0	662	5686	—361	8656	14642
5	— 42	— 31	—1086	—1539	—2698
10	2955	1100	2389	509	6953
15	10815	6719	12702	10277	40513
20	7716	12526	15261	26623	62126
25	1979	4458	10792	20750	37979
30	1085	806	12315	21028	35234
35	807	1007	6600	11711	20125
40	577	598	2268	3887	7331
45	694	577	881	977	3129
50	376	528	526	854	2283
55	304	211	442	268	1225
60	115	284	81	279	759
65	231	96	248	65	640
70+	178	178	176	176	706

Notes : (1) The final corrected intercensal net emigrants by triangles of the Lexis Diagram are obtained by multiplying the reported intercensal net emigrants by triangles, listed in Table 21 and again here by the final correction factors for intercensal net emigration that are contained in Table 32.

(2) *See* Notes of Table 21.

Table 41

Estimated Age Distribution on April 1, 1976, Midway between Censuses, Compared with Final Corrected Census Age Distributions, Kerala Females, 1971-81

Age	1971	1976	1981
0	1568931	1495915	1445934
5	1541748	1531143	1474079
10	1458523	1528497	1522286
15	1215072	1441759	1509077
20	942566	1182578	1394160
25	762580	919609	1137690
30	624694	752073	879374
35	652560	612763	720852
40	495354	640280	593896
45	442440	482401	626153
50	375769	426055	467153
55	317040	358599	407932
60	254597	295451	333764
65	189177	224241	262097
70+	272285	320643	401189
Total	11113336	12212008	13175636

Note : The estimated age distribution midway between censuses is obtained from the final corrected census age distributions, intercensal births, deaths and net emigrants that are contained in Tables 33, 34, 39 and 40.

Table 42
Summary of Demographic Trends, Based on Consistently Corrected Data: Kerala, 1971-76 and 1976-81

Measure	Males		Females		Combined Sexes	
	1971-76	1976-81	1971-76	1976-81	1971-76	1976-81
CBR	29.70	25.93	27.89	24.32	28.79	25.12
CDR	9.08	7.94	7.97	6.49	8.52	7.21
e_o	61.72	64.55	64.99	69.81	63.31	67.12
r	1.82	1.49	1.89	1.52	1.85	1.50

Note : CBR denotes crude birth rate, CDR crude death rate, e_o life expectancy (in years), r average annual growth rate. CBR and CDR are rates per 1,000, and r is a rate per 100.

LIST OF APPENDICES

Appendix A. Sources of input data for consistent correction procedure for All India Males and Females, 1971-81.

Appendix B. Calculating births and deaths for All India Males, 1971-81.

Appendix C. Initial correction factors and corresponding initially corrected demographic quantities for All India Males, 1971-81.

Appendix D. Initial correction factors and corresponding initially corrected demographic quantities for All India Females, 1971-81.

Appendix E. Sources of input data for consistent correction procedure for the State of Kerala Males and Females, 1971-81.

Appendix F. Calculating the age-sex-period distributions of net migrants for the State of Kerala Males and Females, 1971-81.

Appendix G. Initial correction factors and corresponding initially corrected demographic quantities for Kerala Males, 1971-81.

Appendix H. Initial correction factors and corresponding initially corrected demographic quantities for Kerala Females, 1971-81.

Appendix J. Interpolating quantities from cohort parallelograms (trapezoids) into their component triangles of the Lexis diagram.

APPENDIX A

SOURCES OF INPUT DATA FOR CONSISTENT CORRECTION PROCEDURE FOR ALL INDIA, MALES AND FEMALES, 1971-81

APPENDIX A

SOURCES OF INPUT DATA FOR CONSISTENT CORRECTION PROCEDURE FOR ALL INDIA, MALES AND FEMALES, 1971-81

Births : Table B3 of Family Welfare Programme in India, *Year Book* 1983-84, New Delhi : Government of India, Ministry of Health and Family Welfare, Department of Family Welfare. This source gives SRS birth rates for combined sexes, from which births were calculated by sex (see Worksheet for Calculating Births in Appendix B).

Deaths : Tables 1 and 4 of Vital Statistics Division, *Sample Registration System*, 1970-75, New Delhi: Office of the Registrar General, India. And same for 1976-78, 1979-80 and 1981. These sources give population age distribution percentages and age-specific death rates from which the deaths age distributions were calculated (see Worksheets for Calculating Deaths in Appendix B). Model life tables used to determine separation factors for age 0 –4 deaths were South Asian Pattern ($e_0 = 50$ for 1971-76 and $e_0 = 53$ for 1976-81 for males; and interpolated based on $e_0 = 49{\cdot}6$ for 1971-76 and $e_0 = 53{\cdot}4$ for 1976-81 for females) from United Nations, 1982, *Model Life Tables for Developing Countries*, Department of International Economic and Social Affairs, Population Studies, No. 77, New York: United Nations.

Censuses: 1971 : Office of Registrar General, India, 1977, *Census of India*, 1971, India, Series I, Paper 3, Age Tables, New Delhi: Manager of Publications, pp. 68-69. A.N.S. (ages not stated) are allotted proportionally.

1981 : P. Padmanabha, Registrar General and Census Commissioner of India, 1983, *Census of India*, 1981, Series I India, Part II, Special Report and Tables Based on 5 Per cent Sample Data, p. 213. A.N.S. (ages not stated) are allotted proportionally and figures are inflated proportionally to agree with accepted totals given by *Report of the Expert Committee on Population Projections, India*, 1981-2001, Table 1.2, p. 48.

Net International Migration : Assumed negligible for 1971-81.

Preliminary Correction Factors for Births and Deaths : *Report of the Expert Committee on Population Projections, India* 1981-2001. pp. 1, 2, and 244. Note : The estimates for births and deaths from this source are roughly consistent with those of Panel on India, Committee on Population and Demography, U.S. National Research Council, published in P. N. Mari Bhat, Samuel H. Preston, and Tim Dyson, *Vital Rates in India*, 1961-81, Report No. 24, Washington, D.C.: National Academy Press, 1984; and those of Vital Statistics Division, *Census of India*, 1981, *Report on the Intensive Enquiry Conducted in a sub-Sample of SRS Units*, Occasional Papers No. 2 of 1983, New Delhi: Office of the Registrar General, India.

Preliminary Correction Factors for 1971 Census : Statement III entitled "Net Omission Rate Per 1000 by Age and Sex—All India and Groups of States", Census of India, 1971, *Post Enumeration Check: Preliminary Results*, Office of the Registrar General, India.

Preliminary Correction Factors for 1981 Census : Table 2, p. 22, entitled "Net Omission Rates per 1000 Enumerated Persons by Age and Sex—India and Zones", Census of India 1981, Series I India, Paper 4 of 1982, *Report on Post Enumeration Check*, Registrar General and Census Commissioner of India.

APPENDIX B

CALCULATING BIRTHS AND DEATHS FOR ALL INDIA MALES, 1971-81

8—24/RGI/ND/90

Worksheet for Calculating Births for All India, 1971-81 (Based on SRS)

Year	(1) SRS Birth Rate (Per Thousand)	(2) Population at Mid-Year	(3)=(1)×(2) Total Births During Year	(4)=(3)/2.05 Female Births During Year**	(5)=(3)—(4) Male Births During Year**
1971	36.9	551584636	20353473	9928523	10424950
1972	36.6	565284571	20689415	10092398	10597017
1973	34.6	578984505	20032864	9772129	10260735
1974	34.5	592684440	20447613	9974445	10473168
1975	35.2	606384375	21344730	10412063	10932667
1976	34.4	620084310	21330900	10405317	10925583
1977	33.0	633784245	20914880	10202380	10712500
1978	33.3	647484179	21561223	10517670	11043553
1979	33.7	661184114	22281905	10869222	11412683
1980	33.7	674884049	22743592	11094435	11649157
1981	33.9	688583984	23342997	11386828	11956169

Source : SRS birth rates for combined sexes obtained from Table B.3 of Family Welfare Programme in India, *Year Book 1983-84*. New Delhi : Government of India, Ministry of Health and Family Welfare, Department of Family Welfare.

Note : Then for each sex, births by 5-year intercensal periods are :

Male		Female	
1971-76	1976-81	1971-76	1976-81
52813695	56001123	50298757	53334402

*Based on total population figures from the 1971 and 1981 censuses, assuming linear growth.

**Assuming a sex ratio at birth of 1.05. Thus $b_f = \frac{t}{2.05}$, $b_m = t - b_f$

where t = total births (male plus female).

Worksheet 1 for Calculating Deaths for All India Males, 1971-81 : Male Population Age Distribution Percentages and Mid-Year Population Figures for Single Years, 1971-81

Age Group	1971	1972	1973	1974	1975
0—4	(14.40) 41156302	(14.96) 43817800	(14.55) 43636126	(14.13) 43374798	(13.96) 43826256
5—9	(14.21) 40613267	(14.03) 41093833	(13.85) 41536794	(13.61) 41778556	(13.40) 42068183
10—14	(12.71) 36326153	(12.95) 37930516	(12.96) 38867642	(12.95) 39752557	(12.98) 40749628
15—19	(9.71) 27751923	(9.86) 28879914	(10.27) 30800207	(10.61) 32569470	(10.85) 34062670
20—24	(7.77) 22207255	(7.78) 22787599	(7.96) 23872410	(8.18) 25110109	(8.35) 26214129
25—29	(7.08) 20235182	(6.86) 29092922	(6.84) 20513478	(6.86) 21058111	(6.85) 21505004
30—34	(6.71) 19177693	(6.61) 19360672	(6.48) 19433821	(6.39) 19615354	(6.31) 19809719
35—39	(6.06) 17319944	(5.88) 17222504	(5.82) 17454450	(5.85) 17957719	(5.85) 18365587
40—44	(5.47) 15633679	(5.34) 15640846	(5.35) 16044899	(5.31) 16300083	(5.23) 16419149
45—49	(4.33) 12375471	(4.30) 12594689	(4.38) 13135824	(4.45) 13660145	(4.52) 14190163
50—54	(3.86) 11032175	(3.79) 11100900	(3.72) 11156453	(3.70) 11357873	(3.63) 11396082
55—59	(2.50) 7145191	(2.55) 7468943	(2.70) 8097425	(2.91) 8932814	(2.92) 9167097
60—64	(2.34) 6687899	(2.22) 6502374	(2.14) 6417959	(2.08) 6384967	(2.03) 6373016

Worksheet 1 for Calculating Deaths for All India Males, 1971-81 : Male Population Age Distribution Percentages and Mid Year Population Figures for Single Years, 1971-81—(Contd.)

