

V. SEX DIFFERENTIALS IN MORTALITY

In demographic analysis it is often desirable to have at hand model patterns of sex differentials. Such patterns are useful when available data make no distinctions as to sex, or when data are reliable for one sex only. In addition, some users may wish to combine the male and female tables presented here into "both sexes combined" life tables. In this chapter sex differentials in life expectancy at birth and at age 10 in the group of reliable life tables constructed for the model life table project are examined and simple orthogonal regression models relating female and male life expectancy are presented.

Figures IV and V present, respectively, plots of male life expectancy at birth against female life expectancy at birth and male life expectancy at age 10 versus female life expectancy at age 10. The best fitting orthogonal regression line among the points is also shown.²³ Three

²³Many studies have found a linear relationship between male and female life expectancy. See, for example, A. J. Coale and P. Demeny, *Regional Model Life Tables and Stable Populations* (Princeton, N.J., Princeton University Press, 1966), p. 23; and S. H. Preston and J. A. Weed, "Causes of death responsible for international and intertemporal variation in sex mortality differentials", *World Health Statistics Report*, vol. 29, No. 3 (Geneva, World Health Organization, 1976). Orthogonal regression lines have the advantage that, because perpendicular distances from the line are minimized rather than vertical distances, variables need not be designated as independent or dependent.

symbols are used to represent countries of Latin America, Asia (excluding Far East Asia) and Far East Asia, respectively. The orthogonal regression line clearly separates the data regionally into these three groups. Generally the Asian countries outside Far East Asia fall below the line, indicating higher female mortality at a certain level of male mortality; the Latin American countries fall above the line, indicating relatively lower female mortality; and the Far East Asian countries are also above the line, but further displaced than the Latin American countries, indicating the largest male excess. This clustering of sex differentials is not identical, however, to the age pattern clusterings. The Caribbean countries, which were grouped with the Far Eastern age pattern group, are grouped with the Latin American set for sex differentials. In the same way, the Asian countries of the Philippines, Sri Lanka and Thailand have sex differentials consistent with the Asian (excluding Far East Asian) countries although their age patterns were similar to those of the Latin American countries.

The clustering of sex differentials by geographical region permitted estimation of orthogonal regression lines separately for each region. These regression equations are presented in table 15, together with their coefficients of determination, and pictorially in figures VI and VII. In these equations, e_0^f , e_0^m , e_{10}^f and e_{10}^m are life expectancies at birth and age 10 for females and males.

Figure IV. Life expectancy at birth for males versus life expectancy at birth for females and fitted over-all orthogonal regression line

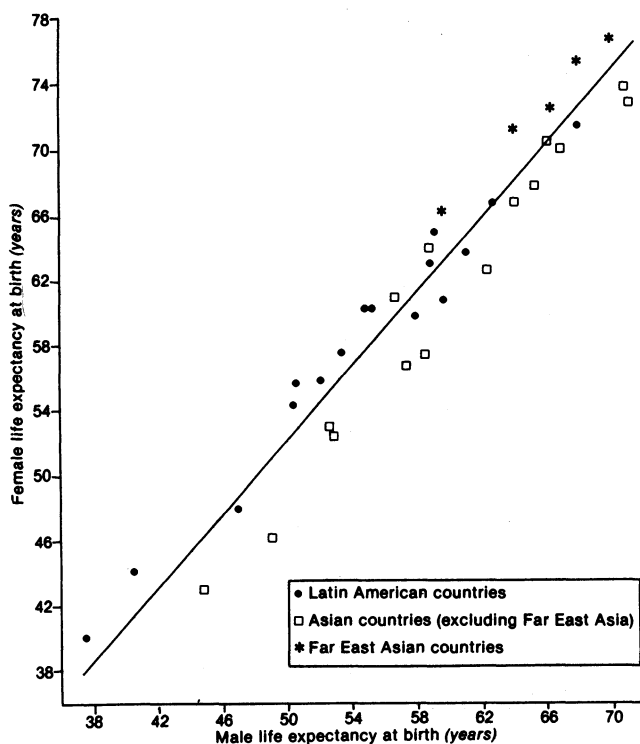


Figure V. Life expectancy at age 10 for males versus life expectancy at age 10 for females and fitted over-all orthogonal regression line

