THE AGING OF POPULATIONS

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When a demographer speaks of "an aging population," he is not merely acknowledging the fact that with the passage of time any specific group of individuals must perforce grow older; he is more probably referring to an increase in the proportion of old people in a population resulting from the effects of births, deaths or migrations.

For some purposes there is significance in the mere increase of numbers of old people in the population. It is largely numbers which determine the volume of need for services, such as medical care or Social Security. But an increase in numbers does not necessarily mean an increase in the proportion within the total population. If the total population is growing, some increase in the number of the aged will be required just to maintain the same proportion. In order for the proportion of aged to increase the number of aged must be increasing faster than the rest of the population.

This is the condition which is usually referred to when we speak of "an aging population." Such a process may be indicated by increases in any one of a number of conventional measures of relative age of a population. one of the crudest of such measures is the median age of the total population. This is defined as that age which divides the total population into two equal groups, fifty per cent older than the median and fifty per cent younger. In 1970, the median age of the population of Thailand was 17.1 years.[1] When this is compared with

the median of 28.1 in the United States for the same year,[2] it is quite evident that Thailand has a relatively young population and that the population of the United States is considerably older.

The most common measure of aging is the per cent 65 and over. In 1970, the per cent 65 and over in Thailand was 3.1 while in the United States it was 9.9. By this measure also, then, Thailand's population is much younger than that of the United States.

Another measure of the relative age of a population is Valaoris' index of aging.[3] This is a ratio between the extremes of age in a population, i.e., between the old and the young. More specifically, it is the number of persons 65 years of age and over per 100 persons under 15. Again it is obvious that Thailand is a young population when its index of aging, 6.8, is compared with that of the United States, 34.7.

Still another measure of relative age which is sometimes used is the aged dependency ratio. This is the ratio between the number of people 65 and over and the number 15 through 64. Of course, the rationale for this ratio and for calling it a "dependency" ratio is the assumption that for the most part the population over 65 is economically non-productive and dependent for its economic support upon the productive or working population most of which will be between the ages of 15 and 65. In 1970, the aged dependency ratio for Thailand was 5.9 and that for the United States was 16.0. This was a marked increase over 1950 when the ratio was only 13.8.[4]

Thus all of these measures of relative age of populations yield similar conclusions in the comparison of Thailand and the United States; by all measures Thailand is much younger than the United States. Each measure has advantages for specific purposes, but in a general treatise

on the demography of aging, it would be redundant to continue to employ all of them. Therefore throughout the remainder of this article we will use only the per cent 65 and over.

WHEN DOES OLD AGE BEGIN?

There is no universally accepted criterion as to when old age begins. Within given cultures we may find somewhat standardized conceptions, but certainly definitions of old age have varied widely from time to time and place to place.

Early Chinese scholars used to refer to the period from 60 to 70 years of age as "the longed-for age," and "old age" began at 70.[3] Pythagoras likened the stages of life to the seasons of the year; each season comprised a twenty-year period and the last season, winter, or old age, began at 60. However, the great Greek physician, Hippocrates, had a more complex system of ages; for him the life span consisted of ten 7-year cycles with the ninth cycle, 56 to 63, apparently marking the onset of old age. A more optimistic and modern view is that of the French 19th century physiologist, Flourens, who divided life into 8 periods of variable length, the first two comprising childhood and extending to 20 years of age, the second two described as youth and lasting until 40, the first period of maturity stretching from 40 to 54, and a period of later maturity including the ages 55 to 69, and finally old age beginning at 70 and again consisting of two periods with the last one starting at age 85.

The Polish anatomist, Bochenek, divided old age into three decades; the first degree of aging was between 60 and 70, the second between 70 and 80, and the final degree from 80 to 90. He apparently assumed that no one would live beyond 90. The Soviet gerontologist, Frenkel, after surveying a number of age classifications, concludes that:

"Most nations, in various periods of history, have employed 60 as the beginning of old age."

However, a few pages later, he contradicts himself and asserts that for hundreds and thousands of years old age has meant an age of 70 and over.

The British physician-demographer, William Farr, provides a euphoric flourish when he refers to the period from 60 to 80 as the "Laureate age." In other words, this was the age when a person having earned his laurels, rested on them.

A final illustration of an age classification is one proposed by the American Public Health Association:

(1) infancy; up to 1 year
(2) pre-school period; 1 to 4 years
(3) school years: 5 to 14 years
(4) adolescence: 14 to 24 years
(5) years of greatest activity: 25 to 44 years
(6) middle age: 45 to 64 years
(7) early period of old age: 65 to 74 years
(8) old age: 75 years and over

The most notable feature of this classification is the fact that old age proper does not begin until age 75. This classification appears to be based more upon the modern of work than upon physiological change.

On the basis of these and other classifications, the following generalizations appear to be justified as to the beginning of old age:[6]

(1) Various people have defined the beginning of old age all the way from 45 years to 70 years of age.
(2) There is a strong predilection toward the use of multiples of 5 in stating the age at which old age begins.

(3) The most commonly designated years appear to be 60 and 70.

(4) Obviously there is no single, natural, or universally valid age for the beginning of old age.

(5) The age which is designated as the beginning of old age varies with the culture and is relative to the state of general health and the functional roles which people perform at different ages.