Age Group	1971	1972	1973	1974	1975
65– 69	(1.27) 3629757	(1.33) 3895566	(1.45) 4348617	(1.41) 4328271	(1.59) 4991672
70+	(1.58) 4515761	(1.52) 4452076	(1.52) 4558551	(1.54) 4727331	(1.53) 4803307
Totals	(100.0)	(99.98)	(99.99)	(99.98)	(100.0)
Mid-year Total Population	285807652	292841154	299874656	306908159	313941661

Source : Percentages (in parentheses) are from Table 1 of Vital Statistics Division, *Sample Registration System*, 1970-75. New Delhi : Office of the Registrar General, India, Ministry of Home Affairs.

Notes : (1) Mid-year total population for each calendar year from 1971 to 1981, which is listed at the bottom of the table, is based on total population figures from the 1971 and 1981 censuses, assuming linear growth between censuses because birth rates were decreasing over the period.

(2) Mid-year population by calendar year and age group is calculated by multiplying the mid-year total population for the calendar year (at the bottom of the table) by the population age distribution percentage for the calendar year and age group (in parenthesis). For example, for the age group 5-9 for the calendar year 1971 the mid-year population is calculated as 285807652 (.1421)=40613267. For years where population age distribution percentages don't add to 100 because of rounding, population numbers have been adjusted proportionally.

Worksheet 1 for Calculating Deaths for All India Males, 1971-81 (*Concld.*)

Age Group	1976	1977	1978	1979	1980	1981
0—4	(13.29) 42657599	(13.38) 43887560	(13.13) 43991037	(13.19) 45119781	(13.25) 46256965	(13.29) 47331362
5—9	(13.30) 42689697	(14.90) 48873291	(13.09) 43857020	(12.97) 44367214	(12.72) 44406687	(12.56) 44731520
10—14	(12.93) 41502089	(12.38) 40607473	(12.62) 42282322	(12.34) 42212138	(12.22) 42661141	(12.36) 44019235
15—19	(11.14) 35756633	(11.01) 36113754	(11.31) 37893269	(11.36) 38859796	(11.29) 39414426	(11.25) 40066051
20—24	(8.63) 27700157	(8.56) 28077542	(9.08) 30421829	(9.27) 31710415	(9.49) 33130461	(9.45) 33655483
25—29	(7.09) 22757139	(6.94) 22763801	(7.17) 24022523	(7.28) 24903109	(7.44) 25973722	(7.54) 26853158
30—34	(6.27) 20125143	(5.83) 19122905	(6.08) 20370564	(6.01) 20558748	(6.04) 21086194	(6.17) 21974003
35—39	(5.91) 18969632	(5.73) 18794897	(5.67) 18996891	(5.64) 19293068	(5.52) 19270826	(5.48) 19516619
40—44	(5.30) 17011684	(5.05) 16564438	(5.19) 17388689	(5.18) 17719520	(5.16) 18014033	(5.17) 18412576
45—49	(4.66) 14957443	(4.51) 14793191	(4.51) 15110402	(4.58) 15667066	(4.51) 15744824	(4.46) 15883963
50—54	(3.69) 11843984	(3.63) 11906715	(3.82) 12798611	(3.81) 13033083	(3.89) 13580347	(3.90) 13889564
55—59	(2.97) 9532962	(2.93) 9610654	(2.96) 9917248	(2.94) 10057025	(2.93) 10228899	(2.91) 10363752
60—64	(1.69) 5424480	(2.04) 6691377	(2.18) 7303919	(2.22) 7594080	(2.31) 8064422	(2.28) 8120053
65—69	(1.58) 5071408	(1.53) 5018533	(1.51) 5059137	(1.49) 5096927	(1.47) 5131905	(1.45) 5164069
70+	(1.55) 4975115	(1.58) 5182537	(1.68) 5628708	(1.72) 5883701	(1.76) 6144321	(1.73) 6161268
Totals	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
Mid-year Total Population	320975164	328008666	335042168	342075671	349109173	356142676

Source : Same as for the years 1971-75, except using the 1976-78, 1979-80 and 1981 issues of *Sample Registration System.*

Note : Same as for the years 1971-75.

Worksheet 2 for Calculating Deaths for All India Males 1971-81 : Male Age-Specific Death Rates per Thousand and Deaths Age Distributions for Single Year 1971-81

Age Group	Years				
	1971	1972	1973	1974	1975
0– 4	(49.2) 2024890	(53.2) 2331107	(48.9) 2133807	(47.0) 2038616	(52.4) 2296496
5– 9	(4.5) 182760	(5.0) 205469	(4.8) 199377	(4.1) 171292	(4.4) 185100
10– 14	(2.1) 76285	(1.9) 72068	(2.3) 89396	(1.8) 71555	(2.0) 81499
15– 19	(1.9) 52729	(2.4) 69312	(2.2) 67760	(2.3) 74910	(2.1) 71532
20– 24	(3.0) 66622	(2.9) 66084	(2.9) 69230	(2.7) 67797	(2.6) 68157
25—29	(3.0) 60706	(3.4) 68316	(2.9) 59489	(2.8) 58963	(3.1) 66666
30– 34	(3.9) 74793	(4.1) 79379	(4.5) 87452	(3.5) 68654	(4.1) 81220
35– 39	(5.5) 95260	(5.4) 93002	(5.3) 92509	(5.7) 102359	(6.8) 124886
40—44	(7.4) 115689	(8.6) 134511	(7.6) 121941	(7.2) 117361	(8.2) 134637
45—49	(10.5) 129942	(12.2) 153655	(12.0) 157630	(11.9) 162556	(13.2) 187310
50– 54	(19.0) 209611	(19.1) 212027	(17.2) 191891	(16.9) 191948	(15.0) 170941
55—59	(24.6) 175772	(27.5) 205396	(26.0) 210533	(27.2) 242973	(28.7) 263096
60—64	(37.0) 247452	(43.3) 281553	(42.6) 273405	(37.7) 240713	(39.6) 252371
65–69	(53.8) 195281	(61.9) 241136	(55.8) 242653	(57.2) 247577	(59.0) 294509
70+	(110.3) 498088	(112.8) 573427	(112.14) 512381	(106.0) 501097	(120.3) 577838

Source : Age-specific death rates (in parentheses) are from Table 4 of Vital Statistics Division, *Sample Registration System*, 1970-75. New Delhi : Office of the Registrar General, India, Ministry of Home Affairs.

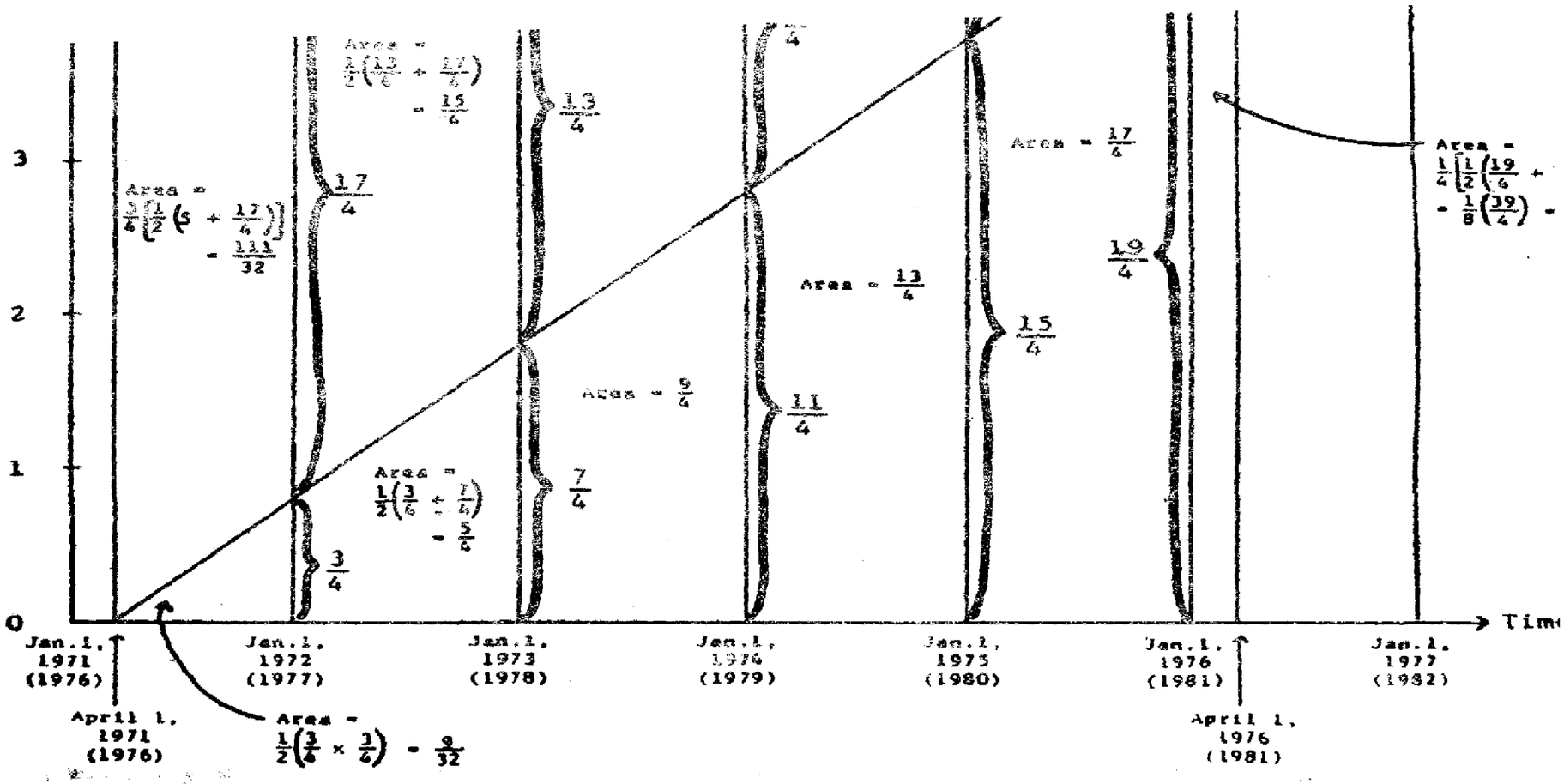
Note : To obtain the numbers of deaths here, multiply the numbers on Worksheet 1 by the corresponding rates (in parentheses) here. For example, for age group 0—4 for 1971, (41156302) (.0492)= 2024890.