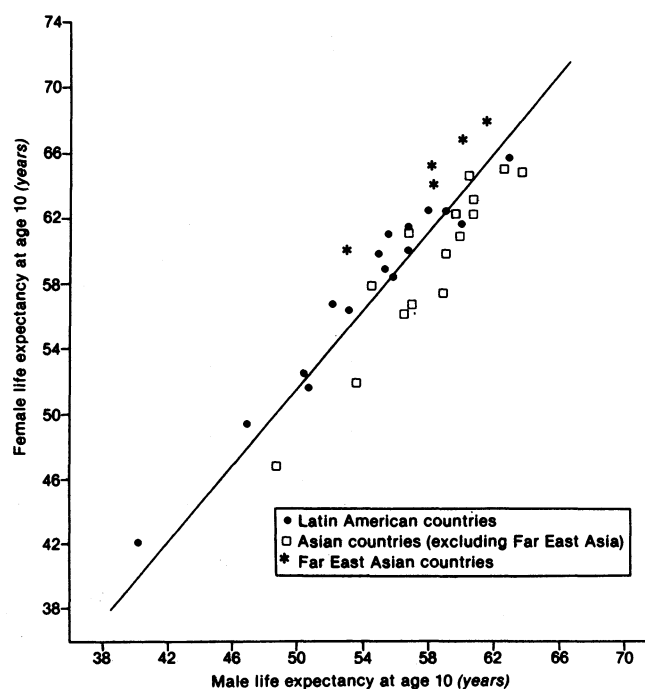


TABLE 15. ORTHOGONAL REGRESSION ESTIMATES OF FEMALE LIFE EXPECTANCY AS A FUNCTION OF MALE LIFE EXPECTANCY

Region	Orthogonal regression line	Coefficient of determination
All countries combined	$e_6^f = 1.135 e_6^m - 4.588$	$R^2 = 0.96$
	$e_{10}^f = 1.201 e_{10}^m - 8.290$	$R^2 = 0.91$
Latin America	$e_6^f = 1.065 e_6^m + 0.201$	$R^2 = 0.99$
	$e_{10}^f = 1.106 e_{10}^m - 2.431$	$R^2 = 0.98$
Asia, excluding Far East Asia	$e_6^f = 1.238 e_6^m - 12.759$	$R^2 = 0.98$
	$e_{10}^f = 1.339 e_{10}^m - 18.217$	$R^2 = 0.94$
Far East Asia	$e_6^f = 1.027 e_6^m + 5.285$	$R^2 = 0.99$
	$e_{10}^f = 0.984 e_{10}^m + 7.848$	$R^2 = 0.99$

TABLE 16. FEMALE MINUS MALE LIFE EXPECTANCY AT BIRTH (Years)

Region	Life expectancy at birth (both sexes combined)			
	40 years	50 years	60 years	70 years
Latin America	2.7	3.3	4.0	4.6
Asia, excluding Far East Asia	-2.9	-0.8	1.4	3.5
Far East Asia	x	x	6.8	7.1
Above three regions combined	0.8	2.0	3.3	4.6
West region	2.7	2.9	3.6	4.0
North region	3.1	3.4	3.7	3.7
East region	2.9	3.4	4.1	4.7
South region	1.7	2.8	3.8	3.9

Figure VI. Life expectancy at birth for males versus life expectancy at birth for females and fitted regional orthogonal regression lines

