Active Life Expectancy of the Elderly in Selected Asian Countries

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I. Introduction

Measures of active life expectancy (ALE) have been used as global measures of population health for a number of years. By incorporating estimates of mortality and functional disability the ALE indicator provides a measure of disability-free life expectancy that can be compared with total life expectancy to understand a population's general state of health. Active life expectancy is a topic of interest to persons concerned with the health of the elderly as well. As the average life expectancy increases for countries moving through the demographic transition, it is important to consider quality of life and the ability to perform daily tasks of living.

Most of the studies in which ALE has been calculated have used data from Western Europe, North America and Australia (e.g., Bebbington, 1988; Katz et al., 1983; Mathers, 1991; Robine et al., 1986; Wilkins and Adams, 1983). Few studies have examined ALE for non-Western countries, primarily due to the lack of adequate data. A notable exception is an early calculation of active life expectancy for Japan estimated by Koizumi (1982).

The purpose of this research is to examine the active life expectancy of the elderly, i.e., persons aged 60 years and older, from selected countries in Asia. For each country, the age-specific prevalence of functional disability will be used to calculate ALE. Countries will be compared in the proportion of total life expectancy that is estimated to be free of disability, for males and females, at various ages.

Specifically directing focus on disability among the elderly is useful for a number of reasons. Most countries are at or near the third stage of the epidemiologic transition (Omran, 1971), where the incidence and prevalence of chronic conditions, and associated disabilities, are most likely to be present. It has been noted that for elderly populations:

> (a) there is a higher prevalence of (possibly multiple) chronic diseases, (b) the natural history of chronic diseases is affected by interaction with other acute and chronic diseases and with age-related losses in physiological function and the ability to maintain homeostasis, and (c) many chronic diseases do not currently admit to "cure"--only to management and control (Manton, 1990, p. 64).

Also, the elderly are a crucial component of the dependency load incumbent on a society. Many less developed countries, with high but declining rates of fertility, are beginning to experience aging from the base. This is a significant trend because currently the majority of the world's population at age 55 years and higher live in developing countries (Kinsella, 1988; 1993). Forecasts indicate that the regional distribution of the older population will shift considerably such that by 2020 the proportion of elderly in developing countries is projected to rise to over 70 percent. As populations age, the proportion of old dependents increase. Thus, it is especially meaningful to examine the life expectancy and disability of this growing (and heterogeneous) part of a country's population.

Finally, it would be useful to direct attention to the state of health and disability of those who have survived to old age in countries at different levels of development. As Ju and Jones (1989, p.73) have noted, "In high mortality populations, the aged are a very select group; they are those who have survived the dangers of being born, the risks of infancy and childhood, and the sickness and accidents of middle age." Are those men and women who have survived to old age more hardy in the developed countries?

II. Studies of Disability in Asian Countries

In the research that has specifically focused on the health and disability of the elderly, some interesting trends have been noted. Evans (1985) reported the results from a comparative study of disability levels in Indonesia and Australia, countries that clearly are at different stages of development. He found that: (1) age-specific prevalence rates of disability in Australia were on the average 4.3 times (range 1.0 to 11.9) greater than corresponding rates for Indonesia, (2) prevalence rates of disability increased by age in both societies, but approximately twice as fast in Indonesia as was evident in Australia, and (3) there was a cross-over in disability rates by sex in both countries (with rates for females exceeding that of males at later ages), however, the cross-over appears to occur 7 to 15 years earlier in Indonesia. Moreover, he suggested that death rates for disabled persons (case-fatality rates) are probably greater in Indonesia, while incidence rates also may be higher. Thus, the disabled population in Indonesia may be smaller due to the higher age-specific mortality rates.

The ASEAN Ageing Surveys (Ju and Jones, 1989) of the elderly in Indonesia, Malaysia, the Philippines, Singapore and Thailand, found that more than 90 percent of the elderly surveyed were able to get around the house without help. Such a proportion is higher than that from studies of the elderly in developed countries. Indeed, for the ASEAN countries, more than 80 percent of those persons aged 75 years and over were able to get around the house with no help.