Worksheet 2 for Calculating Deaths for All India Males, 1971-81 (*continued*)

Age Group	Years					
	1976	1977	1978	1979	1980	1981
0—4	(49.6) 2115817	(47.5) 2084659	(44.7) 1966399	(43.8) 1976246	(40.1) 1854904	(39.2) 1855389
5—9	(4.3) 183566	(3.7) 180831	(3.7) 162271	(3.3) 146412	(3.3) 146542	(3.7) 165507
10—14	(2.4) 99605	(1.8) 73093	(2.0) 84565	(1.6) 67539	(1.7) 72524	(1.8) 79235
15—19	(2.5) 89392	(2.3) 83062	(2.1) 79576	(1.7) 66062	(2.0) 78829	(1.9) 76125
20—24	(2.7) 74790	(3.1) 87040	(2.7) 82139	(2.5) 79276	(2.3) 76200	(2.4) 80773
25—29	(3.1) 70547	(2.5) 56910	(3.4) 81677	(2.4) 59767	(2.2) 57142	(2.5) 67133
30—34	(4.2) 84526	(3.6) 68842	(3.8) 77408	(3.6) 74011	(3.4) 71693	(3.7) 81304
35—39	(4.5) 85363	(5.5) 103372	(5.2) 98784	(5.1) 98395	(4.7) 90573	(4.6) 89776
40—44	(9.5) 161611	(8.2) 135828	(7.4) 128676	(6.7) 118721	(7.2) 129701	(6.5) 119682
45—49	(12.1) 180985	(11.6) 171601	(11.4) 172259	(9.0) 141004	(9.6) 151150	(9.5) 150898
50—54	(19.5) 230958	(18.5) 220274	(17.5) 223976	(14.8) 192890	(14.6) 198273	(15.3) 212510
55—59	(28.6) 272643	(26.6) 225643	(26.9) 266774	(24.2) 243380	(21.5) 219921	(23.8) 246657
60—64	(48.4) 262545	(39.4) 263640	(42.7) 311877	(35.3) 268071	(35.0) 282255	(36.3) 294758
65—69	(57.6) 292113	(55.1) 276521	(56.5) 285841	(46.2) 235478	(59.0) 302782	(51.7) 266982
70+	(114.6) 570148	(104.4) 541057	(110.2) 620284	(93.6) 550714	(98.5) 605216	(102.6) 632146

Sources : Same as for the years 1971-75, except using the 1976-78, 1979-80 and 1981 issues of *Sample Registration System.*

N te : Same as for 1971-75.



NW Triangle $= \left(\frac{\frac{111}{32}}{5}\right)(1971) + \left(\frac{\frac{15}{4}}{5}\right)(1972) + \left(\frac{\frac{11}{4}}{5}\right)(1973) + \left(\frac{\frac{7}{4}}{5}\right)(1974) + \left(\frac{\frac{3}{4}}{5}\right)(1975) + \left(\frac{\frac{1}{32}}{5}\right)(1976)$;

i.e., NW Triangle $= \frac{111}{160}(1971) + \frac{3}{4}(1972) + \frac{11}{20}(1973) + \frac{7}{20}(1974) + \frac{3}{20}(1975) + \frac{1}{160}(1976)$

SE Triangle $= \left(\frac{\frac{9}{32}}{5}\right)(1971) + \left(\frac{\frac{5}{4}}{5}\right)(1972) + \left(\frac{\frac{9}{4}}{5}\right)(1973) + \left(\frac{\frac{13}{4}}{5}\right)(1974) + \left(\frac{\frac{17}{4}}{5}\right)(1975) + \left(\frac{\frac{39}{32}}{5}\right)(1976)$;

i.e., SE Triangle $= \frac{9}{160}(1971) + \frac{1}{4}(1972) + \frac{9}{20}(1973) + \frac{13}{20}(1974) + \frac{17}{20}(1975) + \frac{39}{160}(1976)$

Worksheet 4 for Calculating Deaths for All India Males, 1971-81 : Death Calculations by Northwest (NW) and Southeast (SE) Triangles, 1971-1976 (April 1), Based on Lexis Diagram Area Considerations

Age Group 0–4

$$\frac{111}{160}(2024890) + \frac{3}{4}(2331107) + \frac{11}{20}(2133807) + \frac{7}{20}(2038616) + \frac{3}{20}(2296496) + \frac{1}{160}(2115817)$$

$$+ \frac{9}{160}(2024890) + \frac{1}{4}(2331107) + \frac{9}{20}(2133807) + \frac{13}{20}(2038616) + \frac{17}{20}(2296496) + \frac{39}{160}(2115817) = 10847648$$

Age Group 5–9

$$\text{NW: } \frac{111}{160}(182760) + \frac{3}{4}(205469) + \frac{11}{20}(199377) + \frac{7}{20}(171292) + \frac{3}{20}(185100) + \frac{1}{160}(183566) = 479413$$

$$\text{SE : } \frac{9}{160}(182760) + \frac{1}{4}(205469) + \frac{9}{20}(199377) + \frac{13}{20}(171292) + \frac{17}{20}(185100) + \frac{39}{160}(183566) = 464786$$

Age Group 10–14

$$\text{NW : } \frac{111}{160}(76285) + \frac{3}{4}(72068) + \frac{11}{20}(89396) + \frac{7}{20}(71555) + \frac{3}{20}(81499) + \frac{1}{160}(99605) = 194033$$

$$\text{SE : } \frac{9}{160}(76285) + \frac{1}{4}(72068) + \frac{9}{20}(89396) + \frac{13}{20}(71555) + \frac{17}{20}(81499) + \frac{39}{160}(99605) = 202600$$

Age Group 15 – 19

$$\text{NW}: \frac{111}{160}(52729) + \frac{3}{4}(69312) + \frac{11}{20}(67760) + \frac{7}{20}(74910) + \frac{3}{20}(71532) + \frac{1}{160}(89392) = 163340$$

$$\text{SE}: \frac{9}{160}(52729) + \frac{1}{4}(69312) + \frac{9}{20}(67760) + \frac{13}{20}(74910) + \frac{17}{20}(71532) + \frac{39}{160}(89392) = 182069$$

Age Group 20 – 24

$$\text{NW}: \frac{111}{160}(66622) + \frac{3}{4}(66084) + \frac{11}{20}(69230) + \frac{7}{20}(67797) + \frac{3}{20}(68157) + \frac{1}{160}(74790) = 168278$$

$$\text{SE}: \frac{9}{160}(66622) + \frac{1}{4}(66034) + \frac{9}{20}(69230) + \frac{13}{20}(67797) + \frac{17}{20}(68157) + \frac{39}{160}(74790) = 171654$$

Age Group 25 – 29

$$\text{NW}: \frac{111}{160}(60706) + \frac{3}{4}(68316) + \frac{11}{20}(59489) + \frac{7}{20}(58963) + \frac{3}{20}(66666) + \frac{1}{160}(70547) = 157149$$

$$\text{SE}: \frac{9}{160}(60706) + \frac{1}{4}(68316) + \frac{9}{20}(59489) + \frac{13}{20}(58963) + \frac{17}{20}(66666) + \frac{39}{160}(70547) = 159452$$

Age Group 30 – 34

$$\text{NW}: \frac{111}{160}(74793) + \frac{3}{4}(79379) + \frac{11}{20}(87452) + \frac{7}{20}(68654) + \frac{3}{20}(81220) + \frac{1}{160}(84526) = 196261$$

$$\text{SE}: \frac{9}{160}(74793) + \frac{1}{4}(79379) + \frac{9}{20}(87452) + \frac{13}{20}(68654) + \frac{17}{20}(81220) + \frac{39}{160}(84526) = 197671$$

Age Group 35—39

$$\text{NW}: \frac{111}{160}(95260) + \frac{3}{4}(93002) + \frac{11}{20}(92509) + \frac{7}{20}(102359) + \frac{3}{20}(124886) + \frac{1}{160}(85363) = 241810$$

$$\text{SE}: \frac{9}{160}(95260) + \frac{1}{4}(93002) + \frac{9}{20}(92509) + \frac{13}{20}(102359) + \frac{17}{20}(124886) + \frac{39}{160}(85363) = 263732$$

Age Group 40—44

$$\text{NW}: \frac{111}{160}(115689) + \frac{3}{4}(134511) + \frac{11}{20}(121941) + \frac{7}{20}(117361) + \frac{3}{20}(134637) + \frac{1}{160}(161611) = 310492$$

$$\text{SE}: \frac{9}{160}(115689) + \frac{1}{4}(134511) + \frac{9}{20}(121941) + \frac{13}{20}(117361) + \frac{17}{20}(134637) + \frac{39}{160}(161611) = 325127$$

