The Old-Age Demographic Transition Across the Globe

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The demographic transition has two primary consequences: population growth and aging (Lee 2003; Reher 2004; Dyson 2010). According to the United Nations' latest projections, the world's population is expected to peak at around 10.3 billion people in the mid-2080s, up from 8.2 billion in 2024. Population growth through mid-century will be primarily driven by momentum from past growth, with the number of women aged 15–49 projected to peak at around 2.2 billion in the late 2050s. As the demographic transition advances, larger cohorts are reaching older ages due to declining fertility and mortality rates. Fertility rates have dropped from 3.3 births per woman in 1990 to 2.3 in 2024, with over half of countries now below the replacement level of 2.1 births per woman. Global life expectancy at birth has increased to 73.3 years in 2024 and is projected to rise to 77.4 years by 2054. As a result, by 2080, the global population aged 65 and older is expected to reach 2.2 billion, surpassing the number of children under 18. Moreover, by the mid-2030s, those aged 80 and over will outnumber infants under one year, reaching 265 million (United Nations 2024).

Despite the rapid aging of the population, many studies continue to treat individuals aged 60 and over or 70 and over as a homogeneous group, mainly when calculating dependency ratios, which are widely used demographic indicators (United Nations 2017). However, significant differences exist between individuals in their sixties and seventies compared to those aged 80 and over, with health-related factors largely driving these distinctions. For example, the 60–69 age group often marks the beginning of the life cycle economic deficit, where consumption surpasses labor income. Most older adults depend on familial and public intergenerational transfers for financial support (National Transfer Accounts Project 2019; Lee et al. 2017). However, older people's economic and social needs vary considerably, with differences in work capacity, savings, healthcare usage, family support, and the need for care.

As populations age, pension reforms have become a central topic, such as postponing retirement ages to reflect increased longevity (OECD 2021). Furthermore, the healthcare needs of the oldest-old, particularly those over 80, are significantly more complex and costly due to higher rates of chronic illnesses and disabilities. Studying the population aged 60 and over can help inform the development of specialized senior care, assistive technologies, and policies to reduce social isolation. As this older population grows, their demand for long-term care, both formal and informal, will also increase, placing further pressure on families and healthcare systems. Moreover, living arrangements, such as the need for age-appropriate housing and multigenerational support, will become increasingly important for understanding the aging process in different regions (Ruggles 2007; 2014; Ruggles and Heggeness 2008). Thus, understanding the distinct demographic trends within the older population is crucial for effective policymaking and resource allocation.

Demographic projections further highlight the importance of measuring age transitions within the older population. Over the years, successive revisions by various research institutes have extended the upper age limit of population estimates. For instance, the United Nations now projects population data for individuals aged 100 and older (United Nations 2024). The arrival of larger cohorts at age 100, driven by past fertility and migration patterns and improved survival rates at very old ages, will eventually require projections for the absolute and relative size of centenarian groups, including super-centenarians (110+).

What will the demographic dynamics of older people (60+) look like? Which demographic factors (fertility, mortality, and migration) will drive the aging and age-specific growth rates of older groups of different ages (e.g., 60+, 70+, 80+, 90+)? These are questions that are often overlooked when analyzing demographic projections. This article benefits from the new demographic projections of the United Nations (United Nations 2024) to investigate the old-age demographic transition and its demographic factors across the globe, using classical demographic measures and decompositions. We also estimate some of the economic consequences of the old-age transition by looking at the effects of the projected population age structure at ages 60 and older on

Methods

We use data from the United Nations' 2024 Revision of Population Estimates and Projections (United Nations 2024). The 2024 Revision spans 150 years, covering estimates from January 1950 to January 2024 and projections to January 2101. We used the medium-fertility projection variant for 237 countries or areas by single years of age. We also adopt the United Nations Standard Country Codes (M49) to identify five continental regions—Africa, Americas, Asia, Europe, and Oceania—and their subregions.