The 1984 World Health Organization's Western Pacific Regional Office (WPRO) four country survey of Fiji, the Philippines, Malaysia and South Korea, indicated rather low prevalence rates of functional disability among persons over the age of 60 years: 8, 9, 10, and 29 percent respectively (Andrews, et al., 1986). It is interesting to note that South Korea, a "newly industrialized country," exhibits the highest prevalence rate of disability among the four countries.

This short overview indicates a trend in that the prevalence rates of disability among the elderly in the developing Asian countries tend to be low. How would such rates translate into measures of active, or disability-free, life expectancy?

III. Data and Methods

Because this study is cross-national, a number of datasets are used to obtain population estimates of late-life disability. The data are drawn from two components of the World Health Organization's "Health and Social Aspects of Aging" project, conducted under the auspices of the Centre for Ageing Studies, Flinders University of South Australia, under the direction of Gary R. Andrews. The two datasets are: WPRO (Western Pacific Regional Office--Malaysia, the Philippines, and South Korea), collected in 1984, and SEARO (South East Asian Regional Office-Burma, Indonesia, North Korea, Sri Lanka and Thailand), collected in 1989.

Each country-level project had a principal investigator from a research institution or organization within the country. The principal investigators were responsible for the construction and implementation of the appropriate sampling techniques and the selection and training of interviewers. The interviewers were natives who spoke the languages and/or dialects that were necessary for accurate data collection. Many interviewers were health care professionals, such as community nurses and health care workers, or persons who had previously participated in health surveys. Detailed instructions for the project directors and the interviewers were established to ensure better comparability of the data collected.

A. Sampling

The individual level data were collected through personal interviews with non-institutionalized persons aged 60 years and older. Standardized interview schedules were used throughout. For each country the interview schedules were translated into the native languages, and then back-translated to check for consistency in meaning and content. In all of the countries, the sample design was intended to represent the population distribution of the elderly in terms of gender, urban-rural residence and major ethnic groups.

For the WPRO project, area sampling was conducted in Malaysia at the district level, due to the ethnic diversity of the country. The sampling was designed to represent Peninsular Malaysia. This area was divided into five subregions, based upon ethnic distributions, population infrastructure and geography. One state from each of the subregions was included in the sample. From each state, urban and rural districts were selected, with the state capital being selected as the urban district. Because persons of the same ethnic groups live in clusters, lists were made of all villages and clusters of houses according to ethnicity. Individual villages and clusters were randomly selected for interviews with persons aged 60 years and older. There was a 2.6 percent refusal rate (26 out of 1000), the majority of which were from the urban areas. Additional names were added to substitute for the refused interviews (Andrews et al., 1986).

The Tagalog Region was the target population for the Philippines study. This region is two-thirds urban whereas the rest of the Philippines is much more rural. The Tagalog Region is composed of the Metropolitan Manila area and 10 provinces. A three-stage, stratified cluster sampling technique was used, with the provinces as the primary sampling units. Selection among the municipalities, of the provinces, and the districts, of the cities, composed the second stage. The barangays (villages or areas) were chosen in the third stage of the sampling. Random sampling techniques were employed at each stage. All persons aged 60 years and over were interviewed from the designate barangays. The response rate for completed interviews was about 90 percent. As with Malaysia, the majority of the refusals occurred in urban areas (Andrews et al., 1986).

The sample from South Korea was designed to represent the entire country. Multi-staged random sampling techniques were used to select the sampling areas. One area (gun) was selected from each of the eight provinces and a smaller area (myeon) was chosen from each gun. All persons aged 60 years and older were interviewed in each myeon. Response rates were not reported for the Republic of Korea (Andrews et al., 1986).

For the SEARO countries, the sampling in Burma was taken from seven Divisions in the country representing 69 percent of the population. Three Divisions were selected, Yangon, Mandelay and Ayeyarwady, and were considered representative of the country. Townships within the Divisions were randomly selected for inclusion in the study. The wards within the townships were stratified by socio-economic status. Because no official registers existed, area sampling was employed in that households were randomly selected within the chosen locations. The non-response rate was less than one percent.

Samples drawn in North Korea were designed to be representative of the entire population. Rural counties and urban districts were selected in the east and west coast and inland regions. Two ri (localities) were selected from each county or district. List sampling, by age and sex, was accomplished using the official listing of persons in each selected ri. No refusals were reported.