(6) More recent definitions tend to set somewhat higher ages for the onset of old age.

Leo Simmons has stated that:[6]

"The farther back we go in human society the earlier people become 'old' ".

In many primitive societies, a person is defined as old by the age of 45 or 50, whereas in most modern societies old age is thought not to begin until 60, 65 or 70 years. In their book on Aging and Modernization Cowgill and Holmes assert that:

".....the concept of old age itself appears to be relative to the degree of modernization."[7]

As the average expectation of life increases, as the health of older people improves, there is a tendency to specify a later age as the beginning of old age. In Thailand, the most commonly accepted definition of the onset of old age is the beginning of the sixth 12-year cycle, or 60 years of age.[8] In the United States which is more thoroughly dominated by the work ethic, the beginning of old age is usually associated with the modal age of retirement which is 65 years.

HUMAN LONGEVITY IN HISTORICAL PERSPECTIVE

An increasing expectation of life is a necessary prelude to the aging of a population. The reduction of the death rate which leads to

increased life expectancy and this in turn to increased numbers of older people in a population, does not necessarily lead to an increased proportion of aged in the population. That depends on whether the numbers in younger age groups continue to increase as rapidly as the numbers of aged. Nevertheless, since the prolongation of life is one of the necessary ingredients in the aging of populations, it may be helpful to obtain some historical perspective on this phenomenon.

It is obvious that the systematic registration of deaths is a very recent, modern practice. Our knowledge of life expectancy of populations at earlier times must therefore rest on other kinds of evidence. For prehistoric populations, the only evidence we have is the apparent stage of growth and development of the individuals whose skeletons have been excavated. The approximate age at death of these individuals may be estimated and when we have a sufficient sample of any population we may therefore estimate the average age at death in such a population and impute the mortality conditions which would have had to prevail in such a population.

> "According to Vallois (1937), none of the known Neanderthal individuals passed the age of fifty; of 102 skeletons of the Upper Paleolithic only one (Oberkassel) did so, possibly passing sixty; and of sixty-five Mesolithic individuals, largely European, only two passed fifty. Of forty-eight Mesolithic skeletons of Northwest Africa none was older than forty-five--no woman older than thirty-five; ninety-four Silesian Neolithic Skeletons furnished only four over fifty years of age..."[9]

Thus, for Neanderthal man, living 150,000 to 100,000 years ago, only half reached adulthood, 95 per cent died before the age of 40, and, as far as present evidence tells us, none lived to 50.[10] This would indicate an average expectation of life of less than 20 years, and a usual death rate of about 50 per thousand per year. For the Paleolithic period in the Near East, 35,000 to 8,000 years ago, about 10 per cent of the population appears to have reached 40 and 1 per cent passed 50.[11] An extensive excavation at Indian Knoll, Kentucky, dating from about 500 B.C. to 500 A.D., yielded 1,132 skeletons of which 57 per cent were thought to be of individuals under 21 years of age.[12] The distribution of the ages of the remnants of this population led Howells to construct a life table which indicated that only 48.6 per cent survived to the age of 20, 3.0 per cent reached 40, and a mere 0.3 per cent lived to be 50.[13] This also would suggest an average life expectancy of less than 20 and a death rate of more than 50 per thousand per year.

Apparently life expectancy increased somewhat during the Greek and Roman period in Europe; inscriptions on stelae in Greece around 400 B.C. indicate that life expectancy may have been as high as 30. In the later Greek and Roman periods, while only 46 per cent reached 20 years of age, judging by epitaphs, greater proportions lived to older ages--18 per cent to 40, 9 per cent to 60, and 2 per cent even to 80.[14] However, estimates based on epitaphs are very likely to overestimate life expectancy, since infants are rarely memorialized in this way and hence their deaths are not averaged in with the total.

Durand estimated that the urban population during the Roman Empire had a life expectancy of somewhere between 15 and 25 years, but the rural population lived longer, and thus the expectation for the whole

empire may have ranged up to 30. He suggested that the death rate during this period was probably 35 or 40 deaths per thousand.[15] It is probable that average life expectancy dropped after the fall of Rome and remained at a near primitive level through the Middle Ages. Peller found in using genealogical records for the nobility in Europe from 1480 to 1579, that even these favored classes had an average length of life of only about 30 years.[16] Near the end of the seventeenth century, Halley using the death records for the city of Breslau constructed the world's first life table and found an average expectation of life of 35.5 years.[17] However, most of the estimates for eighteenth century Europe still place the average between 25 and 30 and indicate a crude death rate of about 35 per thousand per year.

Thus, it appears that in prehistoric times, average life expectancy was probably less than 20, and, while there were modest gains during the height of ancient civilizations, these gains were lost during the so-called Dark Ages and were certainly wiped out entirely during the periods of the Black Plague. By the opening of the nineteenth century in Europe and America, we had only managed to retrieve such modest gains as had been achieved by the Romans two millenia earlier and the average person still lived only about 30 years.

In the next century and a half, longevity more than doubled and now most modern areas of the world, including most of Europe and America have average life expectancies of 70 years or more. This is a part of the Revolution of aging which modern populations are experiencing.