Age Group 45—49

$$\text{NW}: \frac{111}{160}(129942) + \frac{3}{4}(153655) + \frac{11}{20}(157630) + \frac{7}{20}(162556) + \frac{3}{20}(187310) + \frac{1}{160}(180985) = 378207$$

$$\text{SE}: \frac{9}{160}(129942) + \frac{1}{4}(153655) + \frac{9}{20}(157630) + \frac{13}{20}(162556) + \frac{17}{20}(187310) + \frac{39}{160}(180985) = 425646$$

Age Group 50—54

$$\text{NW}: \frac{111}{160}(209611) + \frac{3}{4}(212027) + \frac{11}{20}(191891) + \frac{7}{20}(191948) + \frac{3}{20}(170941) + \frac{1}{160}(230958) = 504244$$

$$\text{SE}: \frac{9}{160}(209611) + \frac{1}{4}(212027) + \frac{9}{20}(191891) + \frac{13}{20}(191948) + \frac{17}{20}(170941) + \frac{39}{160}(230958) = 477510$$

Age Group 55–59

$$\text{NW: } \frac{111}{160}(175772) + \frac{3}{4}(205396) + \frac{11}{20}(210533) + \frac{7}{20}(242973) + \frac{3}{20}(263096) + \frac{1}{160}(272643) = 517991$$

$$\text{SE: } \frac{9}{160}(175772) + \frac{1}{4}(205396) + \frac{9}{20}(210533) + \frac{13}{20}(242973) + \frac{17}{20}(263096) + \frac{39}{160}(272643) = 603967$$

Age Group 60– 64

$$\text{NW: } \frac{111}{160}(247452) + \frac{3}{4}(281553) + \frac{11}{20}(273405) + \frac{7}{20}(240713) + \frac{3}{20}(252371) + \frac{1}{160}(262545) = 656953$$

$$\text{SE: } \frac{9}{160}(247452) + \frac{1}{4}(281553) + \frac{9}{20}(273405) + \frac{13}{20}(240713) + \frac{17}{20}(252371) + \frac{39}{160}(262545) = 642314$$

Age Group 65– 69

$$\text{NW: } \frac{111}{160}(195281) + \frac{3}{4}(241136) + \frac{11}{20}(242653) + \frac{7}{20}(247577) + \frac{3}{20}(294509) + \frac{1}{160}(292113) = 582441$$

$$\text{SE: } \frac{9}{160}(195281) + \frac{1}{4}(241136) + \frac{9}{20}(242653) + \frac{13}{20}(247577) + \frac{17}{20}(294509) + \frac{39}{160}(292113) = 662923$$

Age Group 70+

$$\frac{3}{4}(498088) + (573427) + (512381) + (501097) + (577838) + \frac{1}{4}(570148) = 2680846$$

Note : The calculations are by the formulas derived from the Lexis diagram on Worksheet 3. The numbers of deaths by age group and year that are used in the calculation are from Worksheet 2.

Worksheet 5 for Calculating Deaths for All India Males, 1971-81 : Death Calculations by Northwest (NW) and Southeast (SE) Triangles, 1976-1981 (April 1), Based on Lexis Diagram Area Considerations

Age Group 0—4

$$\frac{111}{160}(2115817) + \frac{3}{4}(2084659) + \frac{11}{20}(1966399) + \frac{7}{20}(1976246) + \frac{3}{20}(1854904) + \frac{1}{160}(1855389)$$

$$+ \frac{9}{160}(2115817) + \frac{1}{4}(2084659) + \frac{9}{20}(1966399) + \frac{13}{20}(1976246) + \frac{17}{20}(1854904) + \frac{39}{160}(1855389) = 9932918$$

Age Group 5—9

NW: $\frac{111}{160}(183566) + \frac{3}{4}(180831) + \frac{11}{20}(162271) + \frac{7}{20}(146412) + \frac{3}{20}(146542) + \frac{1}{160}(165507) = 426481$

SE : $\frac{9}{160}(183566) + \frac{1}{4}(180831) + \frac{9}{20}(162271) + \frac{13}{20}(146412) + \frac{17}{20}(146542) + \frac{39}{160}(165507) = 388626$

Age Group 10—14

NW: $\frac{111}{160}(99605) + \frac{3}{4}(73093) + \frac{11}{20}(84565) + \frac{7}{20}(67539) + \frac{3}{20}(72524) + \frac{1}{160}(79235) = 205444$

SE : $\frac{9}{160}(99605) + \frac{1}{4}(73093) + \frac{9}{20}(84565) + \frac{13}{20}(67539) + \frac{17}{20}(72524) + \frac{39}{160}(79235) = 186790$

Age Group 15—19

NW: $\frac{111}{160}(89392) + \frac{3}{4}(83062) + \frac{11}{20}(79576) + \frac{7}{20}(66062) + \frac{3}{20}(78829) + \frac{1}{160}(76125) = 203501$

SE : $\frac{9}{160}(89392) + \frac{1}{4}(83062) + \frac{9}{20}(79576) + \frac{13}{20}(66062) + \frac{17}{20}(78829) + \frac{39}{160}(76125) = 190103$

Age Group 20—24

NW : $\frac{111}{160}$ (74790) $+\frac{3}{4}$ (87040) $+\frac{11}{20}$ (82139) $+\frac{7}{20}$ (79276) $+\frac{3}{20}$ (76200) $+\frac{1}{160}$ (80773) = 202023

SE : $\frac{9}{160}$ (74790) $+\frac{1}{4}$ (87040) $+\frac{9}{20}$ (82139) $+\frac{13}{20}$ (79276) $+\frac{17}{20}$ (76200) $+\frac{39}{160}$ (80773) = 198917

Age Group 25—29

NW: $\frac{111}{160}$ (70547) $+\frac{3}{4}$ (56910) $+\frac{11}{20}$ (81677) $+\frac{7}{20}$ (59767) $+\frac{3}{20}$ (57142) $+\frac{1}{160}$ (67133) = 166456

SE : $\frac{9}{160}$ (70547) $+\frac{1}{4}$ (56910) $+\frac{9}{20}$ (81677) $+\frac{13}{20}$ (59767) $+\frac{17}{20}$ (57142) $+\frac{39}{160}$ (67133) = 158733

Age Group 30—34

NW : $\frac{111}{160}$ (84526) $+\frac{3}{4}$ (68842) $+\frac{11}{20}$ (77408) $+\frac{7}{20}$ (74011) $+\frac{3}{20}$ (71693) $+\frac{1}{160}$ (81304) = 190012

SE : $\frac{9}{160}$ (84526) $+\frac{1}{4}$ (68842) $+\frac{9}{20}$ (77408) $+\frac{13}{20}$ (74011) $+\frac{17}{20}$ (71693) $+\frac{39}{160}$ (81304) = 185663

Age Group 35– 39

NW : $\frac{111}{160}$ (85363) $+\frac{3}{4}$ (103372) $+\frac{11}{20}$ (98784) $+\frac{7}{20}$ (98395) $+\frac{3}{20}$ (90573) $+\frac{1}{160}$ (89776) = 239666

SE : $\frac{9}{160}$ (85363) $+\frac{1}{4}$ (103372) $+\frac{9}{20}$ (98784) $+\frac{13}{20}$ (98395) $+\frac{17}{20}$ (90573) $+\frac{39}{160}$ (89776) = 237924

Age Group 40—44

$$\text{NW}: \frac{111}{160}(161611)+\frac{3}{4}(135828)+\frac{11}{20}(128676)+\frac{7}{20}(118721)+\frac{3}{20}(129701)+\frac{1}{160}(119682)=346516$$

$$\text{SE}: \frac{9}{160}(161611)+\frac{1}{4}(135828)+\frac{9}{20}(128676)+\frac{13}{20}(118721)+\frac{17}{20}(129701)+\frac{39}{160}(119682)=317539$$

Age Group 45—49

$$\text{NW}: \frac{111}{160}(180985)+\frac{3}{4}(171601)+\frac{11}{20}(172259)+\frac{7}{20}(141004)+\frac{3}{20}(151150)+\frac{1}{160}(150898)=421969$$

$$\text{SE}: \frac{9}{160}(180985)+\frac{1}{4}(171601)+\frac{9}{20}(172259)+\frac{13}{20}(141004)+\frac{17}{20}(151150)+\frac{39}{160}(150898)=387509$$

Age Group 50—54

$$\text{NW}: \frac{111}{60}(230958)+\frac{3}{4}(220274)+\frac{11}{20}(223976)+\frac{7}{20}(192890)+\frac{3}{20}(198273)+\frac{1}{160}(212510)=547200$$

$$\text{SE}: \frac{9}{160}(230958)+\frac{1}{4}(220274)+\frac{9}{20}(223976)+\frac{13}{20}(192890)+\frac{17}{20}(198273)+\frac{39}{160}(212510)=514559$$

Age Group 55—59

$$\text{NW}: \frac{111}{160}(272643)+\frac{3}{4}(225643)+\frac{11}{20}(266774)+\frac{7}{20}(243380)+\frac{3}{20}(219921)+\frac{1}{160}(246657)=647317$$

$$\text{SE}: \frac{9}{160}(272643)+\frac{1}{4}(225643)+\frac{9}{20}(266774)+\frac{13}{20}(243380)+\frac{17}{20}(219921)+\frac{39}{160}(246657)=604548$$

Age Group 60—64

$$\text{NW}: \frac{111}{160}(262545) + \frac{3}{4}(263640) + \frac{11}{20}(311877) + \frac{7}{20}(268071) + \frac{3}{20}(282255) + \frac{1}{160}(294758) = 689408$$

$$\text{SE}: \frac{9}{160}(262545) + \frac{1}{4}(263640) + \frac{9}{20}(311877) + \frac{13}{20}(268071) + \frac{17}{20}(282255) + \frac{39}{160}(294758) = 707033$$

