III. OVERVIEW OF THE MODEL AGE PATTERNS

The procedures described in the previous chapter identified four age patterns of mortality. These patterns have been labelled the Latin American pattern, the Chilean pattern, the South Asian pattern and the Far Eastern pattern according to the geographical region which is predominant within each pattern group. A fifth pattern, denoted the general pattern, has also been constructed, based on the average of logit $[{}_nq_x]$ values for all life tables combined (including those not contained in any of the regional patterns). Figures I and II present graphically these age patterns of mortality in the form of the ratios q_x/q_x^w as a function of age x, where q_x is the mortality rate at age x for the given model and q_x^w is the mortality rate at age x in the Coale and Demeny West region model life table with the same expectation of life at age 10. The graphs show the ratios for life expectancy at birth of 40, 55 and 70 years in the new tables. The paragraphs below describe in turn characteristics of the life tables in each of these models. Included in the discussion are not only the life tables which make up the refined data set but also other presumably less reliable life tables which appear to have similar characteristics.

The first model, designated the Latin American pattern, is based on the life tables of Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico and Peru, as well as the non-American countries of the Philippines, Sri Lanka and Thailand which were shown by the previously mentioned statistical and graphical procedures to have similar patterns of mortality. Compared to historical Western European experience, as described by the Coale and Demeny West region pattern, the South Asian pattern shows high mortality during the infant and childhood years, high mortality again during young adult years and relatively low mortality during the older years. These deviations are rather small when mortality is high but increase as mortality declines, perhaps reflecting the growing importance, relative to Western European experience, of diarrhoeal and parasitic diseases during childhood and accidental deaths (mainly motor vehicle) during the prime ages, and the

Figure I. Deviations of developing country patterns from Coale and Demeny West region (males)