Indonesian data were drawn from the Central Java province, which at the time had a population of 29 million persons. Districts were selected from urban and rural areas. Stratified random samples were drawn from official village registers. Ten people could not be contacted during the interview period and substitute respondents were obtained. The response rate was 100 percent.

In Sri Lanka, a three-stage sampling procedure was used in three districts of the Western Province: Colombo, Kalutan and Gampaha. Census data was used to identify 10 urban and rural districts. Clusters were randomly selected from election wards in urban districts and from Grama Sevaka divisions in the rural areas. The electoral registers served as the sampling frame for the random selection of persons to be interviewed. The refusal rate was less than one percent.

The Thai sample was designed to represent the entire country. Bangkok and four geographical regions were sampled. In each region, one municipal area and three provinces were randomly selected, and then districts and villages were selected. In Bangkok, three districts and two sub-districts were randomly chosen.

Interview subjects were drawn from official population registers. Only one person refused to be interviewed.

For all of the WHO surveys, data were collected through personal interviews with the elderly subjects, and when possible, with an informant who lived with the respondent. The total number of persons sampled were for WPRO: Malaysia, 998; Philippines, 827; South Korea, 977; and for SEARO: Burma, 1221; North Korea, 1182; Indonesia, 1202; Sri Lanka, 1200; Thailand, 1199.

B. Measuring Active Life Expectancy

Data on age- and sex-specific prevalence rates of disability are used in the calculation of active life expectancy measures for each of the eight countries. The estimation of active life expectancy, using cross-sectional data, is based on a technique that was developed by Sullivan (1971). The Sullivan (1971) method, using population prevalence rates and current mortality rates, is a reflection of the health levels of a population at a particular point in time adjusted for age-specific mortality levels (Crimmins, Saito and Hayward, 1992).

The conceptualization and operationalization of disability is fraught with problems. This is intensified when one tries to conduct cross-national comparisons, even when comparable surveys are used throughout. For example, the inability to complete a task may be due to cultural norms and gender expectations rather than to physical or health limitations. For this research, "disability" refers to functional limitations in personal care activities. The variables used to measure disability are self-reported (or proxy-reported) abilities in activities of daily living, or ADLs:

1. Can you eat (EAT)
2. Can you dress and undress yourself (DRESS)
3. Can you take care of your appearance (GROOM)
4. Can you walk (WALK)
5. Can you get in and out of bed or the place where you sleep (TRANSFER)
6. Can you take a bath or shower (BATHE)

For each activity, there were three responses: 1) without help, 2) with some help, or 3) unable to do (for EAT, DRESS, GROOM and WALK) or totally dependent (for TRANSFER and BATHE).

Activities of daily living are typically used in calculations of healthy life expectancy (e.g., Katz et al., 1963; Rogers, Rogers and Belanger, 1990; Branch et al., 1991). Because the activities represent personal care routines and basic functioning, they are more likely to be culturally universal, and thus, appropriate in the calculation of a composite measure of functional disability for cross-national comparisons.

A respondent was considered to be disabled if he or she needed help in completing, or was unable to do, at least one of the six activities. It should be noted that these measures of disability are self-reported, and thus may be inaccurate assessments of the respondent's actual abilities. However, the vast majority of disability studies have used self-reported measures of physical function and found such measures of disability to be significant predictors of outcomes such as mortality. Therefore, in this research the assessment of disability is based upon the self-reported ability to complete the six activities of daily living. A person was considered to be healthy, or disability-free, if he or she reported being able to do all six activities without help.

The age-specific disability prevalence rate is the proportion of persons who are disabled in each age group. A caveat is necessary regarding problems with age misreporting, especially with data gathered from elderly persons in less developed countries. In all probability such persons were born before the countries had systematic birth registration systems and before the Western system of marking years was understood or widespread. In reviewing the reported ages by single year, clustering was noted for decade and mid-decade years (e.g., 70, 75). There also may be age inflation for the oldest old, as some persons reported ages at 100 years and over. Age group intervals are used to reduce the possible age reporting biases, with the open category being age 80 years and over.

For the present study, country-specific abridged life tables, for males and females, were obtained from Kevin Kinsella, the Director of the Center for International Research, Bureau of the Census, U.S. Department of Commerce. These

life tables reflect the mortality experience of the populations for the approximate times of the surveys.