Age Group 65—69

$$\text{NW}: \frac{111}{160}(292113) + \frac{3}{4}(276521) + \frac{11}{20}(285841) + \frac{7}{20}(235478) + \frac{3}{20}(302782) + \frac{1}{160}(266982) = 696760$$

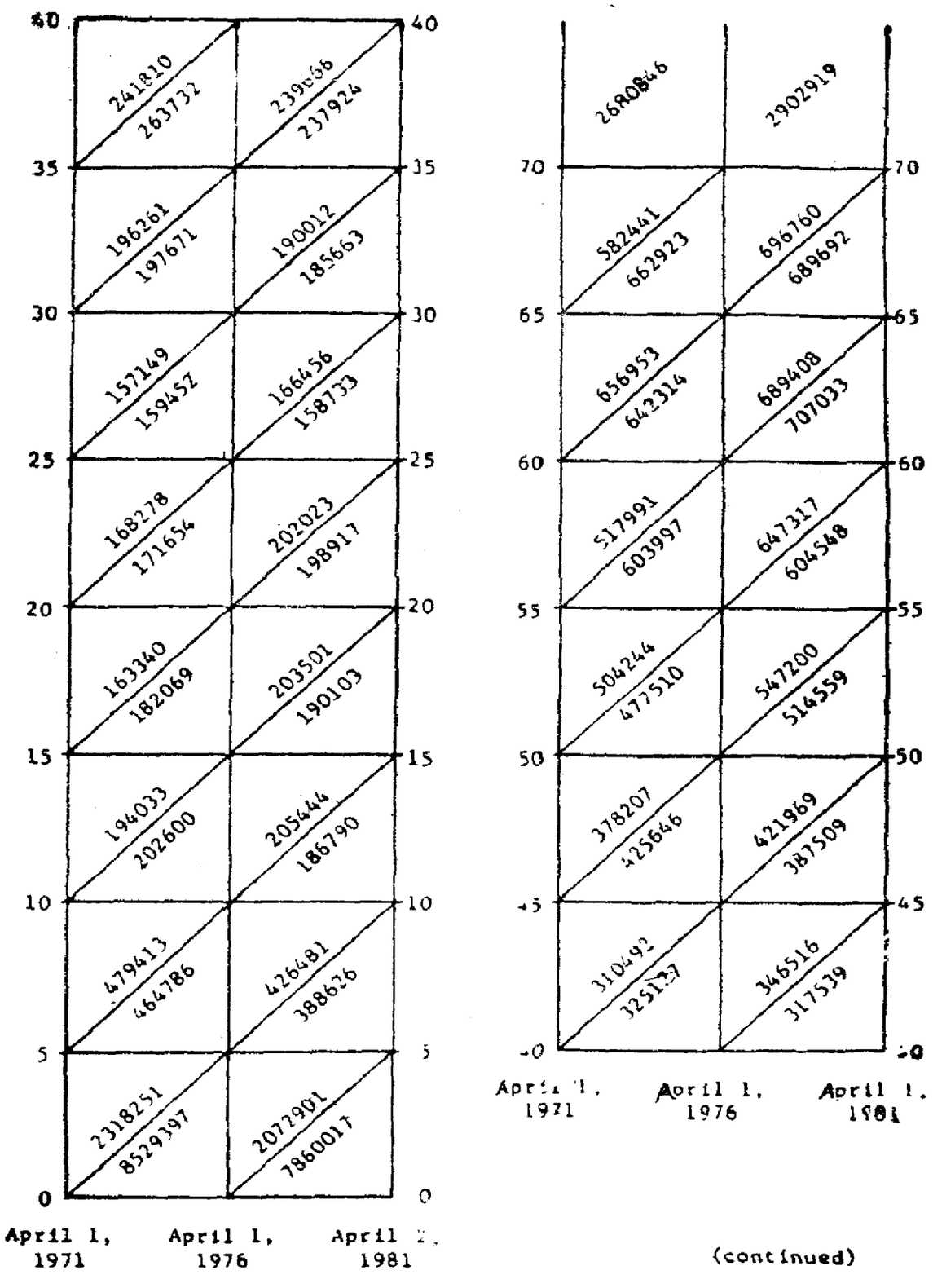
$$\text{SE}: \frac{9}{160}(292113) + \frac{1}{4}(276521) + \frac{9}{20}(285841) + \frac{13}{20}(235478) + \frac{17}{20}(302782) + \frac{39}{160}(266982) = 689692$$

Age Group 70+

$$\frac{3}{4}(570148) + (541057) + (620284) + (550714) + (605216) + \frac{1}{4}(632146) = 2902918.5$$

Note : *See* Note for Worksheet 4.

Worksheet 6 for Calculating Deaths for All India Males 1971-81: Males Registered Deaths according to SRS, 1971-76 and 1976-81



(continued)

Note : The numbers are obtained from Worksheets 4 and 5 preceding, except for the age group 0—4 for which the numbers are calculated on the following Worksheet 7 using separation factors based on model life tables.

Worksheet 7 for Calculating Deaths for All India Males, 1971-81 : Males Registered Deaths According to SRS, 1971-76 and 1976-81

For breaking 0—4 age group deaths into triangles

1971-76 : Using United Nations South Asian Pattern Male model life table with $e_0 = 50$, we obtain the separation factor

$$\frac{5l_0 - {}_5L_0}{5(l_0 - l_5)} = \frac{500000 - 413481}{5(100000 - 77993)} = .78629$$

so deaths in SE $= .78629\ (10847648) = 8529397$,
and deaths in NW $= 10847648 - 8529397 = 2318251$.

1976-81 : Using United Nations South Asian Pattern Male model life table with $e_0 = 53.0$, we obtain the separation factor

$$\frac{5l_0 - {}_5L_0}{5(l_0 - l_5)} = \frac{500000 - 424216}{5(100000 - 80846)} = .79131$$

so deaths in SE $= .79131\ (9932918) = 7860017$,
and deaths in NW $= 9932918 - 7860017 = 2072901$.

Sources : (1) The United Nations model life tables used here are referenced in Appendix A.

(2) Age 0—4 deaths are from Worksheets 4 and 5.

Note : The life expectancies for calculating the separation factors are based on India Sample Registration System data. The results are very insensitive to variation of these life expectancies.

APPENDIX C

INITIAL CORRECTION FACTORS AND CORRESPONDING INITIALLY CORRECTED DEMOGRAPHIC QUANTITIES FOR ALL INDIA MALES, 1971-81

Table C 1

Initial Correction Factors for All India Males, 1971-81

Initial Correction Factors for Intercensal Births

1971-76	1976-81
1.125	1.070

Initial Correction Factors for Census Age Distributions and Intercensal Deaths

Age	Censuses		Deaths	
	1971	1981	1971-76	1976-81
0	1.134	1.185	1.014	1.032
5	.935	.970	1.019	1.012
10	.929	.905	1.029	1.019
15	1.059	1.098	1.023	1.029
20	1.048	1.108	1.017	1.023
25	1.040	.980	1.018	1.017
30	1.050	.984	1.018	1.018
35	1.010	.992	1.019	1.018
40	1.041	.979	1.019	1.019
45	.931	1.013	1.023	1.019
50	1.061	.980	1.022	1.023
55	1.063	1.088	1.015	1.022
60	.990	.961	1.019	1.015
65	.990	.959	1.022	1.019
70+	.990	1.031	1.022	1.022

Table C 2

Reported and Initially Corrected Intercensal Births for All India Males, 1971-81

Total Reported 1971-81	Reported Births by 5-year Period 1971-76	1976-81
108814818	52813695	56001123

Total Initially Corrected	Initially Corrected Births by 5-year Period	
1971-81	1971-76	1976-81
119361717	59439054	59922663

Completeness of Births (Based on Initial Correction Factors)

	Intercensal Births Completeness by 5-year Period	
Overall		
1971-81	1971-76	1976-81
91.164	88.854	93.456

Notes : (1) The initially corrected births are obtained by multiplying the reported births by the initial correction factors for births that are contained in Table C1.

(2) Completeness of births for each period is obtained by dividing reported births by initially corrected births and multiplying by 100.

Table C 3

Reported and Initially Corrected Census Age Distributions for All India Males, 1971-81

Age	Reported Census Age Distributions		Initially Corrected Census Age Distributions	
	1971	1981	1971	1981
0	40211877	43711289	45593356	51810946
5	42219656	49743981	39470894	48254773
10	36500531	46579059	33894241	42146219
15	25226773	34933452	26723947	38369024
20	21577691	29856366	22604587	33095607
25	20343399	26543560	21162174	26014318
30	18324969	22265678	19238702	21912975
35	17239761	20540101	17412560	20365558
40	15061099	18599029	15682173	18202819
45	12469979	15878632	11605095	16086907
50	11118088	14257929	11796935	13974096
55	6877786	8780815	7311182	9553151
60	7486203	9666337	7411411	9289660
65	3645094	4930388	3608677	4728618
70+	5746370	8097684	5688960	8349041
Total	284049276	354384300	289204895	362153714

Note : The initially corrected census age distributions are obtained by multiplying the reported census age distributions by the initial correction factors for census age distributions that are contained in Table C1 .

Table C 4

Reported and Initially Corrected Intercensal Deaths for All India Males, 1971-81

Age	Reported Intercensal Deaths		Initially Corrected Intercensal Deaths	
	1971-76	*1976-81*	*1971-76*	*1976-81*
0	10847648	9932918	11003074	10250999
5	944199	815107	962057	825105
10	396633	392234	408035	399774
15	345409	393604	353352	404926
20	339932	400940	345646	410000
25	316601	325189	322226	330661
30	393932	375675	400888	382352
35	505542	477590	515057	486021
40	635619	664055	647754	676653
45	803853	809478	821996	824850
50	981754	1061759	1002944	1086237
55	1121988	1251865	1138986	1278828
60	1299267	1396441	1323542	1417588
65	1245364	1386452	1273062	1412325
70+	2680846	2902919	2740471	2967483
Total	22858587	22586226	23259089	23153802

Completeness of Deaths (Based on Initial Correction Factors)

Overall	Intercensal Deaths	Completeness by 5-year Period
1971-81	1971-76	1976-81
97.914	98.278	97.549

Notes : (1) The initially corrected intercensal deaths are obtained by multiplying the reported intercensal deaths by the initial correction factors for intercensal deaths that are contained in Table C1.