Old-Age Demographic Transition

We use the balancing equation of population change to describe the demographic growth of different age groups (60+, 80+, and 100+) over 150 years. The equation allows us to decompose the demographic growth rate according to the primary entry and exit forms in these age groups. In the case of the elderly, this includes reaching a certain age - equivalent to births (*B*) in the total population - as well as deaths (*D*) and net migrations (*I and O*) above the considered age. Our goal is to describe what we call the old-age demographic transition, using a similar approach to the one in the classical demographic transition theory.

$$\frac{N(T)-N(0)}{PY[0,T]} = \frac{B[0,T]}{PY[0,T]} - \frac{D[0,T]}{PY[0,T]} + \frac{I[0,T]}{PY[0,T]} - \frac{O[0,T]}{PY[0,T]}$$

Population Aging among Older Adults – Changes in the mean age

Preston, Himes, and Eggers (1989) decomposed the rate of change in a population's mean age as a function of birth, death, and migration rates. The mathematical expression relies on crude period rates, which are the product of age-specific demographic rates and population age structure. Therefore, it is analogous to the balancing equation for demographic growth.

$$\frac{dA_p}{dt} = 1 - b.\left(A_p\right) - i.\left(A_p - A_i\right) - d.\left(A_D - A_p\right) - o.\left(A_o - A_p\right)$$

According to the authors, every person ages one year every calendar year. In a hypothetical scenario with no births, deaths, or migrations, any population naturally ages at the same rate. The rates of births, deaths, and migrations, as well as their age selectivity, can either accelerate or slow down the aging process of a population. Newborns always contribute to making the population younger, while in-migrants do the same if their average age is lower than the population's average age. On the other hand, deaths and out-migration contribute to an older population. This equation can be used to analyze the changes in the average age of older age groups (60+, 80+, 100+). The number of individuals reaching the lowest age in the open-age group represents the births. The effects of mortality and migration are calculated for the respective age groups included in the analysis.

Economic Consequences of Population Aging among Older Adults

In the last section of our paper, we use estimates from the National Transfer Accounts project (National Transfer Accounts Project 2019) to measure how aging among the elderly affects economic aggregates, including private and public consumption, labor income, and net intergenerational transfers. We analyze, for selected countries, the extent to which the observed age at the onset of economic dependency among the elderly would have to change to offset the accelerated growth of the oldest old.

Preliminary Results

Table 1 shows preliminary findings for changes in the mean age of the population over 60 years old in different regions of the world. It compares data from United Nations estimates (1950-2024) and projections (2024-2100). Overall, there is a greater increase in the mean age during the second period, indicating an expected acceleration of population aging. Globally, the mean age is projected to increase from 70.59 to 74.98 years over the next 77 years, marking a rise of 4.39 years. This change can be even more significant in specific subregions, such as 6.11 years in South America and 8.37 years in Eastern Asia. It is important to note that variation refers solely for the oldest age group of the population.

The research by Preston and colleagues suggests that the mean age would be increasing even faster if it weren't for the rejuvenating demographic effects in the age group 60 and older. Most of the natural aging trend (one year for each calendar year) is offset by the influx of new individuals at age 60, known as the cohort size effect. It comprises the combination of changes in the number of births, and in migrations and deaths that occur at ages below 60. However, over time, this effect diminishes due to slower growth in the “younger” elderly groups. Globally, for example, the effect will decrease from about 70% (52.15 years out of 74 years) to 61% (47.56 years out of 77 years). At the same time, mortality will become more age-selective, shifting deaths to increasingly older ages, which will enhance its rejuvenating influence on the mean age, even though its intensity tends to decrease, making it easier for people to reach older ages. Thus, the effect of mortality in preventing the aging of the elderly will become relatively greater. Meanwhile, migration has minimal impact on aging for ages 60 and older.

In the final version of the paper, we plan to discuss various aspects of the changes in population growth and aging among the elderly in the world. Also, we will measure some of its economic consequences for selected countries.

Table 1 – Changes in the Mean Age of the Population 60 and older and its demographic components, UN subregions, 1950-2100