HISTORICAL PERSPECTIVE ON POPULATION STRUCTURE

However, the increase in longevity is only one aspect of this revolution. Another aspect with which we are chiefly concerned in this article is

the proportion of older people present in the population at any given time.

Given no change in fertility, as the death rate goes down and as the axpectation of life increases, we may expect slight increases in the proportions of a population which will be over 5 or over 65. We cannot know actual percentages of older people in prehistoric or even early historic populations; we can only guess on the basis of the scanty knowledge concerning the age of death, reviewed above. Table 1 contains a few of such guesses.

TABLE 1

ESTIMATED PER CENT OF SPECIFIED POPULATIONS
50 YEARS OF AGE AND OVER AND 65 YEARS OF AGE AND OVER

	Per Cent 50 and Over	Per Cent 65 and Over
Neanderthal Man	none	none
Paleolithic, Near East	1	none
Pre-Columbian Indians	1	none
Early Greek	3	1
Later Greek and Roman	4	1
Medieval Europe	3	1
17th century Europe	4	1
19th century Europe	8	4

Thus, through most of human history, old people have been exceedingly rare. Up to the opening of the nineteenth century, persons 65 and over rarely constituted more than 1 per cent of the population. Since that time, the dramatic increase in longevity coupled with reduced fertility have produced the revolution in age structure which has eventuated in some modern populations with more than 12 per cent 65 and over.

Figure 1 shows this dramatic aging of some modern populations during the past century and contrasts them with some less modernized countries in which the trend has not yet become apparent. In France the trend was already well under way in 1870 when almost 8 per cent of the population was 65 and over, but the trend has continued with only slight variations until 1970 when 13.4 per cent was 65 and over. England remained at about 5 per cent until 1910, but since then the percentage has soared upward to 12.4. Sweden has shown an almost continuous upward trend during the century, from 5.4 in 1870 to 13.7 in 1970. The Netherlands show the same trend but at a slower

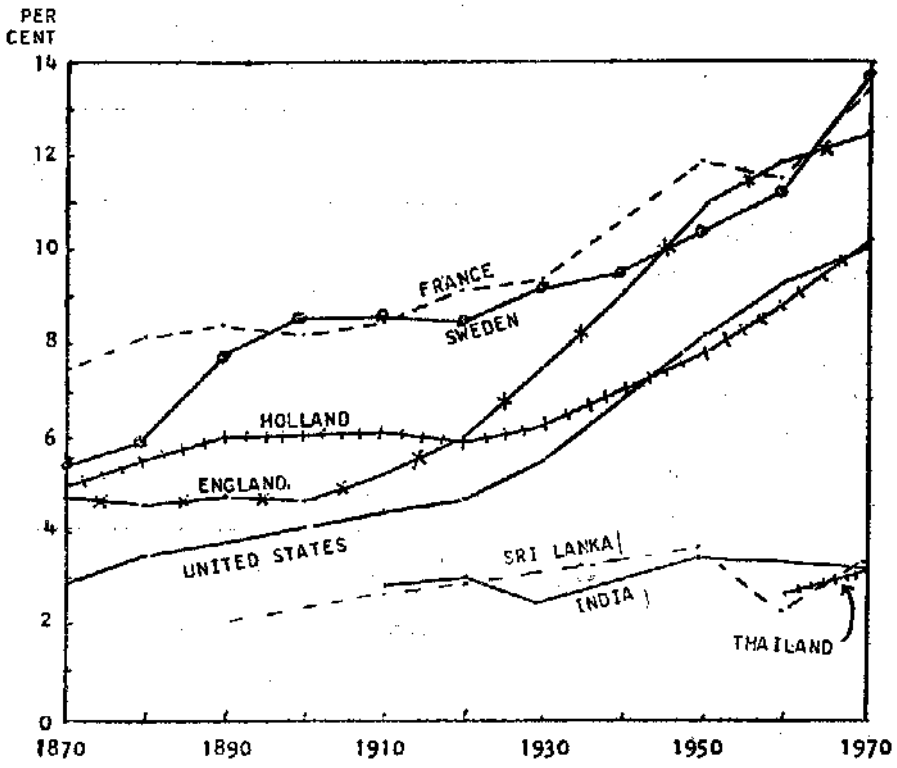

FIGURE 1. PER CENT 65 AND OVER IN SELECTED COUNTRIES, 1870-1970

pace, from 5.5 per cent in 1870 to 10.1 in 1970. The United States was younger than these European countries in 1870, only 2.9 per cent 65 and over, but it is following the same trend; the census of 1970 indicated 9.9 per cent, but since then further increase has taken place and it now has more than 10 per cent.

Few less developed countries have adequate statistics to permit tracing the age structure over such a period of time, but perhaps the cases of Sri Lanka and India can point up the contrast. Sri Lanka had less than 2 per cent 65 and over in 1890 and 80 years later the percentage had increased only slightly to 3.6; it is still a young population. Similarly, India which had 2.4 per cent 65 and over as late as 1910, has increased only 1 per cent in 60 years.

Comparable statistics are not available for Thailand prior to 1960 when 2.8 per cent of the population was 65 and over. By 1970 this had increased to 3.1, but whether this slight increase signifies the beginning of the aging trend is difficult to tell. That outcome depends upon whether and how fast the birth rate declines.

