



Department of International Economic and Social Affairs

**UNABRIDGED MODEL LIFE TABLES
CORRESPONDING TO THE NEW
UNITED NATIONS MODEL LIFE TABLES
FOR DEVELOPING COUNTRIES**

UNITED NATIONS

New York, 1982

NOTE

Symbols of United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The term "country" as used in the text of this report also refers, as appropriate, to territories or areas.

ST/ESA/SER.R/47

PREFACE

This study, carried out by the Population Division of the Department of International Economic and Social Affairs of the United Nations Secretariat, as part of the United Nations model life table project, presents unabridged model life tables for developing countries. By presenting model patterns of mortality by single years of age, these tables will prove useful to researchers carrying out short-term population projections and other demographic analyses in developing countries. Additional publications related to the model life table project are Model Life Tables for Developing Countries, 1/ Stable Populations Corresponding to the New United Nations Model Life Tables for Developing Countries (ST/ESA/SER.R/44) and Computer Programs to Facilitate Use of the New United Nations Model Life Tables for Developing Countries (forthcoming).

1/ United Nations publication, Sales No. E.81.XIII.7.

CONTENTS

	<u>Page</u>
Explanatory notes	v
 <u>Tables</u>	
United Nations model unabridged life tables for developing countries	
Latin American pattern -- males	1
Latin American pattern -- females	43
Chilean pattern -- males	85
Chilean pattern -- females	127
South Asian pattern -- males	169
South Asian pattern -- females	211
Far Eastern pattern -- males	253
Far Eastern pattern -- females	295
General pattern -- males	337
General pattern -- females	379

EXPLANATORY NOTES

This volume presents a set of model unabridged (complete) life tables based on the new model abridged life tables developed at the United Nations.* Model life tables are primarily constructed for estimation of demographic parameters under conditions of deficient data. As the models presented here are based on mortality patterns which reflect actual experiences in less developed countries, they are likely to have considerable use for carrying out demographic estimation in that milieu. These unabridged life tables, by providing calculated rates of mortality for single years of age (rather than in five-year age groups as usually appear in abridged tables), serve a variety of purposes, although for demographic analysis in developing countries the most important use may be for carrying out population projections by single-year time periods. These projections require the single-year mortality rates provided by unabridged life tables. Unabridged life tables are also helpful for intercensal survival analysis when the period is not a multiple of five years and for the estimation of mortality levels from indirect methods which provide estimates of survivorship to ages other than those usually presented in abridged tables.

The new United Nations model life tables, on which this report is based, present age-sex patterns of mortality reflecting the experiences of populations in the less developed world. As more data of higher quality have become available for less developed countries, evidence has grown that mortality age patterns in less developed countries often differ from those recorded in historical life tables from the more developed world, and consequently from those patterns described by Coale and Demeny's 2/ well known models. The new United Nations models reflect some distinctive patterns of mortality found in less developed countries.

Four major age patterns of mortality are described by the models and are labelled the Latin American pattern, the Chilean pattern, the South Asian pattern and the Far East Asian pattern, according to the geographical location of the countries which are predominant. A fifth pattern called the general pattern has also been constructed and represents an overall average of all the above patterns. 3/

The characteristics of the four models of United Nations patterns for developing countries are shown in the accompanying figure. Each of the age-specific mortality rates is compared to those of the Coale-Demeny west region at the same life expectancy at age 10 by calculating the ratio of corresponding ${}_nq_x$ values. The Coale-Demeny

* Footnotes may be found on page ix below.

west region is chosen as indicative of historical western mortality experiences. The comparisons were made for Coale-Demeny levels 9, 15 and 21. Although the comparisons are shown only for the female tables, the major characteristics are similar for males.

The Latin American model, when compared to the Coale-Demeny west region, exhibits high mortality during the infant and childhood years (owing mainly to excess diarrhoeal and parasitic diseases) and again during the young adult ages (largely owing to accidents). Relatively low mortality levels are also exhibited during the older ages, apparently owing to comparatively low death rates from cardiovascular diseases.

The Chilean pattern is characterized mainly by extremely high infant mortality relative to both west region and to mortality at the childhood ages. The high infant mortality rate appears to be due mainly to deaths from respiratory diseases and may also be related to early weaning.

The South Asian pattern is typified by extremely high mortality under age 15 and somewhat high mortality again over about age 55. Correspondingly, mortality during the prime ages is relatively low. Cause of death data for this region is scarce; however, data from the International Centre for Diarrhoeal Disease Research in Matlab and from the Indian Model Registration Project point to high rates of diarrhoeal and parasitic diseases at the young ages and high mortality from diarrhoeal and respiratory diseases at the older ages.

The Far Eastern pattern exhibits very high death rates at the older ages compared to the younger ages. There is some evidence that this distinctive pattern may be due to a past history of tuberculosis.

The general pattern (not shown), which can be considered an average of the previous patterns, is very similar to the Coale-Demeny west region.