The active expectancy measure (ALE), following the Sullivan (1971) method, uses the age-specific prevalence rates of disability in its calculation. The age-specific disability rate is the percentage of persons who are disabled in each age interval (i.e., for ages 60-64, 65-69, 70-74, 75-79, 80 and over).

The first step is to calculate the person-years of life lived active, or disability-free, for each age interval. To obtain the person-years of active life for the age intervals, the following formula is used:

$$L_{x(disability-free)} = (1 - ASDPR) * L_x \qquad (1)$$

The ASDPR is the age-specific disability prevalence rate.

The age interval person-years of active, or disability-free life, are summed from age x and older to produce the total person-years that are active, or disability-free:

$$T_{x(df)} = \sum_{t=0}^{\infty} L_{[x(df)+t]} \qquad (2)$$

The df denotes the disability-free state.

The active, or disability-free, life expectancy values are obtained by dividing each age-specific total person-years by the age-specific l_x value from the basic life table:

$$e_{x(df)} = \frac{T_{x(df)}}{l_x} \qquad (3)$$

Separate ALE estimates are calculated for males and for females.

IV. Results

Tables 1 and 2 present, for each country, age and sex-specific total life expectancy, active life expectancy and the percentage of total life expectancy that is estimated to be spent active (disability-free). In general, the proportion of ALE years declines through the age intervals, with the oldest old having the lowest expected portion of remaining active years.

There are some interesting trends with the WPRO countries (see Table 1). Malaysian males and females have very high proportions of active life expectancy. The rates are virtually the same at age 60 years. After that point the female age-specific rates decline at a slightly quicker pace. Although the life expectancy estimates for South Korea are much more favorable for females, the male and female shares of expected active years are comparable, with the males having a slight advantage. The percentage of ALE for males and females in South Korea remain above 50 percent at age 80 years. The Filipino male and female proportions of ALE are analogous and show no clear trend of advantage, except at age 80 years. This is in part due to the similarities between the male and female LE and ALE estimates.

In the SEARO countries, the proportion of ALE is high for males and females in Burma, Indonesia, Thailand and North Korea (see Table 2). The trends for Burma indicate that, through the age intervals, females can expect a higher proportion of active life expectancy than males. The rates for the Indonesian and Thai males only drop below 90 percent at age 80. The North Korean males show a sharper decline in the proportion of active life expectancy. Sri Lanka has the lowest percentage of ALE for males and females through the age intervals, falling to below 50 percent at age 80.

A set of figures are presented, based on the values in Tables 1 and 2, to illustrate the patterns of health and disability among the countries under study. All of the data are for age 60, rather than 65, because these countries have not completed the demographic transition. The first three figures show male and female comparisons of total life expectancy (Figure 1), active life expectancy (Figure 2), and the proportion of

total life expected to be active (Figure 3). For each of these three graphs, the estimates for the females are measured along the x-axis, and that of males are measured along the y-axis. Country points above the diagonal indicate that males are advantaged, and points below the diagonal mean that females are favored.

From the graph of total life expectancy at age 60 (Figure 1), it is clear that females have more years of expected life than do males, as would be expected. The distance from the diagonal line indicates the gap between average male and female life expectancies at age 60. Thus, the difference between males and females in the Philippines is quite small. There is a greater gender difference in years of remaining life for elderly in North and South Korea. A greater gender difference in years of total life expectancy suggests an increasing survival advantage for females over males as countries become more developed.

Similarly, females tend to have more years of healthy life expectancy (Figure 2), as compared to males. Although females can expect more years of both healthy life and total life expectancy, Figure 3 shows that males, for the most part, can expect a smaller proportion of their lives to be spent in disability. The exceptions are Burma and Malaysia. However the female advantage is extremely small. Indeed, for the majority of the countries under study, the percentage point gender difference in the percent of remaining life expected to be active is minimal at age 60 (see Tables 1 and 2).