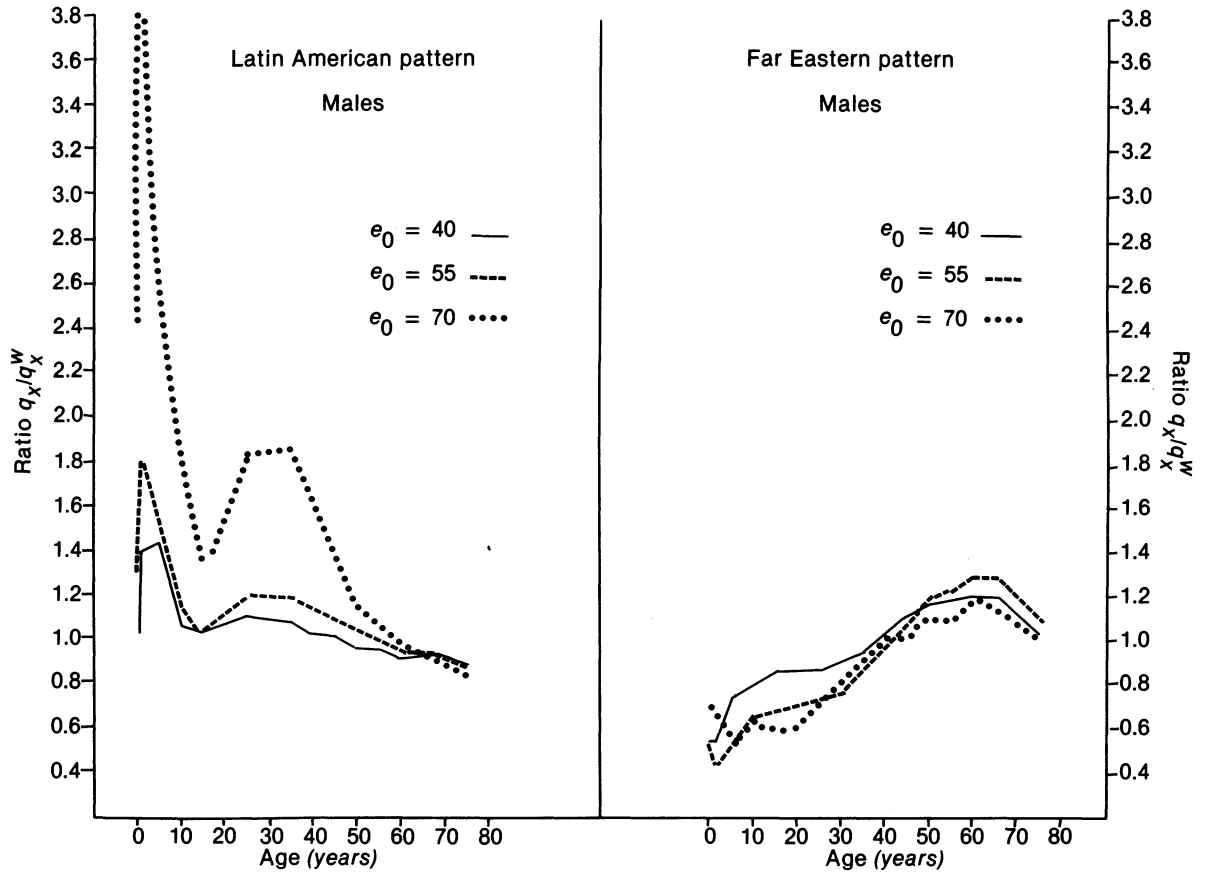
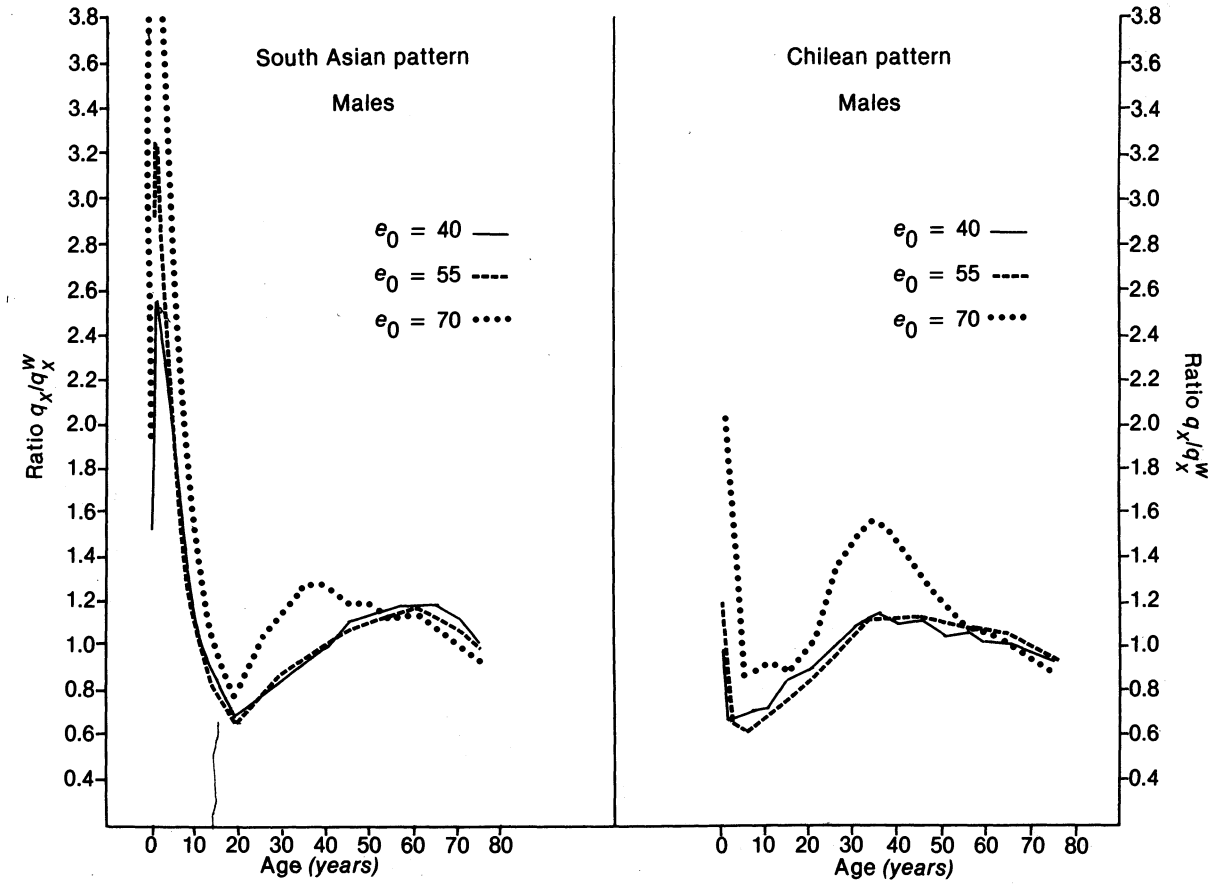
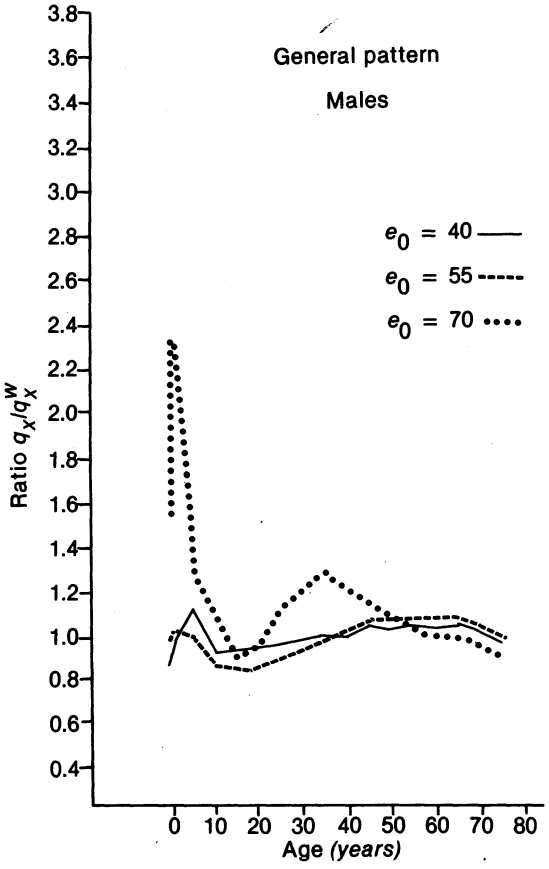