The tables that follow present unabridged life tables which have been interpolated from these new United Nations models. The unabridged model life tables were constructed at the United Nations by use of an eight-parameter formula developed by Heligman and Pollard ^{4/} for the age curve of mortality,

$${}_1q_x = A(x + B)^C + D^{-E(\ln x - \ln F)^2} + \frac{GH^x}{1 + GH^x}$$

where ${}_1q_x$ is the probability of someone of exact age x dying before $x + 1$, ${}_1q_x$ and A, B, \dots, H are parameters to be estimated. The parameters were estimated by non-linear least squares, minimizing the

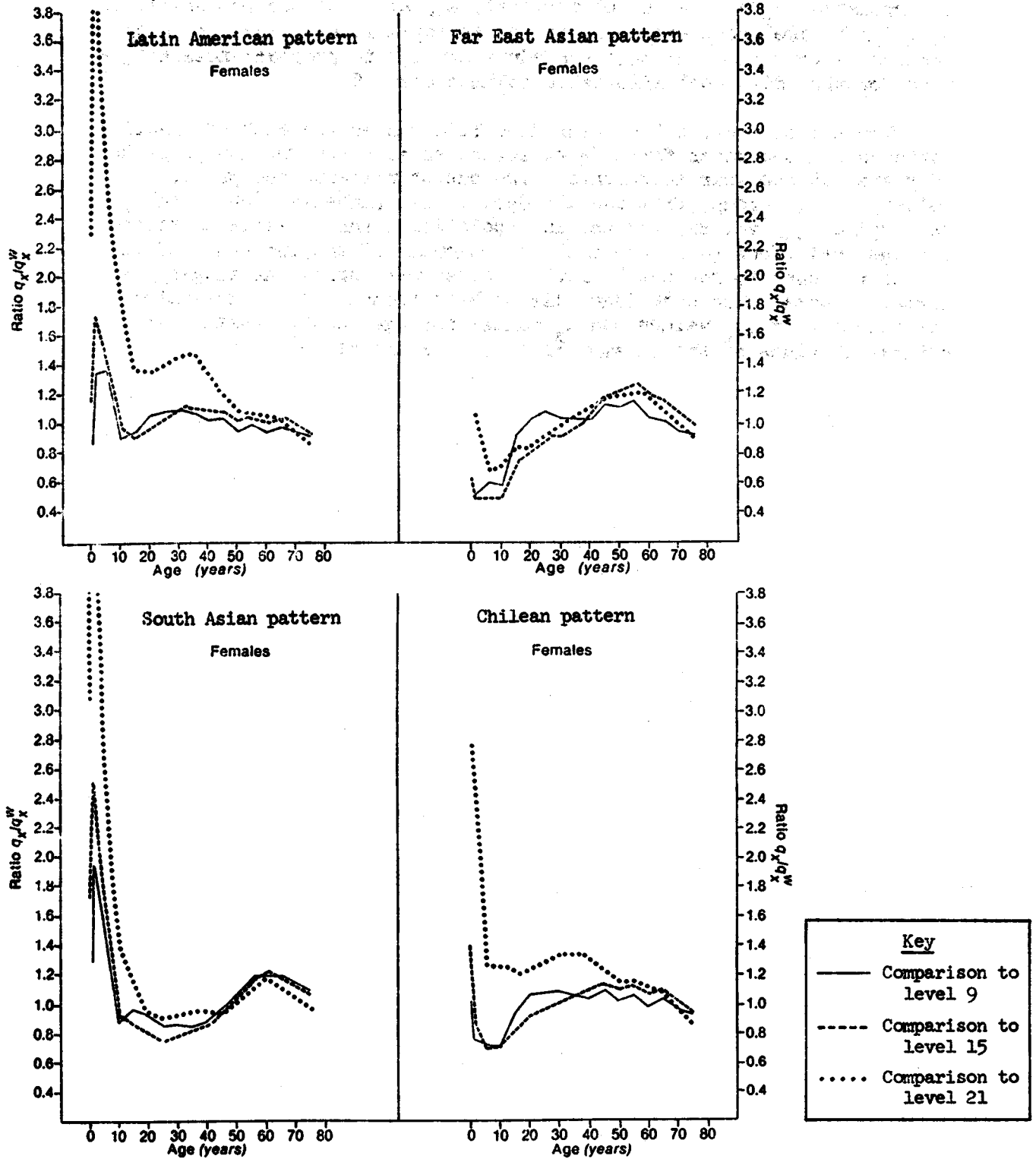
sum of squares of the proportional differences of the predicted from the observed mortality probability, after regrouping into age groups 0, 1-4, 5-9, 10-14,

Because the function is fit by least squares criteria the interpolated ${}_1q_x$ values do not perfectly aggregate to the probabilities of dying by age group presented in the abridged model. The fit nevertheless is very good and this procedure appears to provide excellent fits for the additional life-table columns also. 5/

The tables present the unabridged life tables for each of the five patterns and two sexes for life expectancies at birth from 35 years to 75 years, at one year increments. The output presents the published ${}_nq_x$ values, by age group, from the abridged models (labelled "observed"), the implied ${}_nq_x$ values from the interpolation formula (labelled "fitted") and the deviations (absolute and proportional) of the two sets. This allows the user to see the "error" involved with using the single-year mortality data. The unabridged life tables themselves are presented for single-year ${}_1q_x$ values and l_x values for ages 0-92. Lastly, the estimated values of the parameters A, ..., H are given.

Figure

Deviations of developing country patterns from Coale-Demeny west region levels 9, 15 and 21 (females)



Notes

1/ Model Life Tables for Developing Countries (United Nations publication, Sales No. 81.XIII.7).

2/ Ansley J. Coale and Paul Demeny, Regional Model Life Tables and Stable Populations (Princeton, Princeton University Press, 1966).

3/ Only a brief description of the new United Nations model patterns are presented here. For a fuller description and explanation please refer to Model Life Tables for Developing Countries

4/ See L. Heligman and J.H. Pollard, "The age pattern of mortality," The Journal of the Institute of Actuaries, vol. 107, part 1, No. 134 (June 1980).

5/ It is also true that for the same reason the mortality values for ages 5 and under provided in these unabridged life tables are not identical to the single-year mortality values under age 5 presented in annex II of Model Life Tables for Developing Countries Unlike those presented here, the single-year rates in that publication aggregate exactly to the grouped data.