AGEDNESS OF CONTEMPORARY POPULATIONS

Because contemporary populations run the gamut from those which are very primitive in technology and standard of living to those which have been in the fore-front of scientific and technological development, we also find populations which range from very young age structure to quite old, i.e., from populations comprised mostly of children (because the death rate is so high that most people die before reaching maturity) to populations reflecting the maximum application of that science and

technology to the most vital business of life, the prolongation of life. Too often we concentrate upon the problems attendant upon the aging of populations; forgetting that this very aging is one of the truest and most meaningful measures of progress.

Data are not available for the most primitive of contemporary populations, because such countries do not have censuses which permit the classification of their populations by age. But Table 2 illustrates the range of variation in agedness of some sixty-six populations.

The classification used in this table differs from that formerly employed by the United Nations.[18] The U.N. proposed that all populations with less than 4 per cent 65 and over be classified as "young"; the present classification agrees with that designation. However, the second class, from 4.0 to 6.9 per cent, was labeled "mature" by the U.N.; the present author believes that designation overstates the case since such populations are merely in the early stages of the aging process; therefore, he prefers to retain the category but to rename it with the more accurate title, "youthful". The U.N. classification contained only three classes, the final one being called "aged" and including all populations with more than 7 per cent 65 and over. The present author contends that the range of variation above 7 per cent is too great to include in one such open-ended class; to call Japan and Uruguay "aged" along with Sweden and Austria obscures significant differences. Furthermore, it will be noted that there is more difference between Japan (7.0 per cent) and Austria (14.1 per cent), both of which would be classed as "aged" by the U.N., than between Japan and Turkey (3.9 per cent) and yet Turkey would fall in the lowest class and be labeled "young". Not only is there

TABLE 2

Per Cent of the Population 65 and over in Various Countries*

Country	Per Cent 65 and over	Country	Per Cent 65 and over
Young Populations		Mature Populations	
New Guinea	1.1	Japan	7.0
Kuwait	1.6	Uruguay	7.5
Nigeria	2.0	Yugoslavia	7.5
Zambia	2.1	Canada	7.9
Greenland	2.3	Australia	8.3
W. Samoa	2.7	New Zealand	8.4
Guatemala	2.7	Poland	8.4
Nicaragua	2.9	Romania	8.5
Colombia	2.9	Finland	8.6
Haiti	3.0	Gribraltar	8.6
Costa Rica	3.1	Iceland	8.8
Thailand	3.1	Bulgaria	9.5
Ecuador	3.2	United States	9.9
Korea	3.2		
Bahamas	3.4		
Kenya	3.5		
Afghanistan	3.5		

TABLE 2 (Continued)

Country	Per Cent 65 and over	Country	Per Cent 65 and over
Young Populations		Aged Populations	
Sri Lanka	3.5	Netherlands	10.1
Tunisia	3.5	Italy	10.4
Mexico	3.7	N. Ireland	10.5
Paraguay	3.8	Czechoslovakia	10.6
Uganda	3.8	Ireland	11.1
Iran	3.8	Switzerland	11.8
Liberia	3.9	Hungary	11.5
Turkey	3.9	Denmark	12.0
		Scotland	12.1
Youthful Populations		England & Wales	12.4
		Luxembourg	12.6
Swaziland	4.1	W. Germany	12.6
Algeria	4.4	Norway	12.9
Botswana	4.6	France	13.4
Surinam	4.6	Sweden	13.7
Guadaloupe	4.7	Austria	14.1
Iraq	5.1	E. Germany	15.5
Martinique	5.1	Monaco	22.1
French Guiana	5.3		
Tanzania	5.5		
Lesotho	6.4		

* Data computed from Demographic Yearbook 1971, New York: United Nations, 1972, Table 7. Effective dates vary from country ranging from 1962 to 1971. See original source for actual dates.

too great disparity within the class called "aged" by the U.N., there is even some trace of bimodality within this category with one cluster around 8 per cent and a second cluster around 12 per cent. For these reasons, the author prefers to divide the U.N. "aged" class into two classes, with 10 per cent as the breaking point between them, to call the class from 7.0 per cent "mature" and to reserve the designation of "aged" for those with 10 per cent or more and over.[19]

This results in a symmetrical and meaningful classification which fits the real range of aging in contemporary populations.

Utilizing this classification in Table 2, we note that the youngest among the "young" populations is New Guinea, with only 1 per cent and that several Latin American countries, such as, Columbia, Ecuador and Mexico, are classed along with such Asian countries as Afghanistan, Sri Lanka, Iran and Thailand as "young" populations. All of these, of course, are nations in the early stages of modernization.

The "youthful" populations include only African, Asian and Latin American countries. The countries which are classified as "mature" appear to include newly modernized nations and some modern ones in which the aging process has been retarded by immigration. These include Japan, Canada, Australia and the United States. It will be noted in passing that the new classification employed here converts the United states from being designated "aged" (under the U.N. classification) to merely one of the "mature" populations. However, since 1970, the United States moved across the line and should now be classed as aged.

All of the other "aged" populations are in Europe. They range from Netherlands with 10.1 per cent 65 and over to Monaco with 22.1

per cent. The latter case is obviously an abnormal population in which the high proportion of the aged appears to be brought about by in-migration of older population, many of whom are retired.