Figure I *(continued)*





relatively low levels of cardiovascular disease at the older ages.[9]

Since the model life table project only included countries for which data could be reliably evaluated and, if necessary, corrected, mortality data from two of the largest and most populous countries in Latin America, namely, Brazil and Argentina, were excluded from the sample. This is unfortunate as these two countries comprise 41 per cent of the population and 55 per cent of the land area of the Latin American region.[10] Life tables are available for Brazil, based on intercensal survival analysis and indirect questions on early-age mortality, and for Argentina, based on civil registration and census data.[11] Death registration in Argentina is generally

[9] The relatively low level of mortality at the older ages is a point of some controversy, as the figures may possibly reflect errors in the data rather than a true mortality experience. Nevertheless, there is evidence that low death rates in the Latin American region from cardiovascular diseases may be a significant factor. See, for example, R. R. Puffer and G. W. Griffith, *Patterns of Urban Mortality*, Pan American Health Organization Scientific Report No. 151 (Washington, D.C.,1967), pp. 44-51, for results from a study of 12 American cities; and C. B. Nam, N. L. Weatherby and K. A. Ockay, "Causes of death which contribute to the mortality crossover effect", *Social Biology*, vol. 25, No. 4 (Winter 1978), pp. 306-314, for an analysis of causes of death responsible for the crossover effect in age patterns of mortality.

[10] Calculated from data presented in *Demographic Yearbook, 1978* (United Nations publication, Sales No. E/F.79.XIII.1), tables 1 and 3.

[11] For Brazil, see V. da Motta Leite, "Brasil: estudo da mortalidade por sexo e grupos de idade durante o período 1950-1970", *Revista Brasileira de Estadística*, vol. 34, No. 135 (Rio de Janeiro, 1973), pp. 435-464. For the Argentinian life tables, see A. Ortega, *Tablas Completas de Mortalidad para la República Argentina, 1959-1961* (Santiago, CELADE, 1967).

