



EXPLAINING GLOBAL PATTERNS OF POPULATION AGING IN 2012 BY THE DEMOGRAPHIC TRANSITION MODEL

Ramani Ponnappalli

Department of Population Studies, Annamalai University, Annamalainagar-608 002 Tamil Nadu, India

Krishna Murthy Ponnappalli

Department of Fertility Studies, International Institute for Population Sciences, Mumbai, India

A. Subbiah

Department of Population Studies, Annamalai University, Annamalainagar-608 002 Tamil Nadu, India

ABSTRACT

The objective of the present paper is twofold: (1) to make an attempt to review in general the inter-linkages between the demographic transition model and the ageing process, (2) to show how one can make use of the recent criterion suggested by McCracken and Phillips in understanding the ageing process presently taking place in different countries of the world.

The study comes to the important conclusion that out of 210 countries in the world, in 91 countries the aging process is in full progress. In 63 countries it is going to be a problem in the near future. However, for 56 countries it is not at all a problem and majority of these countries are observed in the African region, if one follows the criterion suggested by McCracken and Phillips. [130 words]

Keywords: Demographic transition, Ageing of the population, Fertility, Mortality.

JEL classification numbers: Not known

INTRODUCTION

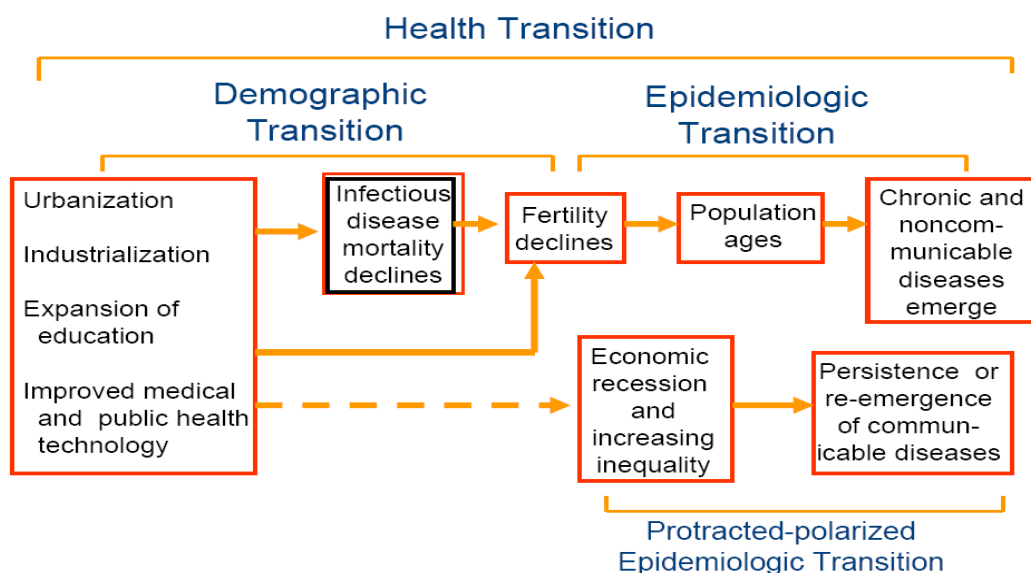
Population Aging

'Population aging is fast becoming a global phenomenon'. At the outset it is recognized that "individual aging" differs from "population aging". In the literature several terms are in use to describe 'someone becomes old' or 'individual aging'. For instance, (Kinsella and Phillips, 2005) refer to people of age 65 or older as "older population" or "older people", and those people age 80 or older as "oldest old", for convenience. They further clarify that "Population aging" is "usually defined as the percentage of a given population age 65 or older (and sometimes the percentage ages 60 and older)."

The commonly asked question is *How Populations Age? It* may be well explained by means of looking at the inter-linkages between the two components of the Health transition namely the demographic transition and the epidemiological transition given in Figure 1.1 below which is due to Mosley and Chen.