Subregion	Estimates / Projections	Initial mean age	Final mean age	Actual change in the mean age	Potential change in mean age	Number of ageing years avoided by			
						Cohort size effect	Mortality effect	Net migration effect	Total
World	Estimates	69,00	70,61	1,62	74,00	52,15	20,47	-0,22	72,40
World	Projections	70,59	74,98	4,39	77,00	47,56	25,13	-0,08	72,61
Eastern Africa	Estimates	68,53	69,03	0,50	74,00	54,28	19,75	-0,54	73,49
Eastern Africa	Projections	69,04	71,97	2,94	77,00	54,72	19,42	-0,08	74,06
Middle Africa	Estimates	69,00	68,70	-0,30	74,00	53,98	20,86	-0,54	74,29
Middle Africa	Projections	68,71	70,49	1,78	77,00	55,16	20,10	-0,03	75,22
Northern Africa	Estimates	68,03	68,73	0,70	74,00	53,16	20,09	0,01	73,26
Northern Africa	Projections	68,78	73,89	5,11	77,00	49,51	22,44	-0,05	71,89
Southern Africa	Estimates	69,74	69,60	-0,15	74,00	54,06	18,73	1,37	74,16
Southern Africa	Projections	69,58	73,38	3,80	77,00	52,60	20,55	0,05	73,20
Western Africa	Estimates	68,02	68,63	0,61	74,00	53,38	20,45	-0,42	73,40
Western Africa	Projections	68,62	70,53	1,91	77,00	54,20	20,98	-0,09	75,09
Central Asia	Estimates	68,68	68,69	0,01	74,00	52,39	22,45	-0,85	74,00
Central Asia	Projections	68,69	73,45	4,76	77,00	49,57	22,71	-0,04	72,24
Eastern Asia	Estimates	68,63	71,13	2,50	74,00	52,15	19,65	-0,13	71,66
Eastern Asia	Projections	70,96	79,33	8,37	77,00	39,39	29,28	-0,04	68,63
Southern Asia	Estimates	68,38	69,35	0,97	74,00	54,01	19,02	-0,07	72,97
Southern Asia	Projections	69,42	74,92	5,50	77,00	48,48	23,10	-0,07	71,50
South-Eastern Asia	Estimates	68,39	69,33	0,94	74,00	54,16	19,10	-0,21	73,05
South-Eastern Asia	Projections	69,35	74,83	5,48	77,00	47,26	24,30	-0,04	71,52
Western Asia	Estimates	69,40	69,72	0,32	74,00	53,81	21,85	-1,94	73,72
Western Asia	Projections	69,68	74,39	4,70	77,00	50,40	22,97	-1,07	72,30
Eastern Europe	Estimates	69,74	71,07	1,34	74,00	49,94	22,46	0,13	72,52
Eastern Europe	Projections	71,21	76,59	5,38	77,00	42,71	28,87	0,04	71,62
Northern Europe	Estimates	69,82	72,57	2,75	74,00	46,90	24,22	0,07	71,20
Northern Europe	Projections	72,62	77,16	4,54	77,00	42,19	30,15	0,12	72,46
Southern Europe	Estimates	69,52	72,86	3,35	74,00	47,64	22,79	0,22	70,65
Southern Europe	Projections	72,87	78,24	5,37	77,00	39,16	32,48	-0,01	71,63
Western Europe	Estimates	69,32	72,77	3,45	74,00	46,92	23,67	-0,03	70,55
Western Europe	Projections	72,76	77,36	4,60	77,00	41,04	31,27	0,09	72,40
Caribbean	Estimates	69,21	70,70	1,50	74,00	52,49	21,73	-1,70	72,51
Caribbean	Projections	70,69	74,96	4,27	77,00	46,86	26,00	-0,13	72,73
Central America	Estimates	68,96	70,07	1,12	74,00	54,95	22,75	-4,85	72,86
Central America	Projections	70,10	75,82	5,72	77,00	47,10	24,27	-0,08	71,28
South America	Estimates	68,79	70,31	1,52	74,00	53,47	19,74	-0,79	72,43
South America	Projections	70,36	76,46	6,11	77,00	44,80	26,15	-0,06	70,89
Northern America	Estimates	69,44	71,45	2,01	74,00	49,85	21,99	0,03	71,87
Northern America	Projections	71,57	76,49	4,92	77,00	43,33	28,51	0,25	72,08
Australia/New Zealand	Estimates	69,34	72,04	2,71	74,00	49,22	21,36	0,62	71,21
Australia/New Zealand	Projections	72,13	76,75	4,62	77,00	43,27	28,75	0,36	72,38
Melanesia	Estimates	69,11	68,26	-0,84	74,00	59,61	22,00	-6,74	74,87
Melanesia	Projections	68,24	71,68	3,44	77,00	52,56	21,05	-0,04	73,56
Micronesia	Estimates	69,81	69,09	-0,72	74,00	55,40	19,61	-0,38	74,63
Micronesia	Projections	69,19	73,89	4,70	77,00	49,90	22,66	-0,26	72,30
Polynesia	Estimates	69,64	69,76	0,12	74,00	54,72	21,12	-2,00	73,84
Polynesia	Projections	69,80	75,81	6,01	77,00	46,82	24,63	-0,46	70,99

Source: United Nations (2024)

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