Figure II. Deviations of developing country patterns from Coale and Demeny West region (females)

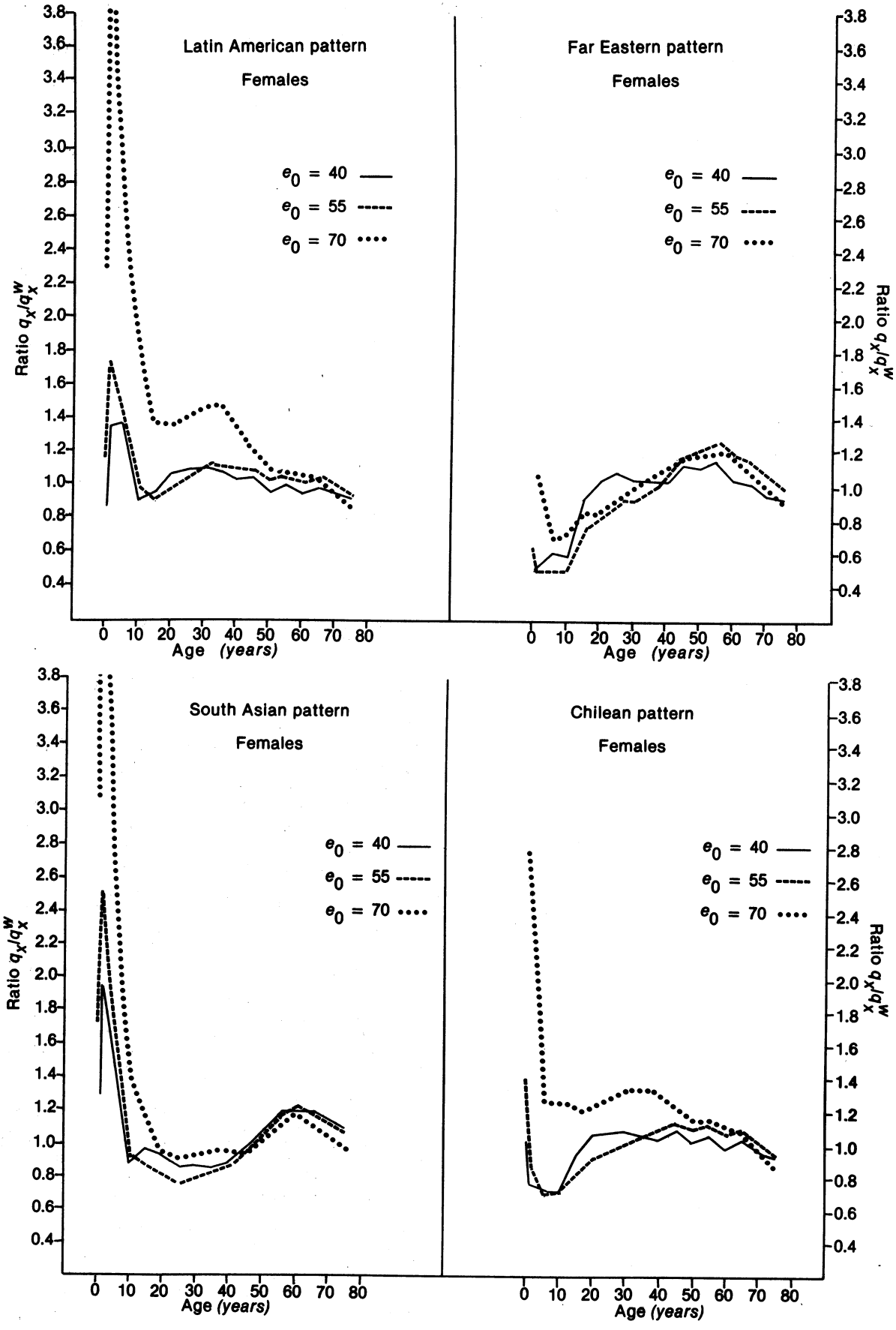
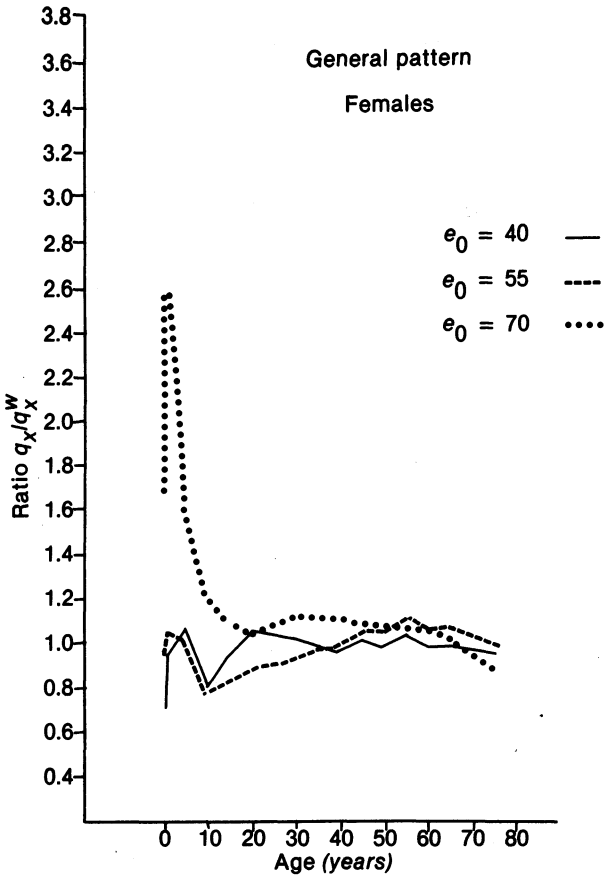