As rightly stated by [Kinsella and Phillips \(2005\)](#) and has been noted in the Figure 1.1, "Population aging may be seen as a human success story-the triumph of public health, medical advancements, and economic development over the diseases and injuries that had limited human life expectancy for millennia." [Kinsella and Phillips \(2005\)](#) further states "the most prominent historical factor in population aging has been declining fertility" Thus said, population aging may be seen fast becoming a global phenomenon as a result of two important factors namely: an increase in life expectancy and a decline in fertility of the global populations. Figure 1.1 further explains that population aging is an ultimate consequence of completion of the phenomenon called the "demographic transition".

Figure-1.1. Mosley and Chen's explanation of the Health Transition



Relations Among the Demographic, Epidemiologic and Health Transitions

(Source: Extracted from Mosley and Chen's lecture notes Module 7a on : Mortality and morbidity trends and differentials of Johns Hopkins University)

The Demographic Transition

[Kinsella and Phillips \(2005\)](#) states that "the term "demographic transition" is used to describe a gradual process of change from high rates of fertility and mortality to low rates of fertility and mortality" [Notestein \(1945\)](#) who at first suggested the "demographic transition" predicted that all countries in the world experience the demographic transition as a result of the impact of

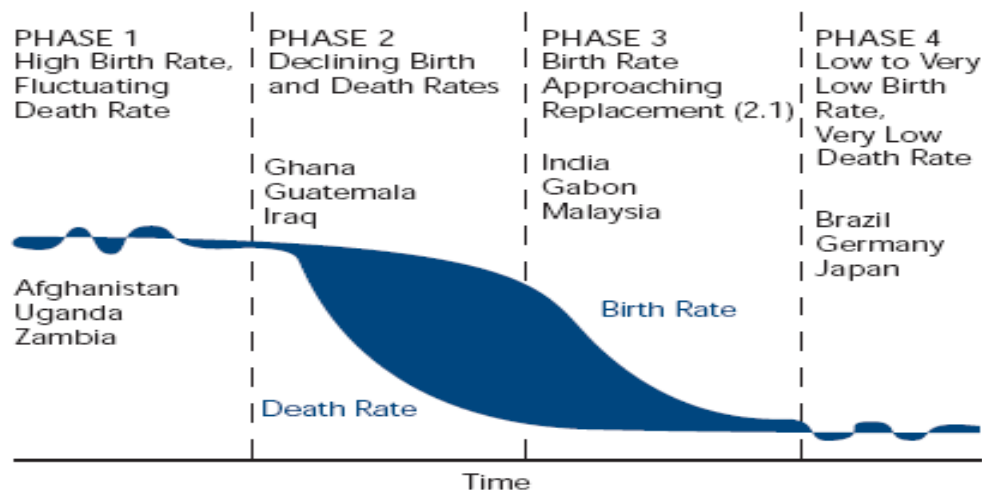
'modernization process' on mortality at first followed by its impact on fertility later on. Some researchers prefer to describe the 'demographic transition further as: 'a theory', 'a historic model', and as 'a predictive model'.

As stated by [Notestein \(1945\)](#), and also as shown in Figure 1.2 below, which is due to ([Haub and Gribble, 2011](#)), one may further show the phenomenon of demographic transition in four phases that describes the past and future of the population growth of several countries in terms of the systematic phase wise changes in mortality followed by changes in fertility due to the impact of modernization and also due to governmental efforts in the recent past especially of the developing countries such as China and India, for instance. [Haub and Gribble \(2011\)](#) illustrated each phase of the transition by means of giving an example of three countries for each of the phase. As per the diagram, India is at present seen to be in the third phase of the demographic transition. As shown in Figure 1.1, and further said, population aging may be seen as a mere resultant of the completion of the demographic transition.

Figure-1.2. The Classic Phases of Demographic Transition due to [Haub and Gribble \(2011\)](#).

FIGURE 2

The Classic Phases of Demographic Transition



Notes: Natural increase or decrease is the difference between the number of births and deaths. The birth rate is the number of live births per 1,000 population in a given year. The death rate is the number of deaths per 1,000 population in a given year.