Thus, the "young" populations are to be found in developing countries of Asia, Africa and Latin America, and the aged populations are found in Europe. The latter consist entirely of the countries which were earliest to feel the effects of modernization.

AGING AND THE DEMOGRAPHIC TRANSITION

Except for the cases which are distorted by migration, the varying degrees of agedness shown in the classification result from the fact that these countries are presently in different stages of what is known as "the Demographic Transition." Some understanding of this phenomenon is necessary in order fully to understand the modern aging process.

The demographic transition is strictly a modern phenomenon; it has never happend previously in human history. This is not to say that we have never had cycles of population growth comparable to the modern "population explosion", on the contrary, there have been many periods of decrease. However, in the past such cycles have been produced almost entirely by fluctuations in the death rate with no particular change in the birth rate.[20] Under those conditions, a cycle of growth was set off by a falling death rate due to good crops, plenteous rainfall, peaceful conditions, or a lack of epidemics, and, by the same token, the cycle was ended, i.e., the growth of population ceased when drouth recurred, crops failed, war broke out, or epidemics set in which brought an increase in the death rate.

By contrast, in the modern cycle or the demographic transition it appears that there is a permanent reduction of the death rate. It appears to drop from about 35 or 40 deaths per 1000 to about 8 to 12 and remains at this lower level. Of course, such a condition is only possible if the birth rate also is reduced; otherwise, any area soon would be grossly over-populated.

It is the permanence of this transition from high death rates to low death rates, plus a subsequent similar transition in birth rates which distinguishes the modern population cycle from previous ones and leads us to call this one "the demographic transition". Its major feature is the transition from high death rates and high birth rates to low birth rates to low death rates and low birth rates. Its general nature is depicted in Figure 2.

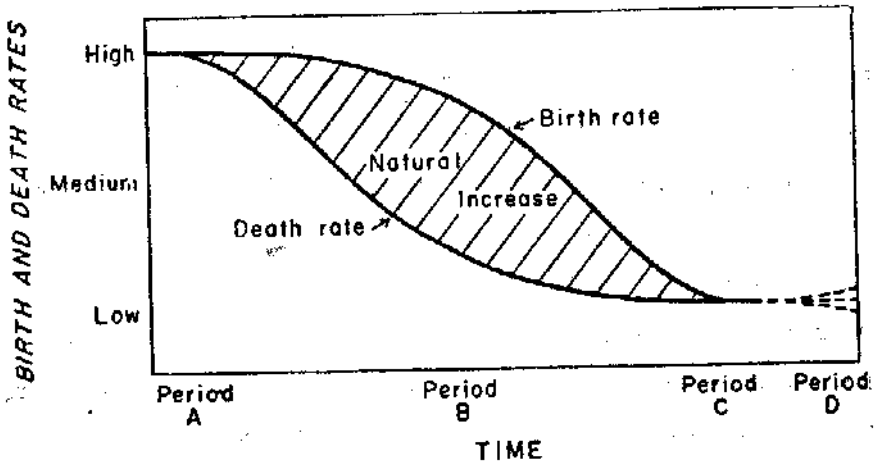

Figure 2- The demographic transition. (From Thomlinson, Ralph, Population Dynamios, New York, Random House, 1965, p. 18)

It will be noted that at the outset both rates are high and that the cycle begins with a falling death rate. Eventually, as the death rate reaches a quite low level, it begins to level off. Some time after the death rate starts falling---often a generation or more---the birth rate begins its descent and eventually it may fall to a level of unity with the death rate. During this transition, since the birth rate is higher than the death rate, there is extensive population increase. If the death rate falls very quickly, as it has in many places in recent decades, this increase can become so massive as to warrant the sobriquet, "population explosion". However, our interest in the transition in the present context is not focused on the increase in size, but rather upon the change in the age composition which accompanies it.[21]

There are increases both in numbers and in proportions of the aged, but both effects are most in evidence in the late phases of the transition. The early reduction of the death rate is more likely to decrease the proportion of the aged in the population than to increase it. This is true because most of the reduction is in infant and child mortality; there is only minor improvement in mortality of older persons. The immediate effect therefore of a major reduction in the death rate is to increase the number of children who are kept alive and who are permitted to grow up. This therefore tends to increase the proportion of children in such populations and, at the same time, to decrease the proportion of the aged; only as these babies grow old, some 65 years later, do the numbers of the aged begin to increase.

Many people find it hard to understand that changes in the birth rate are far more important for the aging of the population than are changes in the death rate. It is true that with a lag of some 65 years

a drop in the death rate will begin to manifest itself in an increase in the numbers of older people, but unless some reduction has also occurred in the birth rate by then the numbers of children will also have increased with the result that the proportion of the aged will have changed very little. It is doubtful if the percentage of the aged in the population would ever exceed 4 percent as a result of the reduction of the death rate alone. Such a population, in other words, would always remain "young."