Figure II *(continued)*



considered to be reliable for the adult ages but is of unknown completeness for deaths at the earliest ages.[12] Age patterns of mortality for these two countries, as represented by deviations from West region patterns, are presented in figure III. Brazil shows deviations similar to those of the Latin American model. However, intercensal survival techniques are probably better suited to estimating the over-all level of mortality than identifying age patterns, especially in situations such as the Brazilian where age mis-statement occurs and adjustments for migration must be made. It is not certain, therefore, whether Brazil actually follows the Latin American pattern or whether the pattern implicit in these Brazilian life tables is a function of data errors and estimation methodology.

Although the pattern for the Argentinian life table for females closely follows the Latin American pattern, the male life table does not. The latter pattern is very close to that of Chile, described below, with relatively low mortality at the younger ages, except during infancy, and somewhat higher mortality in the later years.

The second pattern of mortality presented in figures I and II has been labelled the Chilean pattern. The Chilean pattern was estimated from Chilean life tables for the periods 1949-1951, 1959-1961, and 1969-1971. It has some similarities to the Far Eastern pattern except for an extremely high infant mortality rate due presumably to deaths from respiratory diseases.[13] This pattern was unique in the sample of reliable life tables but is included because it may appear in areas where accurate evidence of age patterns of mortality is not yet available.

A third pattern delineated is the South Asian pattern of mortality. This pattern shows, relative to West region tables, very high rates under age 15 and very high rates again at the oldest ages, with correspondingly lower mortality for the prime age-groups. Life tables for India, Iran, the Matlab area of Bangladesh, and Tunisia all show this pattern. Similar patterns appear in less reliable life tables constructed for Bangladesh, Nepal, Pakistan and Turkey.[14] Life tables constructed for China and Indonesia also show such a pattern, with the exception of remarkably low mortality under age 5.[15] Cause of death data are nearly non-existent for these populations but it can be surmised that the South Asian pattern is related to high incidences of infectious, parasitic and diarrhoeal diseases at the youngest ages and high mortality from diarrhoeal and respiratory diseases at the oldest ages.[16] It is interesting to note that the deviations in these life tables are very similar to those of the Coale and Demeny South region, except that the South region deviations are somewhat less extreme.

A fourth identified age pattern of mortality has been labelled the Far Eastern pattern. Goldman recently noted the existence of a distinctive pattern of mortality in selected Far Eastern populations.[17] This pattern is characterized by high male death rates at older ages relative to their death rates at younger ages and very high sex ratios of mortality at the older ages. Goldman found some

[12] See *Population and Vital Statistics Report, Data available as of 1 April 1980* (United Nations publication, ST/ESA/STAT/SER.A/132), pp. 8-9.

[13] See World Health Organization, *World Health Statistics Annual, 1979*, vol. 1, *Vital Statistics and Causes of Death* (Geneva, 1979), table 9. The Chilean rate is especially high for pneumonia (A91-92). It has also been suggested that early weaning may be responsible for Chile's high infant mortality rate. See S. J. Plank and M. L. Milanesi, "Infant feeding and infant mortality in rural Chile", *Bulletin of the World Health Organization*, vol. 48, No. 2 (1973), pp. 203-210.