Table 1. Total Life Expectancy, Healthy Life Expectancy and Percent of Life Expected to be Healthy Indicators for the WPRO Countries

Age	Total Life Expectancy	Healthy Life Expectancy	Percent Healthy Life Expectancy	Age	Total Life Expectancy	Healthy Life Expectancy	Percent Healthy Life Expectancy
		Males				Females	
Malaysia							
60	14.18	13.28	93.6	60	16.54	15.53	93.9
65	11.30	10.49	92.9	65	13.20	12.13	91.9
70	8.89	8.12	91.4	70	10.27	9.12	88.8
75	6.74	6.08	90.2	75	7.86	6.64	84.5
80	4.66	3.78	81.2	80	5.43	4.17	76.9
Philippines							
60	16.75	14.84	88.6	60	17.40	15.03	86.4
65	13.61	11.62	85.4	65	13.69	11.56	84.5
70	10.36	8.33	80.4	70	10.04	8.05	80.1
75	8.08	5.85	72.4	75	7.30	5.46	74.8
80	6.07	3.82	62.9	80	5.47	3.11	56.9
South Korea							
60	13.63	10.56	77.5	60	18.65	14.23	76.3
65	10.65	8.01	75.2	65	14.84	10.66	71.9
70	8.29	6.03	72.7	70	11.40	7.41	65.0
75	6.27	4.29	68.3	75	8.68	5.12	59.0
80	4.88	2.70	55.2	80	6.30	3.43	54.5

Source: WPRO (Western Pacific Regional Office), 1984

Table 2. Total Life Expectancy, Healthy Life Expectancy and Percent of Life Expected to be Healthy Indicators for the SEARO Countries

Age	Total Life Expectancy	Healthy Life Expectancy	Percent Healthy Life Expectancy	Age	Total Life Expectancy	Healthy Life Expectancy	Percent Healthy Life Expectancy
		Males				Females	
Burma							
60	14.56	11.86	81.5	60	16.30	13.40	82.2
65	11.66	8.80	75.5	65	13.08	10.19	77.9
70	9.11	5.97	65.6	70	10.22	7.29	71.3
75	6.97	4.19	60.1	75	7.78	4.76	61.2
80	5.31	2.66	50.0	80	5.84	2.76	47.3
Indonesia							
60	14.40	13.66	94.9	60	15.89	14.49	91.2
65	11.62	10.86	93.5	65	12.87	11.34	88.1
70	9.20	8.43	91.6	70	10.30	8.61	83.6
75	7.15	6.53	91.3	75	8.14	6.16	75.6
80	5.56	5.70	84.5	80	6.45	4.17	64.7
North Korea							
60	14.79	13.30	90.0	60	18.94	16.15	85.3
65	11.91	10.67	89.6	65	15.42	12.67	82.2
70	9.49	8.21	86.5	70	12.30	9.55	77.7
75	7.50	6.16	82.1	75	9.58	6.84	71.4
80	5.86	4.60	78.4	80	7.18	4.65	64.8
Sri Lanka							
60	18.12	14.14	78.0	60	20.13	14.68	72.9
65	14.60	10.76	73.7	65	16.17	10.94	67.6
70	11.52	7.66	66.5	70	12.66	7.86	62.1
75	8.83	5.14	58.3	75	9.50	5.14	54.1
80	6.18	2.78	45.0	80	6.51	2.77	42.6
Thailand							
60	16.01	15.22	95.1	60	19.06	17.42	91.4
65	12.95	12.10	93.4	65	15.58	13.89	89.2
70	10.04	9.13	91.0	70	12.39	10.56	85.2
75	7.77	7.13	91.8	75	9.63	7.55	78.4
80	5.47	4.89	89.4	80	6.49	4.32	66.6