A reduction of the birth rate has an almost immediate impact on the proportions in all age groups. Within ten years, for example, a reduction of the birth rate will reduce the proportion under 10 years of age, and increase the proportions in all other age groups, including the proportion 65 and over. It is for this reason that demographers maintain that most of the aging of populations is the result of lowered birth rates.[22]

However, it is really the interaction of these two factors which has produced the dramatic Aging Revolution which has eventuated in "Aged" populations such as those in Europe today. At the same time that we have increasing numbers of people reaching their sixty-fifth birthdays due to improved infant and child mortality 65 years ago, we also have relatively fewer babies being added to the populations in consequence of record low birth rates. The United States would have become one of the aged populations much earlier had it not been for the "younging" trend that partially counteracted the "aging" trend for more than a decade after World War II. Now, however, the birth rate has been falling for about 17 years and the population is again aging apace. Thus, we have decreasing numbers of births, and increasidg numbers of people reaching their 65th birthdays. This is the essence and the fact of the aging of populations.

Thailand is still in the early stages of this process; reductions in mortality during recent decades have been most favorable to the increased survival of infants and children and have thus tended to keep the population young, while birth rates have not yet decreased sufficiently to offset this tendency and to initiate the aging process.

MIGRATION AND AGING

Migration is not taken into account in the theory of the demographic transition, but wherever extensive migration occurs it nearly always has effects on the age structures of both the population of origin and the population of destination. While this is too complicated a subject to attempt to treat fully here, we may briefly indicate some of the major ways in which migration usually affects the age structure of populations, with particular emphasis upon the aged population.

One over-riding principle in this connection is: Most migrants are young adults. We may deduce from this principle that at the time of migration, immigration tends to have a "younging" effect on the population which is receiving these young people, and conversely, emigration tends to have an "aging" effect upon the population which is losing them. This must be kept in mind as an added factor which has contributed to the aging of most of the European populations which are now classified as "aged" in Table 2. Many of them have experienced extensive out-migration for many decades and the continuous effect of this has been to decrease the proportion of young adults in their populations.

Furthermore, there is a secondary and cumulative effect of such migrations. Since most of the migrants are at the ages of maximum reproductivity, their emigration tends not only to deplete the numbers of young adults in the population at the time, but also to decrease the fertility of such populations, hence to reduce the proportions of babies and children in subsequent years. Thus, emigration tends to have a double effect in the direction of aging of a population.

Immigration, of course, tends to have the opposite compound effect. Not only do the young adult migrants themselves produce a "younging" effect on the host population; very shortly they start reproducing and thus contribute babies and children to an already "younging" population. This epitomized the situation in the United states at the opening of the 20th century. In fact, the "younging" effect was augmented at that time by the fact that the immigrants maintained higher fertility patterns than the native population of the same age. However, there is little evidence to support the contention that immigrants are always more fertile than native populations. The experience of the United States at that particular point in its history may have been unique.

However, these generalizations pertain mainly to international migrations or, at least, to long distance migrations. Detailed knowledge of the nature and consequences of internal and short-distance migration in reference to age structure is not yet available. We do know that in the main the westward migration of population within the United States, continues to subtract young people out of the east and to add them to the west, thus contributing to the "aging" of the population in the east and the "younging" of the population in the west.

On the other hand, we must not assume that old people never migrate. It is evident that in the United Stated there is some increase of rate of migration between 65 and 70 years of age. This rate of migration is by no means as high as the rate for people in their twenties, but it is higher than for those in their fifties and early sixties. Such migration appears to be associated with two events in the life cycle--retirement and widowhood.

Many American farmers upon retirement move into nearby towns. This largely accounts for the fact that the towns between 1000 and 2500 in population have 13.6 per cent 65 and over. Widowhood appears to produce different patterns of migration for males than for females. Elderly widowers are more likely to remain on farms and ranches, whereas farm widows most frequently move to towns and cities after the death of their husbands. This contributes to a low sex ratio of elderly people in urban population.

There is also some tendency for older men to move to areas where outdoor sports such as hunting and fishing may be indulged. Such areas not only provide recreational possibilities, they also afford business opportunities in what may be viewed as semi-retirement through the operation of hunting lodges, tourist courts, and the like. This leads to high proportions of elderly males in such areas as the Ozarks and the Minnesota lakes.

The migration into and out of Thailand has not been sufficiently great to have measureable effect on the age structure of the kingdom as a whole, but no doubt local areas are affected. In-migration from rural areas combined with lower birth rates probably explain the fact that

only 2.7 per cent of the combined populations of municipal areas are 65 and over as compared with 3.1 per cent for the population of the whole kingdom.

UNBALANCED SEX RATIOS AMONG THE AGED

In most populations women live longer than men and a consequence of this is that in the older ages women outnumber men and the older the population the greater the imbalance.

It is partly because the population of Thailand is younger than that of the United States that the sex ratio of the total population is higher in the former, 99.1 males per 100 females, than in the latter, 94.8. However, the youthfulness of the Thai population may not explain all of this difference, since the difference persists for specific age groups, including all of the older ages up to age 80.

However, the important thing about Table 3 is not the differences between Thailand and the United States, but rather that they show the same general pattern, namely that the sex ratios are much lower for the elderly populations than for the total populations and that the ratios continue downward with increasing age. In both countries, there are only about 3 elderly males for each 4 older women, and the sex ratios of 89 and 81 respectively at ages 65-69 decline steadily and rapidly to only 55 and 56 for those 85 and over. The pattern is very similar in the two countries and there is even very little difference in the absolute levels of the ratios for those 75 years old and over.