(2) Completeness of deaths for each period is obtained by dividing total reported intercensal deaths by total initially corrected intercensal deaths and multiplying by 100.

APPENDIX D

INITIAL CORRECTION FACTORS AND CORRESPONDING INITIALLY CORRECTED DEMOGRAPHIC QUANTITIES FOR ALL INDIA FEMALES, 1971-81

Table D 1
Initial Correction Factors for All India Females, 1971-81

Initial Correction Factors for Intercensal Births

1971-76	1976-81
1.126	1.074

Initial Correction Factors for Census Age Distributions and Intercensal Deaths

Age	Censuses		Deaths	
	1971	1981	1971-76	1976-81
0	1.100	1.150	1.014	1.029
5	.910	.961	1.022	1.014
10	.984	.946	1.027	1.023
15	1.116	1.128	1.018	1.027
20	1.036	1.054	1.015	1.017
25	1.014	.925	1.020	1.015
30	1.009	.994	1.021	1.020
35	.997	1.016	1.022	1.021
40	1.006	1.022	1.021	1.022
45	.966	1.025	1.023	1.021
50	1.096	1.017	1.019	1.023
55	1.104	1.063	1.012	1.019
60	1.010	.947	1.017	1.012
65	1.010	.939	1.022	1.017
70+	1.010	1.043	1.022	1.022

Table D 2

Reported and Initially Corrected Intercensal Births for All India Females, 1971-81

Total Reported	Reported Births by 5-year Period	
1971-81	1971-76	1976-81
103633159	50298757	53334402

Total Initially Corrected	Initially Corrected Births by 5-year Period	
1971-81	1971-76	1976-81
113922320	56659122	57263198

Completeness of Births (Based on Initial Correction Factors)

Overall	Intercensal Births Completeness by 5-year Period	
1971-81	1971-76	1976-81
90.968	88.774	93.139

Notes : (1) The initially corrected births are obtained by multiplying the reported births by the initial correction factors for births that are contained in Table D1.

(2) Completeness of births for each period is obtained by dividing reported births by initially corrected births and multiplying by 100.

Table D 3

Reported and Initially Corrected Census Age Distributions for All India Females, 1971-81

Age	Reported Census Age Distributions		Initially Corrected Census Age Distributions	
	1971	1981	1971	1981
0	39364546	42576102	43290960	48979359
5	39805222	46732010	36206271	44922672
10	32281867	41692643	31762191	39433113
15	22251511	31045215	24824823	35010746
20	21532829	29187053	22300118	30763682
25	20485735	25740574	20777841	23810890
30	17871138	21461821	18030681	21335980
35	15665514	19533138	15612576	19836116
40	13232875	16649963	13311879	17024131
45	10419641	14257671	10062907	14612677
50	9417177	11954085	10316647	12153476
55	5953318	8158841	6569703	8675350
60	6890877	9037497	6957596	8562904
65	3357640	4856104	3390150	4562133
70+	5580486	7891983	5634518	8228558
Total	264110376	330774700	269048860	337911789

Note : The initially corrected census age distributions are obtained by multiplying the reported census age distributions by the initial correction factors for census age distributions that are contained in Table D1.

Table D 4

Reported and Initially Corrected Intercensal Deaths for All India Females, 1971-81

Age	Reported Intercensal Deaths		Initially Corrected Intercensal Deaths	
	1971-76	1976-81	1971-76	1976-81
0	11422681	10362461	11586317	10659664
5	1024682	916818	1047203	929463
10	402747	372440	413800	380873
15	471567	501754	479891	515516
20	534680	552985	542563	562540
25	468996	483948	478302	491166
30	519240	414434	530242	422681
35	483316	443663	493740	453063
40	475815	485201	485914	495666
45	551484	535762	564156	547133
50	695396	681410	708541	697156
55	768019	830788	777290	846408
60	1065550	1091388	1083641	1104530
65	1114145	1157284	1138612	1176930
70+	2564332	2765014	2620647	2825736
Total	22562650	21595350	22950861	22108524

Completeness of Deaths (Based on Initial Correction Factors)

Overall	Intercensal Deaths Completeness by 5-year Period	
1971-81	1971-76	1976-81
98.000	98.309	97.679

Notes: (1) The initially corrected intercensal deaths are obtained by multiplying the reported intercensal deaths by the initial correction factors for intercensal deaths that are contained in Table D1.

(2) Completeness of deaths for each period is obtained by dividing total reported intercensal deaths by total initially corrected intercensal deaths and multiplying by 100.

APPENDIX E

SOURCES OF INPUT DATA FOR CONSISTENT CORRECTION PROCEDURE FOR THE STATE OF KERALA, MALES AND FEMALES, 1971-81

APPENDIX E

SOURCES OF INPUT DATA FOR CONSISTENT CORRECTION PROCEDURE FOR THE STATE OF KERALA, MALES AND FEMALES, 1971-81

Births: Table 2 for the state of Kerala in Vital Statistics Division, *Sample Registration System, 1970-75*, New Delhi: Office of the Registrar General, India. And same for 1976-78, 1979-80 and 1981. These sources give SRS birth rates for combined sexes, from which births were calculated by sex (just as on Worksheet for Calculating Births in Appendix B).

Deaths : Tables 1 and 4 for the state of Kerala in Vital Statistics Division, *Sample Registration System, 1970-75*, New Delhi: Office of the Registrar General, India. And same for 1976-78, 1979-80 and 1981. These sources give population age distribution percentages and age-specific death rates from which the deaths age distributions were calculated (just as on Worksheets for Calculating Deaths in Appendix B). Model life tables used to determine separation factors for age 0–4 deaths were South Asian Pattern (interpolated based on $e_0=60.8$ for 1971-76 and $e_0=63\cdot5$ for 1976-81 for Kerala males; and interpolated based on $e_0=63.3$ for 1971-76 and $e_0=67.6$ for 1976-81 for Kerala females) from United Nations, 1982, *Model Life Tables for Developing Countries*, Department of International Economic and Social Affairs, Population Studies, No. 77, New York: United Nations.

Censuses: 1971: Office of Registrar General, India, 1977, *Census of India, 1971*. India, Series I, Paper 3, Age Tables, New Delhi: Manager of Publications, pp. 96-97. A.N.S. (ages not stated) are allotted proportionally.

1981 : M. Vijayanunni, Director of Census Operations, Kerala, *Census of India, 1981*, Series 10, Kerala, Part IVA, Social and Cultural Tables, Tables C1 and C2. A.N.S. (ages not stated) are allotted proportionally and figures are inflated proportionally to agree with accepted totals given by *Report of the Expert Committee on Population Projections, India, 1981-2001*, Table 3.2.7, p. 84.

Net Migration : In-migrants (including those from outside India) and inter-state out-migrants (i.e. excluding those leaving India) for Kerala for 1971-81 are from Table D15 of P. Padmanabha, Registrar General and Census Commissioner of India, *Census of India, 1981*, Series I, India, Part VA and B (viii), Migration Tables. We also used the same tabulations for 1961-71 from G. K. Mehrotra, 1974, *Birth Place Migration in India*, Census of India, 1971, Special Monograph No. 1, Appendix A, Table 9, p. I-20, New Delhi: Office of the Registrar General, India. Emigrants from Kerala leaving India are from Table 5 of Department of Economics and Statistics, Kerala, *Report on Survey on Housing and Employment, 1980*, Trivandrum: Government of Kerala.

Preliminary Correction Factors for Births and Deaths : *Report of the Expert Committee on Population Projections, India, 1981-2001*, p. 239; Table 2 for the state of Kerala in Vital Statistics Division, *Sample Registration System, 1970-75*, New Delhi: Office of the Registrar General, India (and same for 1976-78, 1979-80 and 1981); and Table 2, p. 4 in Vital Statistics Division, *Census of India, 1981, Report on the Intensive Enquiry Conducted in a Sub-Sample of SRS Units*, Occasional Papers No. 2 of 1983, New Delhi: Office of the Registrar General, India. Note : The estimates for

births and deaths from these sources are roughly consistent with those of Panel on India, Committee on Population and Demography, U.S. National Research Council, published in P. N. Mari Bhat, Samuel H. Preston and Tim Dyson, *Vital Rates in India, 1961-81*, Report No. 24, Washington, D.C.: National Academy Press, 1984.

Preliminary Correction Factors for 1971 Census: Statement III entitled "Net Omission Rate Per 1000 by Age and Sex—All India and Groups of States," Census of India, 1971. *Post Enumeration Check*, Office of the Registrar General, India.

Preliminary Correction Factors for 1981 Census : Table 2, p. 22, entitled "Net Omission Rates Per 1000 Enumerated Persons by Age and Sex—India and Zones," Census of India 1981, Series I India, Paper 4 of 1982, *Report on Post Enumeration Check*, Registrar General and Census Commissioner of India.

Preliminary Correction Factors for Net Emigration : Set equal to 1 for both time periods 1971-76 and 1976-81 and for all age groups, since the estimated net emigration totals, although involving considerablde guesswork, are deemed the best possible given the limited information (see Appendix F).