Explaining Global Patterns of Population Aging by the Demographic Transition Model

In the very recent past some attempts have been made by few researchers (see [Rowland, 2009](#); [Davies and James, 2011](#)) to explain the global patterns of population aging by means of the demographic transition model, as aging is the ultimate outcome of a decline in mortality followed by a decline in fertility as an impact of the modernization.

According to Rowland (2009) as shown in Table 1.1 below, which is due to Rowland, "as a starting point, the course of population aging through time will be discussed with reference to the "classical" pattern of demographic transition, the historical average trend in vital rates in Western Europe since eighteenth century." Table 1.1 clearly explains that population aging 'began relatively late in the demographic transition. Rowland (2009) states Population aging in Europe began "only in the last quarter of the nineteenth century as fertility decline became prominent." A detailed description of the contents of Table 1.1 was well made by Rowland in his study. Rowland (2009) highlights the point that "the timing of the start of population aging itself has varied between countries in Europe and elsewhere, depending when sustained fertility decline began."

Table-1.1. Characteristics of populations during and after the demographic transition

| | Pre-Transition | Mid-Transition | Post-Transition | Future Transition |
|--------------------------------|----------------|----------------|-----------------|-------------------|
| Crude birth rate | 50.0 | 45.7 | 12.9 | 9.8 |
| Crude death rate | 50.0 | 15.7 | 12.9 | 14.8 |
| Annual growth rate per cent | 0.0 | 3.0 | 0.0 | -0.5 |
| Age Structure per cent | | | | |
| 0-14 | 36.2 | 45.4 | 19.2 | 15.6 |
| 15-64 | 60.9 | 52.0 | 62.3 | 52.7 |
| 65+ | 2.9 | 2.6 | 18.5 | 31.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Dependency Ratios | | | | |
| Child | 59.0 | 87.0 | 31.0 | 29.6 |
| Aged | 5.0 | 5.0 | 30.0 | 60.0 |
| Total | 64.0 | 92.0 | 61.0 | 89.6 |
| Percentage Surviving (females) | | | | |
| To age 5 | 46.8 | 81.7 | 98.2 | 99.6 |
| To age 65 | 7.8 | 43.3 | 83.1 | 94.2 |
| Life Expectancy (females) | | | | |
| At birth | 20.0 | 50.0 | 75.0 | 85.0 |
| At age 5 | 36.6 | 55.9 | 71.4 | 80.3 |
| At age 65 | 7.5 | 11.9 | 15.7 | 22.2 |

Notes: ¹ Whereas the figures in the other columns derive from demographic models, those in the last column are based on data for Italy, for which the rates refer to 2025-2050, other data to 2050; ² Crude birth rate: births/population X 1000; ³Crude death rate: deaths/population X 1000; ⁴ Child dependency ratio: 0-14/15-64 X 1000; ⁵ Aged dependency ratio: 65+/15-64 X 1000'

Source: Hauser(1976:66), World Bank (1994:281), Coale and Demeny (1983) and Coale and Guo(1990:33)

NOTE: This table has been extracted from Rowland, Donald T. (2009:40)

Table 1.2 below is an attempt to show by means of a table by the present researcher the inter-linkage between the demographic transition and the age-structure of the population as reported in Davies and James (2011) of the McCracken and Phillips (2005) explanation for using the demographic transition theory for explaining the spatial variations in population ageing. As the points in the table are quite explicable, no further attempt is made here to elaborate the contents in the table.