TABLE 3

Moles per 200 Females among Persons
65 Years of Age and Over by Age, Thailand & U.S.

	Thailand	United States
Total population	99.1	94.8
Total, 65 and Over	78.3	72.2
65–69	89.1	80.7
70–74	77.1	74.0
75–79	71.7	68.6
80–84	60.8	62.2
85 and over	54.9	56.0

AGE DISTRIBUTION OF THE AGED

Most populations are highly skewed in terms of age distribution; usually there are many more young than old and, indeed, the numbers and proportions tend to decrease markedly with increasing age. This principle continues to apply even within the brackets of old age. For example, we see in Table 4 that of all the people 65 and over in Thailand and the United States, more than a third are under 70 and about two-thirds are under 75. By the same token, only about one-third of the elderly are 75 and over.

TABLE 4

Age Distribution of the Aged Populations.
Thailand and the United States 1970

Age	Numbers		Per Cent of Total Population		Per Cent of Aged Population	
	Thailand (000)	U.S. (000)	Thailand	U.S.	Thailand	U.S.
Total	1,056	20,066	3.1	9.9	100.0	100.0
65–69	452	6,992	1.3	3.5	42.8	34.8
70–74	297	5,444	0.9	2.7	28.1	27.1
75–79	169	3,885	0.5	1.9	16.0	19.3
80–84	78	2,284	0.2	1.1	7.4	11.3
85 and over	60	1,311	0.2	0.7	5.7	7.5

But again when we compare the two countries, it is obvious in terms of all of the statistics that the Thai population is younger. Not only is there a much smaller proportion 65 and over as noted above (3.1 per cent vs. 9.9 per cent) but the per cent of the total population found within each older age bracket is lower in Thailand than in the United States, thus only 1.3 per cent of the Thai population is 65-69 as compared with 3.5 per cent of the population of the United States, and only 0.2 per cent 85 and over in Thailand vs. 0.7 per cent in the United States.

But the youthfulness of the Thai population is shown also in terms of the distribution within the aged population itself. Thus, while 43 per

cent of the aged population of Thailand is under 70, only 35 per cent of the aged population of the United States is so young, and, on the other hand, whereas only 29 per cent of the aged population of Thailand is 75 and over, fully 38 per cent of the aged in the United States are in this category which is sometimes called the "old-old,"

MARITAL STATUS

A very striking characteristic of most elderly populations is the high proportion of widows. This is also true of the elderly populations of both Thailahd and the United States as shown in Table 5. In Thailand, 61 per cent of the women 65 and over are widows and the proportion is only slightly lower in the United States, 55 per cent. This means of course that a relatively small ratio of the females of this age are married; in both countries this is about one-third.

TABLE 5

Marital Status of the Aged (65 and over)
Thailand and U.S., 1970

Status	Males		Females	
	Thailand*	U.S.	Thailand*	U.S.
Married, spouse present	75.1	66.4	34.7	38.7
Widowed	20.7	18.0	60.6	54.6
Divorced or Separated	2.5	5.8	2.7	4.0
Never married	1.7	7.8	2.0	7.7

* Excludes unknown and priests. Priests accounted for 3.5 per cent of all males 65 and over.

By contrast, most of the elderly males are still married, 75 per cent in Thailand and 68 per cent in the United States. This contrast between the marital status of older males and older females results from the operation of several factors: in both countries most husbands are several years older than their wives, males die at younger ages than females, and males whose marriages are broken are more likely to remarry.

In both societies, the proportions of the elderly who have never married is relatively low and the proportion whose marriages have been broken by divorce or separation and who have not remarried is also low.

On the other hand, while the general pattern is similar in the two countries, there are significant differences. A higher proportion of older persons of both sexes are widowed in Thailand. This is especially notable, in view of the fact that the population in question in Thailand is younger in its distribution than that of the United States. No doubt this reflects the effects of a higher death rate in previous years in Thailand.

It is curious that the per cent of the aged married is also higher for both sexes in Thailand than in the United States. The fact that this can be true in the face of higher proportions widowed results from lower percentages never married and divorced or separated in Thailand. Marriage is almost universal in Thailand and as a result very few reach old age without having been married, whereas almost 8 per cent of the elderly in the United States have never married. Similarly, the proportions divorced or separated are almost twice as high in the United Stated as in Thailand. This may be the result of a combination of higher divorce rates in the United States and a lesser tendency to remarry.

Living arrangements are closely related to marital status. Since from two-thirds to three-fourths of the males are still married, these are usually living in their own households with their wives and usually the man is viewed as the head of the household. For women the situation is much more varied; since most of them are widowed, they are more likely to be found living alone or with children or other relatives. Only 4 per cent of the aged of the United States are housed in institutions and the percentage is much less in Thailand.

ECONOMIC ACTIVITY OF THE AGED

Retirement is becoming a widespread practice in modern societies, so it is not surprising that we find that most older Americans are not economically active, but it is surprising that the figures are so similar for Thailand, as shown in Table 6. The 1970 census showed that only 31.3 per cent of the males 65 and over in Thailand were still economically active, as compared with 24.8 per cent of American males of the same age. It is especially surprising that this percentage is so low in Thailand, in view of the impression that official retirement is not a prevalent practice except in the civil service, and also in view of the fact that three-fourths of the male labor force is employed in agriculture and nearly all of these are either self-employed or unpaid family labor. One would not expect such early withdrawal from the labor force under these circumstances.