Source: SEARO (South East Asian Regional Office), 1989

Figure 1. Total Life Expectancy for Males and Females at Age 60

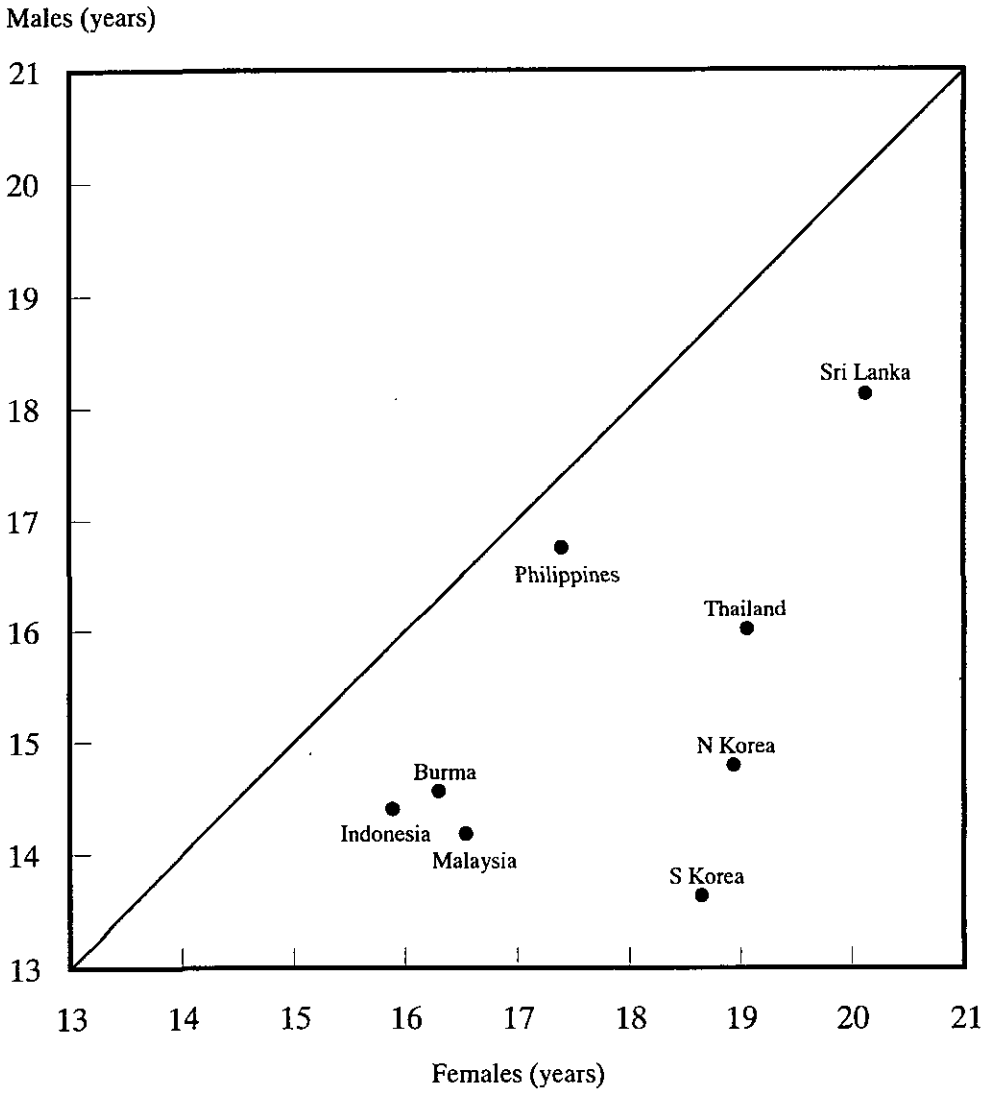