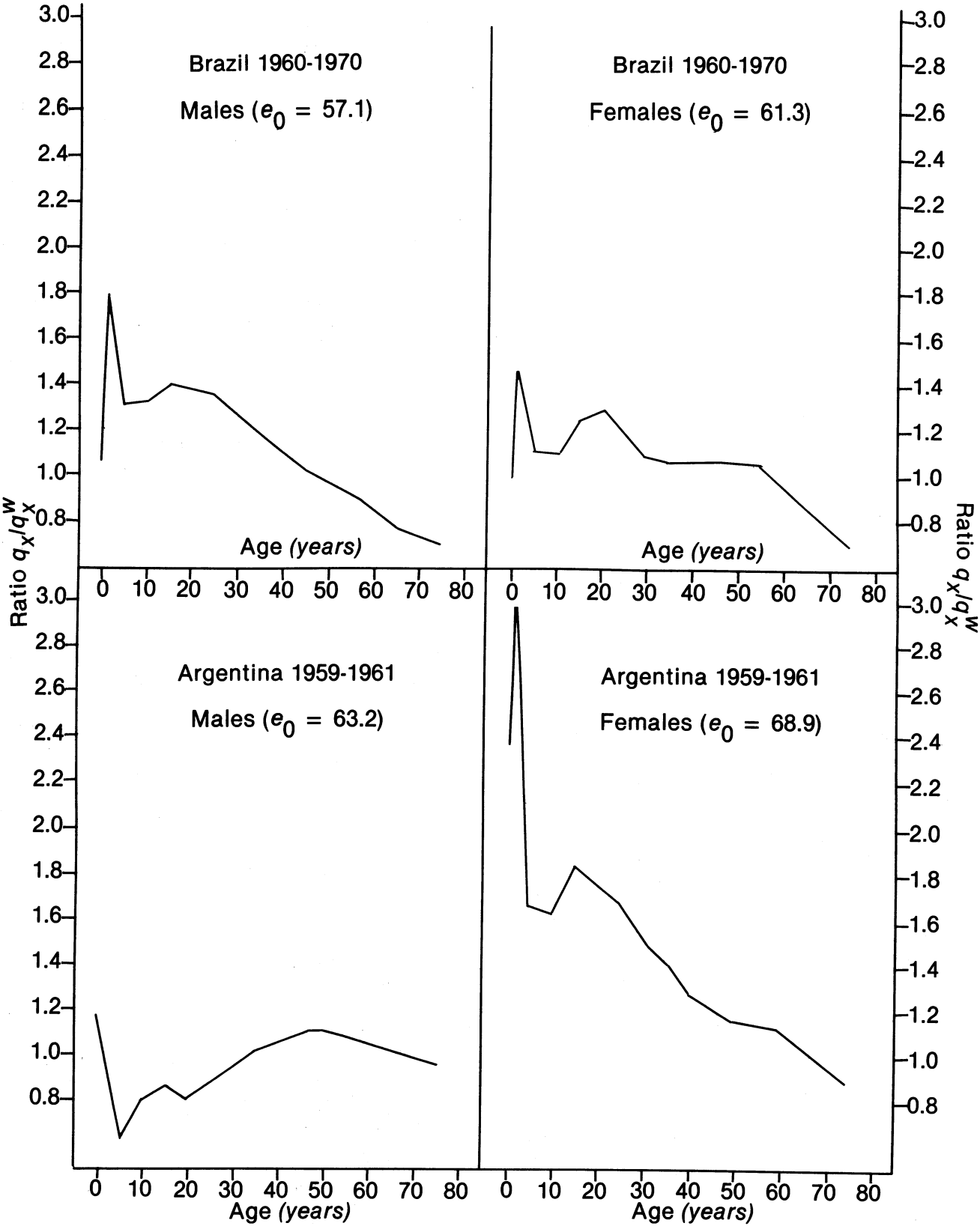
[14] Life tables for these countries appear in United States Bureau of the Census, *Country Demographic Profiles: Pakistan*, by F. B. Hobbs (Washington, D.C., 1980), p. 11, table 5; F. Yusuf, "Abridged life tables for Pakistan and its provinces, 1962-64", *Contributed Papers to the Sydney Conference of the International Union for the Scientific Study of Population*, 21-25 August 1967, pp. 533-541; United States Bureau of the Census, *Country Demographic Profiles: Nepal*, by R. G. Kramer (Washington, D.C., 1980), p. 8, table 5; and Republic of Turkey and Hacettepe University, *Vital Statistics from the Turkish Demographic Survey 1966-67* (Ankara, 1970), p. 121, table 24.