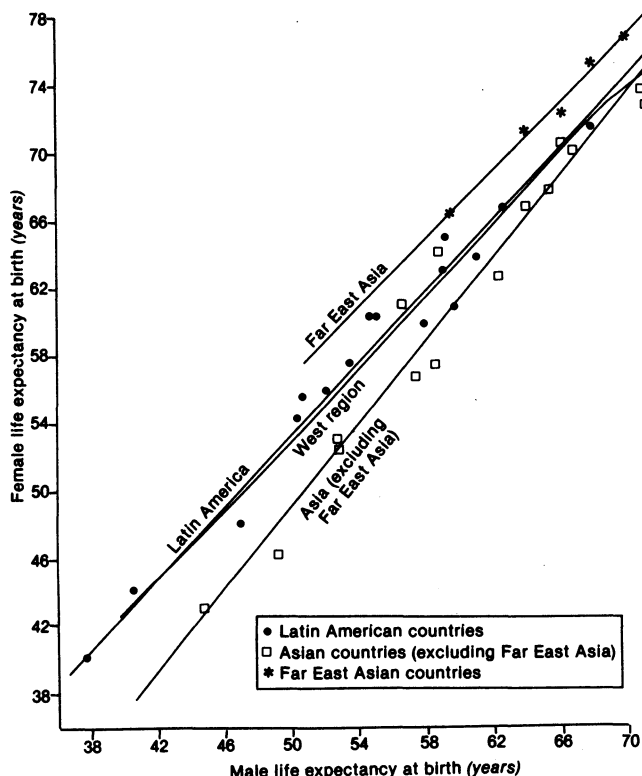
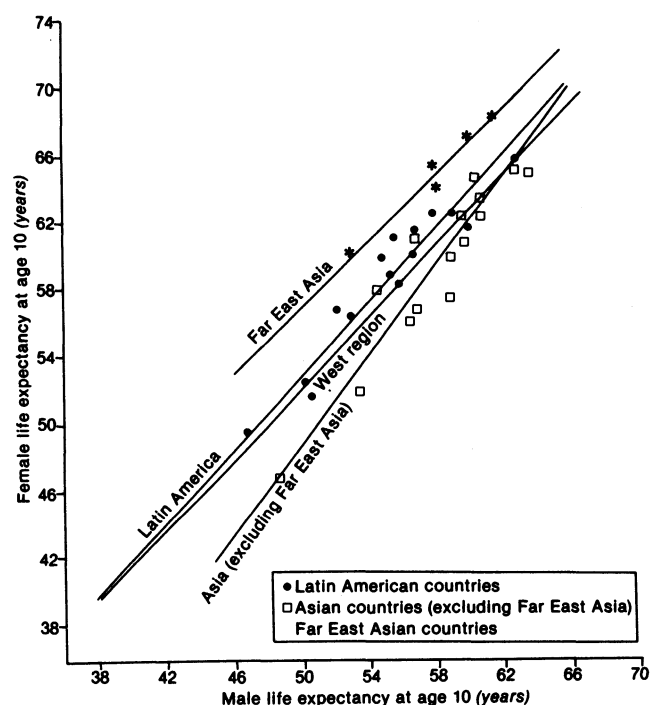


Figure VII. Life expectancy at age 10 for males versus life expectancy at age 10 for females and fitted regional orthogonal regression lines



It is important to note that the Far East Asian countries' line is based on only five countries, all with high life expectancies; any extrapolations based on their equations are likely to be meaningless and should be done with extreme caution.

Figures VI and VII also present the lines based on the tables implicit in the Coale and Demeny West region model, a model comprising mainly Western European experience. The lines are very close to the Latin American line, as are the lines from the Coale and Demeny North, South and East regions (not shown). It appears that sex differentials in life expectancy at birth and age 10 for Latin American countries are very similar to historical European experience. Asian differentials differ, with all but the Far East Asian countries showing relatively low male mortality and the Far East Asian countries showing relatively high male mortality.

To simplify comparison, table 16 presents predicted sex differentials in life expectancy at birth at four different mortality levels for each of the less developed

regions and for the regions of the Coale and Demeny model life table system.²⁴

²⁴The lack of reliable life tables has precluded a confident similar analysis of sub-Saharan African mortality differentials. However, using the life expectancy figures currently available and presented in *Demographic Yearbook, special issue: Historical Supplement* (United Nations publication, Sales No. E/F.79.XIII.8), pp. 542-563, this exercise has been repeated, based on 25 countries for which empirical life tables are available. It should be remembered, however, that the poor quality of the data makes conclusions very tentative.

The equation of the orthogonal regression line for the sub-Saharan countries is

$$e_6^f = 1.102 e_0^m - 1.155.$$

When compared to sex differentials in life expectancy at birth for the other regions, sub-Saharan African sex differentials appear to be similar to those of the Latin American countries at higher levels of mortality but to widen more quickly as mortality declines so that at lower levels sub-Saharan African sex differentials are somewhere between those of Latin American and Far East Asia. The difference between female and male life expectancy at birth, as implied by the orthogonal regression line, would be 2.8 years, 3.8 years, 4.7 years and 5.7 years for life expectancies at birth of 40 years, 50 years, 60 years and 70 years, respectively.