Figure 2. Active Life Expectancy for Males and Females at Age 60

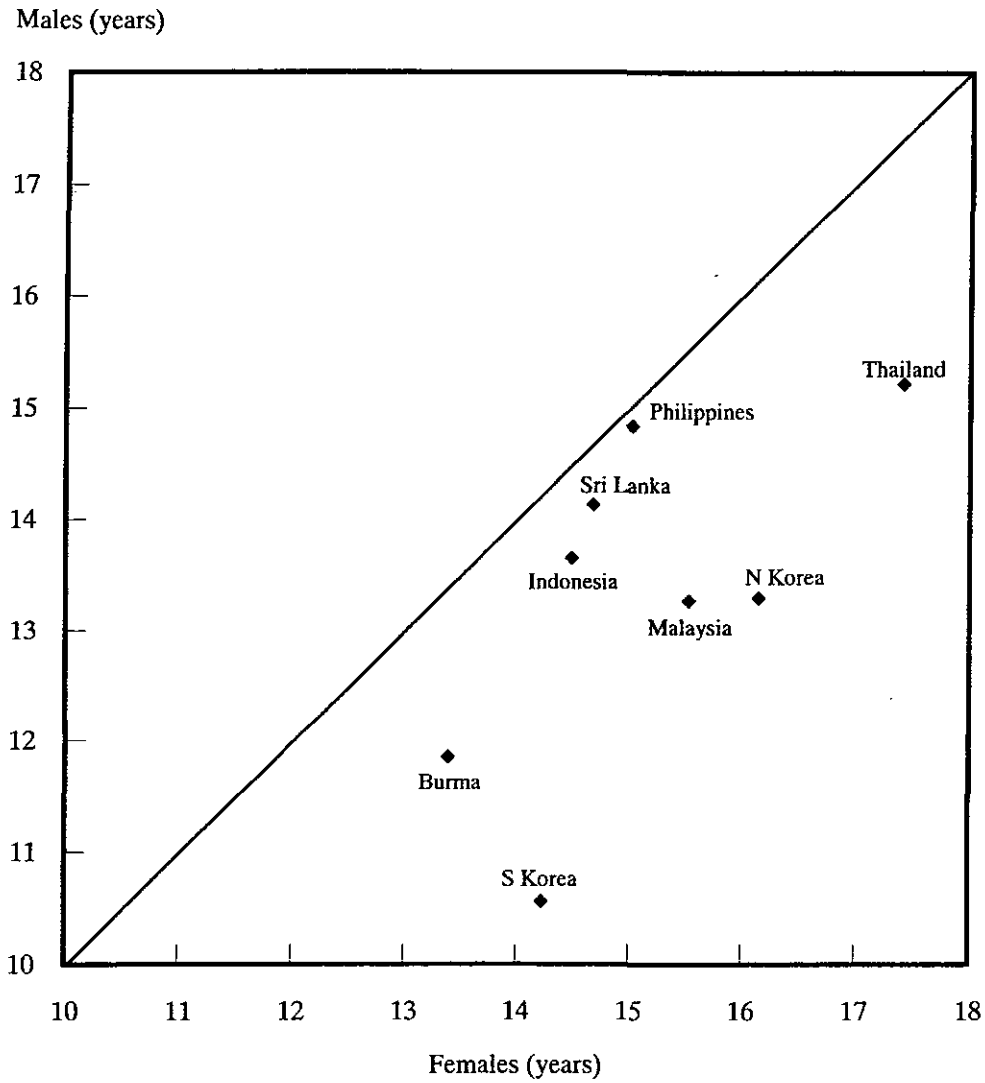
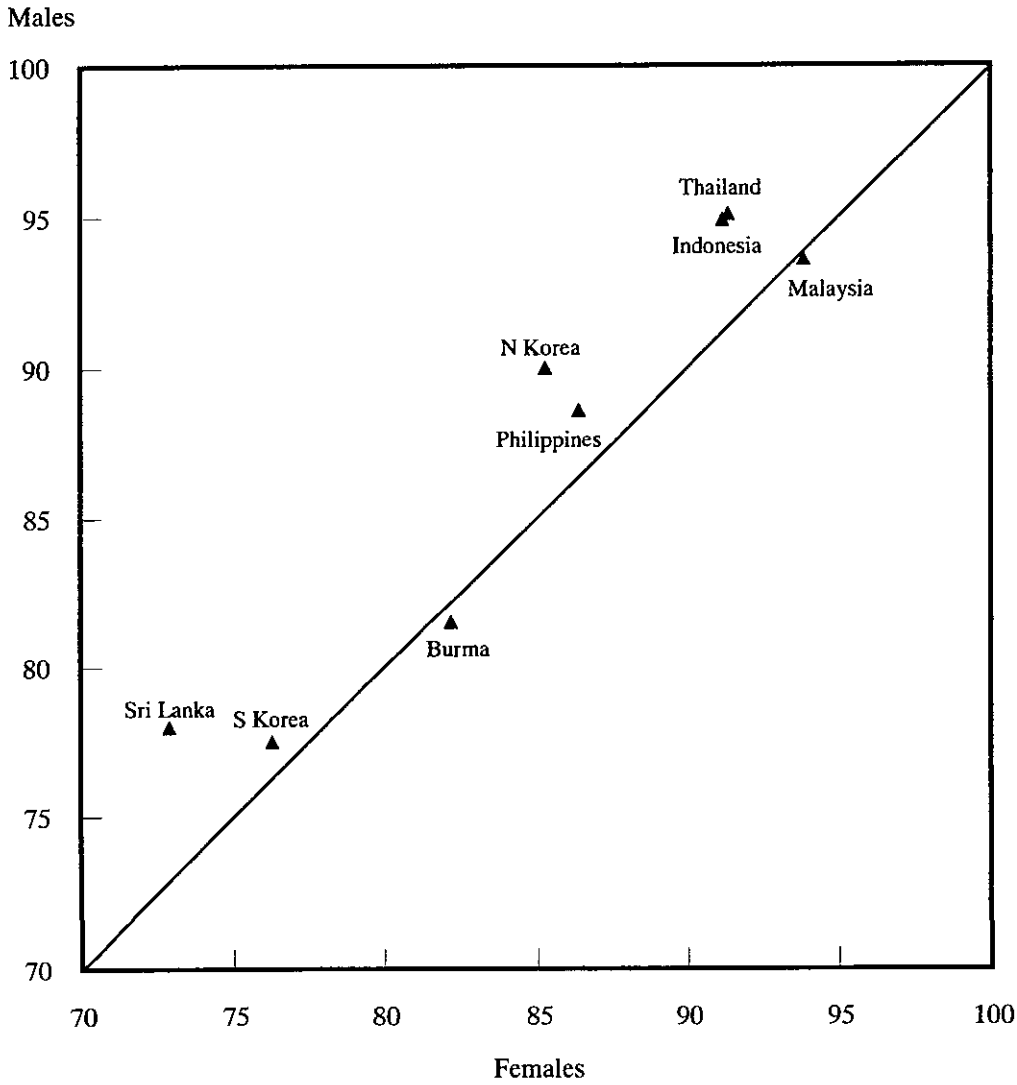