[15] For the Indonesian life tables, see United States Bureau of the Census, *Levels and Trends of Mortality in Indonesia, 1961 to 1971*, by Larry Heligman, International Research Document No. 2 (Washington, D.C., 1975), pp. 3-4, tables B and C. The data for China are from J. Bannister and S. Preston, *Estimates of Completeness of Death Recording in the Chinese Sample Survey of 1972-74*, paper presented at the Workshop on Population Research in China, National Academy of Science, Committee on Population and Demography, Washington, D.C., 28 October 1980.

[16] Although reliability of cause of death data in this region is very low, data are tabulated and analysed regularly as part of the Cholera Research Laboratory project in Matlab and as part of the Model Registration Project in rural India. The Matlab project finds high death rates from dysentery and respiratory diseases (including tuberculosis) among the adult population. In the Indian project, among those aged 55 and over, diseases of the "cough group" (including broncho-pneumonia, pneumonia, respiratory tuberculosis and bronchitis) plus diseases from the diarrhoea group accounted for about two thirds of all deaths. See Cholera Research Laboratory, *Demographic Surveillance System-Matlab*, vol. 5, *Vital Events, Migration and Marriages 1976*, Scientific Report No. 13 (Dacca, 1978), p. 8; and India, Office of the Registrar General, *Model Registration, Survey of Causes of Death: Report for 1971*, series 3, No. 5 (New Delhi, n.d.) pp. 11-14.

[17] N. Goldman, "Far Eastern patterns of mortality", *Population Studies*, vol. 34, No. 1 (London, 1980), pp. 5-19.

Figure III. Deviations of Brazilian and Argentinian life tables from Coale and Demeny West region



evidence that this pattern may be related to a high incidence of tuberculosis in the past which is still evident among adult males in these populations. Research at the United Nations has duplicated Goldman's findings for these populations but has also found a similar pattern of high adult mortality relative to younger-age mortality in Guyana and Trinidad and Tobago. However, in the latter two populations females also show relatively high mortality at the adult ages so that the large sex differentials in mortality at these ages do not appear. A recent life table constructed for Peninsular Malaysia at the United States Bureau of the Census also shows this latter characteristic.[18] The term "Far Eastern pattern" is generalized here to include age patterns characterized by high older-age death rates relative to younger-age death rates, irrespective of sex differentials. Among populations so far identified as having this pattern are the male populations of Guyana, Hong Kong, Peninsular Malaysia, the Republic of Korea, Singapore and Trinidad and Tobago; and the female populations of Guyana, Malaysia, Singapore and Trinidad and Tobago.

The fifth pattern—the general pattern—is constructed as an average of all the life tables in the refined data set, without consideration of cluster. This average pattern appears very similar to that of the Coale and Demeny West region except when mortality is very low. Because of the varied mix of countries underlying the general pattern it is difficult to offer etiological hypotheses of the underlying cause-of-death structure. The age pattern at low levels of mortality presented in figures I and II is similar to that of the Latin American pattern. But rather than suggesting a similar cause-of-death structure the large relative deviations from the West region at low levels of mortality may only indicate the dangers of extrapolation, both in the new United Nations model life tables and in the Coale and Demeny tables.

It appears that the above-mentioned patterns account for many of the variations of mortality in the less developed countries of Latin America, Asia and possibly Northern Africa. Age patterns of mortality in sub-Saharan Africa remain unknown, however, due to the extreme unreliability of the limited data available. The forthcoming United Nations publication, *Levels and Trends in Mortality since 1950*,[19] briefly examines patterns in seven selected sub-Saharan countries (Kenya, Madagascar, Mauritius, Réunion, the Coloured population of South Africa, the United Republic of Cameroon and the Upper Volta) and concludes:

> "The results of these comparisons are disappointing with respect to discovering a single age pattern of mortality for sub-Saharan Africa. If the seven countries analysed are representative, African data show a wide variety of mortality patterns. Some of these patterns are similar to the models of Coale and Demeny, others are not. Patterns under age 10 and over age 10 may resemble different Coale-Demeny models. However, given the unreliability of the data at hand, statements about the age patterns of mortality in this region must remain tentative".

[18] *Country Demographic Profiles: Malaysia*, by G. S. Finch and A. Sweetser (Washington, D.C., United States Bureau of the Census, 1979), p. 8, table 5.

[19] Sales No. E.81. XIII. 3.