APPENDIX F

CALCULATING THE AGE-SEX-PERIOD DISTRIBUTIONS OF NET EMIGRANTS FOR THE STATE OF KERALA, MALES AND FEMALES, 1971-81

APPENDIX F

CALCULATING THE AGE-SEX-PERIOD DISTRIBUTIONS OF NET EMIGRANTS FOR THE STATE OF KERALA, MALES AND FEMALES 1971-81

Total in-migrants (including those from outside India) and interstate out-migrants (not including those leaving India) for Kerala for 1971-81 are listed by sex and by 5-year age group cohorts in the first source for net migration given in Appendix E. (Actually, the preliminary figures used here may be slightly different from the ones in that source; the resulting difference in the final corrected figures will be negligible, especially since net emigration is weighted lightly, hence corrected heavily, in the correction procedure). Although the 5-year age groups listed in that source are not the conventional ones, the totals were converted to the conventional 5-year age group cohorts by quadratic interpolation. The same totals for Kerala for the period 1961-71 are given in the second source for net migration given in Appendix E. From these totals and those for 1971-81, the increase in migration over the period 1971-81 in each of the four categories—male in-migrants, male interstate out-migrants, female in-migrants and female interstate out-migrants—was estimated assuming a linear trend. On this basis, the 1971-81 migrants in each category were apportioned to the periods 1971-76 and 1976-81. For each of these periods and each category, the resulting estimates by 5-year age group cohorts were interpolated from the age cohort parallelograms of the Lexis diagram into their component age group triangles by the quadratic interpolation method described in Appendix J. Then net out-migrants for each sex and period, excluding those leaving India, were calculated for each triangle by subtracting in-migrants from interstate out-migrants for the triangle.

This left Kerala emigrants leaving India to be calculated for each sex, period and triangle of the Lexis diagram since adding these to those net out-migrants already calculated would give total net emigrants by sex, period and 5-year age group triangle of the Lexis diagram, which is the necessary migration input for the consistent correction procedure.

A 1980 survey conducted by the Department of Economics and Statistics, Kerala (see last source for net migration in Appendix E) estimates the total emigration from Kerala leaving India to be 208,179 persons upto that time. (Subsequently, this figure was reported to be 207,805, which again makes a negligible diffe-

rence in the final results). Assuming that most of this emigration occurred since 1971, that there is likely undercount and that there was additional emigration between the time of the survey and the 1981 census, we estimate the total number of emigrants from Kerala leaving India between the censuses of 1971 and 1981 to be (4/3) (208,179)=277,572.

In the absence of age-sex period distribution data for Kerala (or any other state of India) for emigrants leaving India during 1971-81, we used the age-sex-period-triangle (Lexis diagram) distribution of Sri Lanka Citizens net emigrants for Sri Lanka in the intercensal period 1971-81, determined by Luther et al (1987), to distribute the 277,572 Kerala emigrants leaving India during 1971-81 into age-sex-period-triangle groups. (Note that the Sri Lanka censuses of 1971 and 1981 were almost coincidental time wise with those of India and, in particular, Kerala). This seemed most appropriate of the limited alternatives because of cultural, educational and demographic similarities between Kerala and Sri Lanka, and because in both cases the emigration was largely for the purpose of employment, often to the Middle East. (Note that we used the net emigration distribution of Sri Lanka Citizens only, rather than all Sri Lankans, in order to exclude the large numbers of repatriates to India during the early 1970s for which there was no analogous situation in Kerala).

Clearly, the age-sex-period-triangle (Lexis diagram) data for Kerala net emigrants so determined by the process described here involved a lot of guesswork. Hence this data is considered less reliable than the other Kerala input data utilized for applying the consistent correction procedure, and the weighting for the procedure is chosen accordingly.

APPENDIX G

INITIAL CORRECTION FACTORS AND CORRESPONDING INITIALLY CORRECTED DEMOGRAPHIC QUANTITIES FOR KERALA MALES, 1971-81

Table G 1

Initial Correction Factors for Kerala Males, 1971-81
Initial Correction Factors for Intercensal Births

1971-76	1976-81
1.008	.972

Initial Correction Factors for Census Age Distributions, Intercensal Deaths, and Intercensal Net Emigration

Age	Censuses		Deaths		Net Emigration	
	1971	1981	1971-76	1976-81	1971-76	1976-81
0	1.101	1.078	1.022	1.048	1.022	1.246
5	1.022	1.027	1.000	1.006	.866	1.083
10	.974	.936	1.029	1.000	1.074	.874
15	1.006	1.008	1.033	1.028	1.073	1.074
20	.950	1.060	1.040	1.034	1.121	1.100
25	1.066	1.031	1.028	1.041	1.054	1.112
30	1.034	1.077	1.005	1.028	.850	1.064
35	1.015	.961	1.016	1.004	.941	.839
40	1.011	.987	1.020	1.016	.975	.935
45	.931	1.000	1.040	1.020	1.140	.976
50	1.071	1.010	1.028	1.040	1.085	.928
55	1.055	1.088	.994	1.024	.775	.638
60	1.022	.944	1.007	.994	.808	1.157
65	1.022	.960	1.017	1.007	.950	1.508
70+	1.022	.998	1.017	1.017	.950	.950

Table G 2

Reported and Initially Corrected Intercensal Births for Kerala Males, 1971-81

Total Reported	Reported Births by 5-year Period	
1971-81	1971-76	1976-81
3301679	1664896	1636783
Total Initially Corrected	Initially Corrected Births by 5-year Period	
1971-81	1971-76	1976-81
3268239	1677576	1590664

Completeness of Births (Based on Initial Correction Factors)

Overall	Intercensal Births Completeness by 5-year Period	
1971-81	1971-76	1976-81
101.023	99.244	102.899

Notes : (1) The initially corrected births are obtained by multiplying the reported births by the initial correction factors for births that are contained in Table G1.

(2) Completeness of births for each period is obtained by dividing reported births by initially corrected births and multiplying by 100 .

Table G 3

Reported and Initially Corrected Census Age Distributions for Kerala Males, 1971-81

Age	Reported Census Age Distributions		Initially Corrected Census Age Distributions	
	1971	1981	1971	1981
0	1441829	1377732	1587187	1484966
5	1457676	1481291	1489121	1521002
10	1446125	1643310	1409143	1538870
15	1127154	1439602	1133724	1450828
20	977917	1256496	929305	1331890
25	664398	1005975	708366	1037574
30	587485	792216	607556	853161
35	617663	677212	627174	650829
40	497183	561905	502890	554778
45	498612	578138	464111	578312
50	351921	445637	376831	450005
55	288055	371895	303959	404445
60	234481	330500	239617	312028
65	165670	241273	169299	231544
70+	231682	324586	236757	323890
Total	10587851	12527768	10785039	12724122

Note : The initially corrected census age distributions are obtained by multiplying the reported census age distributions by the initial correction factors for census age distributions that are contained in Table G1.

Table G 4

Reported and Initially Corrected Intercensal Deaths for Kerala Males, 1971-81

Age	Reported Intercensal Deaths		Initially Corrected Intercensal Deaths	
	1971-76	1976-81	1971-76	1976-81
0	151163	111567	154502	116891
5	18085	11459	18091	11525
10	6826	5666	7026	5669
15	7077	7251	7313	7455
20	9914	8909	10313	9208
25	8772	9046	9020	9417
30	9987	9622	10041	9895
35	10997	11709	11172	11761
40	15681	15655	15996	15904
45	21913	20268	22791	20676
50	24707	27040	25386	28126
55	29472	33581	29287	34400
60	33080	37707	33310	37477
65	40382	42773	41064	43075
70+	115684	123204	117637	125283
Total	503740	475457	512948	486763

Completeness of Deaths (Based on Initial Correction Factors)

Overall	Intercensal Deaths Completeness by 5-year Period	
1971-81	1971-76	1976-81
97.948	98.205	97.677

Notes : (1) The initially corrected intercensal deaths are obtained by multiplying the reported intercensal deaths by the initial correction factors for intercensal deaths that are contained in Table G1.

(2) Completeness of deaths for each period is obtained by dividing total reported intercensal deaths by total initially corrected intercensal deaths and multiplying by 100.

Table G 5

Reported and Initially Corrected Intercensal Net Emigrants for Kerala Males, 1971-81

Age	Reported Intercensal Net Emigrants		Initially Corrected Intercensal Net Emigrants	
	1971-76	1976-81	1971-76	1976-81
0	8768	6935	8960	8643
5	868	— 2955	752	—3201
10	6075	6364	6526	5564
15	19721	28414	21167	30512
20	24761	46529	27760	51203
25	19606	40147	20660	44641
30	19316	25841	16410	27499
35	16239	19149	15284	16072
40	10057	9630	9810	9005
45	5294	1768	6035	1726
50	2402	511	2607	474
55	1072	—387	831	—247
60	418	— 153	338	— 177
65	274	— 63	260	— 95
70+	276	172	262	163
Total	135147	181902	137662	191784

Completeness of Net Emigration (Based on Initial Correction Factors)

Overall	Intercensal Net Emigration Completeness by 5-year Period	
1971-81	1971-76	1976-81
96.237	98.173	94.847

Notes : (1) The initially corrected intercensal net emigrants are obtained by multiplying the reported intercensal net emigrants by the initial correction factors for intercensal net emigration that are contained in Table G1.

(2) Completeness of net emigration for each period is obtained by dividing total reported intercensal net emigrants by total initially corrected intercensal net emigrants and multiplying by 100.