TABLE 6

Per Cent of Persons 65 and Over Who Are Economically Active, by Sex. Thailand and United States, 1970

	Males	Females
Thailand	31.3	10.3
United States	24.8	10.0

Also striking is the similarity in the proportions of elderly females who are economically active in the two countries, 10.3 and 10.0 in Thailand and the United States respectively. Again these figures seem to mask real differences in practice and since much higher proportions of females are economically active at younger ages in Thailand, these figures also leave one puzzled at the apparent early and rapid withdrawal of Thai females from the labor market.

However, we are forced to conclude at least tentatively that retirement is a frequent, if not prevalent practice in both countries and that the aged in general are not economically active. To the extent that this is true, they become economically dependent on the productivity of the active portion of the population. Since social security programs are not yet widespread in Thailand, this must mean that the inactive elder persons are being cared for by their families.

SUMMARY

Modern populations are undergoing a Revolution of Aging. As they pass through the Demographic Transition, they accumulate greater numbers and proportions of older people. Pre-industrial populations tend to be "young"; rarely do they have as many as 4 per cent of their population 65 and over. By contrast, populations in highly industrialized portions of the world which for the most part are in the late phases of the Transition are "aged" populations, i.e., they usually have 10 per cent or more of their population aged 65 and over.

Thailand is still a young population while the United States must now be called aged. But the aged populations of the two countries are surprisingly similar. In both countries, older women outnumber the

elderly men, and most older women are widows. And in both countries, most older people are reported to have withdrawn from the labor market and have therefore become economically dependent on the rest of the population.

Both countries will experience further aging of their populations, but since the United States is already much farther advanced in the process, it will probably stabilize sooner. Thailand, on the other hand, will experience a very rapid aging trend as soon as its birth rate begins to fall. No one knows the ultimate extent of such aging, but some estimate that it may level off at about 16 per cent.[23]

FOOTNOTES

1. All data on the population of Thailand as of 1970 were taken from National Statistical Office, Thailand, Population and Housing Census: Whole Kingdom, 1970. This item is from p. 11.
2. All data on the population of the United States as of 1970 were taken from the census of 1970 as reported in either of two bulletins: Bureau of the Census, General Population Characteristics: United States Summary, PC (1)-B1, or General Social and Economic Characteristics: United States Summary, PC (1)-C1. This item is from PC (1)-B1, p. 263.
3. This is a modification of the index first proposed by V.G. Valaoris in "Patterns of Aging of Human populations," in The Social and Biological Challenge of Our Aging Population, Proceedings of the Eastern States Health Education Conference, March 31-April 1, 1949, New York: Columbia University Press, 1950, pp. 67-85.

4. The 1950 figure is drawn from Donald O. Cowgill, "The Demography of Aging," in Adeline M. Hoffman, The Daily Needs and Interests of Older People, Springfield, Illinois: Charles C. Thomas, Publisher, 1970, p. 29.
5. The following historical materials on the beginning of old age are drawn from Edward Rosset, Aging Process of population, New York: The Macmillan Company, 1964, pp. 89-98.
6. Leo Simmons, The Role of the Aged in Primitive Society, London: Oxford University Press, 1945, p. 6.
7. Donald O. Cowgill and Lowell D. Holmes (eds.), Aging and Modernization, New York: Appleton-Century-Crofts, 1972, p. 7.
8. See Donald O. Cowgill, "The Social Life of the Aging in Thailand," The Gerontologist 8: (No. 3, Autumn, 1968) 159.
9. W.W. Howells, "Estimating Population Numbers through Archeological and Skeletal Remains," in Robert F. Heizer and Sherburne F. Cook, The Application of Quantitative Methods in Archeology, Chicago: Quandrangle Books, 1960, p. 171.
10. Ralph Thomliinson, Populalion Dynamics (Second Edition), New York: Random House, 1976, p. 80.
11. Ibid.
12. W.W. Howells, op. cit., p. 169.
13. Idid., p. 170.
14. Thomlinson, op. cit., pp. 81-82.
15. Ibid., p. 82.
16. Ibid.
17. Ibid.

18. United Nations, The Aging of Populations and Its Economic and Social Implications, New York: United Nations, Population Studies, 1956.

19. This classification was first used by Donald O. Cowgill in "The Demography of Aging," in Adeline M. Hoffman, op. cit., pp. 35–38.

20. See. Donald O. Cowgill, "The Theory of Population Growth Cycles," American Journal of Sociology 55: (No. 2, September, 1949) 163–170.

21. For a statement of other concomitant changes of composition see Donald O. Cowgill, "Transition Theory as General Population Theory," Social Forces 41: (No. 3, March, 1963) 270–274.

22. Ansley J. Coale, "How a Population Ages or Grows Younger," in Ronald Freedman (ed.), Population: The Vital Revolution, Chicago: Aldine Publishing Company, 1964, Chapter 3.

23. Donald O. Cowgill, "The Aging of Populations and Societies," The Annals of the American Academy of Political and Social Science 415: (September, 1974) 1–18.