Figure 3. Percent Active Life Expectancy for Males and Females at Age 60



V. Discussion

This overview of the patterns of elderly disability in a number of Asian countries raise many interesting theoretical and substantive questions to be pursued in the future. However, before significant research can proceed, a number of issues will have to be addressed regarding the study of disability in developing countries.

The first question to be considered has to do with the selection of appropriate items to capture disability. The goal is a scale, or range of items, that measures health-related functional disability. The WHO data are useful in that a common set of survey items was used throughout. However, further analysis is needed to evaluate the appropriateness of the items, and to assess whether there are inherent biases that could confound the results. To have an unbiased measure of disability may be an impossible goal, but it is certainly worth the pursuit. One possible avenue to pursue may be a focus upon questions relating to mobility per se, or other specific functional activities.

A second set of questions that must be considered, has to do with the reliability of the individual-level data that is collected. If a survey is used, researchers must be aware of the shortcomings of the sampling process, including: the delineation of the target population, the method of selecting the sample, the ability of the interviewers, the language or dialects of the survey instrument, how refusals are dealt with, and the list goes on. Certainly, there will be difficulties in collecting data in developing countries. Indeed, there are problems collecting data in developed countries. The underlying issue is that one must be aware of the shortcomings of the data that is used and, thus, present and interpret the findings accordingly.

For the current study, there were some difficulties in obtaining representative national samples. Efforts were made to collect data to reflect the distributions of the total elderly populations, e.g., rural/urban. Additionally, research organizations within each country were used to organize and implement the data collection.

Many of the countries examined in this paper have been studied in other projects, thus it would be informative to compare trends of disability. However, this task is not as easy as it sounds, as disability items may not be identical, thus differences may be due to variations in questionnaire construction and the wording of disability questions and responses. Wiener et al. (1990) faced such problems in comparing studies of elderly ADL impairments in the U.S.

A third issue in conducting comparative research is the consideration of factors that might be affecting the country-specific patterns of elderly disability. It would be useful to conduct an analysis of the health, economic and political changes that could influence the current prevalence of elderly disabilities. Attention should be given to the period-specific experiences such as wars, drought or famines, that were experienced at different stages of the individuals' lives. Hermalin (1995) recently stated that it is an exciting time for studying the elderly in Asia because so many changes are occurring, such as longer life expectancy, reduced fertility, changes in family sizes, changes in migration patterns and living arrangements. Such changes and contexts should be noted and incorporated in future cross cultural studies of elderly health and disablement.

The study of active life expectancy in developing countries is a very interesting and useful addition to the research that already has been conducted on developed countries. As with any worthwhile research endeavor, rigorous questions must be posed and satisfactorily answered, to determine the adequacy of the data and the appropriateness of the measures being used.

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