APPENDIX H

INITIAL CORRECTION FACTORS AND CORRESPONDING INITIALLY CORRECTED DEMOGRAPHIC QUANTITIES FOR KERALA FEMALES, 1971-81



Table H 1

Initial Correction Factors for Kerala Females, 1971-81

Initial Correction Factors for Intercensal Births

1971-76	1976-81
1.015	.979

Initial Correction Factors for Census Age Distributions, Intercensal Deaths and Intercensal Net Emigration

Age	Censuses		Deaths		Net Emigration	
	1971	1981	1971-76	1976-81	1971-76	1976-81
0	1.098	1.065	1.016	1.040	.974	1.172
5	1.075	1.012	.986	1.001	1.292	1.133
10	1.018	.932	1.004	.986	.909	.728
15	.993	.952	1.026	1.006	1.042	.869
20	.921	1.011	1.053	1.027	1.195	1.013
25	1.043	1.039	1.044	1.053	1.223	1.184
30	.993	1.101	1.023	1.040	1.000	1.193
35	.977	.980	1.036	1.022	1.101	.958
40	.988	1.032	1.035	1.036	1.100	1.099
45	.942	1.041	1.047	1.035	1.193	1.101
50	1.092	1.037	1.023	1.046	1.040	1.158
55	1.104	1.090	.981	1.021	.662	.916
60	1.018	.946	1.001	.981	.746	.679
65	1.018	.934	1.024	.999	1.044	.929
70+	1.018	1.025	1.024	1.024	1.004	1.004

Table H 2

Reported and Initially Corrected Intercensal Births for Kerala Females, 1971-81

Total Reported	Reported Births by 5-year Period	
1971-81	1971-76	1976-81
3144457	1585616	1558841

Total Initially Corrected	Initially Corrected Births by 5-year Period	
1971-81	1971-76	1976-81
3135579	1608957	1526622

Completeness of Births (Based on Initial Correction Factors)

Overall	Intercensal Births Completeness by 5-year Period	
1971-81	1971-76	1976-81
100.283	98.549	102.110

Notes : (1) The initially corrected births are obtained by multiplying the reported births by the initial correction factors for births that are contained in Table H1.

(2) Completeness of births for each period is obtained by dividing reported births by initially corrected births and multiplying by 100.

Table H 3

Reported and Initially Corrected Census Age Distributions for Kerala Females, 1971-81

Age	Reported Census Age Distributions		Initially Corrected Census Age Distribution	
	1971	1981	1971	1981
0	1413696	1343258	1551979	1430311
5	1418419	1441091	1525090	1458152
10	1417882	1614922	1442765	1505839
15	1210250	1568161	1201944	1492773
20	1012068	1364158	932382	1379097
25	723166	1082776	754341	1125398
30	622147	789777	617945	869873
35	660668	727934	645509	713063
40	495941	569431	490002	587479
45	464720	595111	437660	619388
50	340457	445526	371709	462106
55	284192	370155	313615	403524
60	247435	348920	251846	330158
65	183856	277441	187133	259266
70+	264626	387253	269343	396855
Total	10759523	12925914	10993263	13033280

Note : The initially corrected census age distributions are obtained by multiplying the reported census age distributions by the initial correction factors for census age distributions that are contained in Table H1.

Table H 4

Reported and Initially Corrected Intercensal Deaths for Kerala Females, 1971-81

Age	Reported Intercensal Deaths		Initially Corrected Intercensal Deaths	
	1971-76	1976-81	1971-76	1976-81
0	150413	101744	152832	105860
5	16635	11561	16407	11574
10	5655	6853	5675	6759
15	8273	6208	8490	6242
20	10031	9793	10558	10055
25	8601	7603	8978	8006
30	8598	7567	8795	7870
35	10101	6651	10467	6795
40	10412	9943	10780	10303
45	12418	11128	13004	11521
50	15185	13845	15529	14487
55	17827	19501	17495	19910
60	24102	29719	24124	29159
65	35782	32168	36625	32141
70+	117124	123866	119883	126784
Total	451157	398150	459643	407466

Completeness of Deaths (Based on Initial Correction Factors)

Overall	Intercensal Deaths Completeness by 5-year Period	
1971-81	1971-76	1976-81
97.947	98.154	97.714

Notes : (1) The initially corrected intercensal deaths are obtained by multiplying the reported intercensal deaths by the initial correction factors for intercensal deaths that are contained in Table H1.

(2) Completeness of deaths for each period is obtained by dividing total reported intercensal deaths by total initially corrected intercensal deaths and multiplying by 100.

Table H 5

Reported and Initially Corrected Intercensal Net Emigrants for Kerala Females, 1971-81

Age	Reported Intercensal Net Emigrants		Initially Corrected Intercensal Net Emigrants	
	1971-76	1976-81	1971-76	1976-81
0	6446	7000	6279	8205
5	—56	—2291	—72	—2596
10	4411	3939	4011	2866
15	16644	26161	17345	22730
20	16753	40883	20024	41431
25	5205	26352	6367	31201
30	1870	27644	1870	32983
35	1629	18914	1794	18113
40	1057	5542	1163	6089
45	1053	1670	1257	1838
50	860	1178	894	1365
55	771	766	510	701
60	528	525	394	356
65	323	333	324	309
70+	350	346	351	347
Total	57844	158962	62512	165940

Completeness of Net Emigration (Based on Initial Correction Factors)

Overall	Intercensal Net Emigration Completeness by 5-year Period	
1971-81	1971-76	1976-81
94.902	92.533	95.795

Notes : (1) The initially corrected intercensal net emigrants are obtained by multiplying the reported intercensal net emigrants by the initial correction factors for intercensal net emigration that are contained in Table H1.

(2) Completeness of net emigration for each period is obtained by dividing total reported intercensal net emigrants by total initially corrected intercensal net emigrants and multiplying by 100.

APPENDIX J

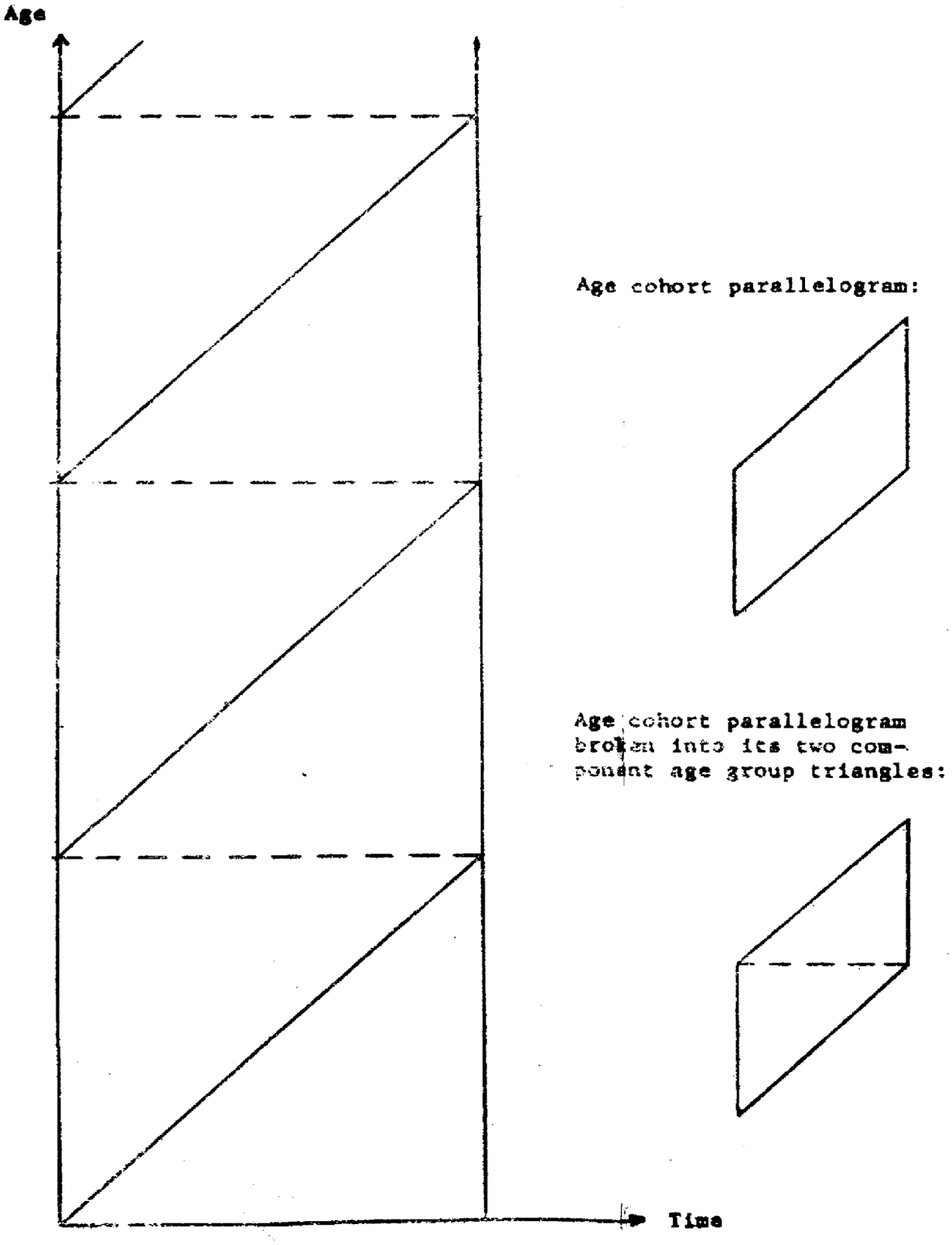
INTERPOLATING QUANTITIES FROM COHORT PARALLELOGRAMS (TRAPEZOIDS) INTO THEIR COMPONENT TRIANGLES OF THE LEXIS DIAGRAM

APPENDIX J

NTERPOLATING QUANTITIES FROM COHORT PARALLELOGRAMS (TRAPEZOIDS) INTO THEIR COMPONENT TRIANGLES OF THE LEXIS DIAGRAM

Migration quantities were quadratically interpolated from each age cohort parallelogram (trapezoid) of the Lexis diagram having the same length age group as time period into its two component age group triangles (see Figure J-1) by an APL computer program entitled INTERPTRAPSTOTRIS that is available upon request from the first author. A quadratic function of age was fit to the quantities for three successive age cohort parallelograms over the same time period, assuming each quantity to be concentrated at the age which bisects the parrallelogram (into its two component age group triangles); then the interpolated quantity in each of the two component age group triangles of the middle parallelogram was determined by integrating the quadratic function over the triangle, assuming a uniform distribution over time there

FIGURE J—1



MGIPCBE—S2—24 RGI/ND/90—30-9-91—750.