Table-1.2. McCracken and Phillips (2005) description for the age structure of countries during each demographic transition phases

| Demographic Transition Phases | Age structure of countries during each demographic transition phases: |
|---|--|
| <p><u>High stationary phase:</u> Birth rates and death rates are high Population growth is kept at a low level by high death rates largely caused by famines, diseases and/or wars</p> | <p><u>During this phase, the population was young, with fewer than 4 per cent of the population aged 65+.</u></p> |
| <p><u>Early expanding phase:</u> Stable birth rate and rapidly declining death rate Population growth is stimulated due to declining death rates as a result of improved nutrition, sanitation and access to medicine</p> | <p>During this phase, the population initially became younger before shifting into a process of contraction of the youth segment. <u>When a country or region is in this phase it is expected that between 4 per cent and 6.9 per cent of the population will be aged 65+.</u></p> |
| <p><u>Late expanding phase:</u> Declining birth rate and stable death rate at a low level Population growth slows and is associated with urbanisation of societies, shifts in attitudes to birth control and family planning and changing patterns of marriage</p> | <p>During this phase, the youth segment of the population contracted and the working aged population expanded. <u>During this phase the proportion of the population aged 65+ will be between 7 per cent and 19.9 per cent.</u></p> |
| <p><u>Low stationary phase:</u> Stable low birth rate and stable low death rate Population growth is very slow and there is little fluctuation in the death rate. The birth rate might fluctuate, caused largely by the influence of social and/or economic policy (Chesnais, 1992, Kirk ,1996, Ogden,200a)</p> | <p>During this phase, ageing would exist in a continuing pattern. <u>During this phase the proportion of the population aged 65+ will be between 20 per cent and 30 per cent.</u></p> |
| <p>NOTE: This information has been extracted from Davies Amanda. and Amity James (2011:27-28)</p> | |

Explaining Patterns of Population Aging by the Demographic Transition Model: 210 Countries in the World in the Year 2012

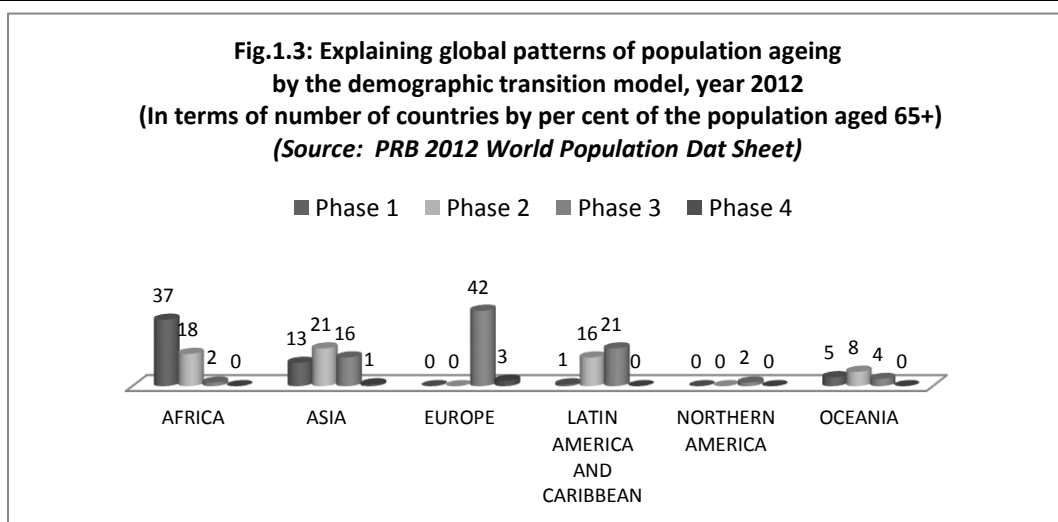
In the present section using the criterion suggested by McCracken and Phillips (2005:43-45) further given in the section above, and the per cent of the population 65+ given in the [Population Reference Bureau. \(2012\)](#) World Population Data Sheet, we tried to explain how the 210 countries of the world which are in different phases of the demographic transition can be regrouped into countries in different phases of their demographic transition based on the aging indicator 'per cent population 65+'

Table 1.3 and Figure 1.3 given below shows the world's 210 countries as countries in different phases of their demographic transition based on the aging indicator 'per cent population 65+'

Table-1.3. Classification of world 210 countries by region into different Phases of the Demographic Transition using the per cent population 65+ given in PRB 2012 World Data Sheet

| Region/Phase | Phase1 P65+: (<4%) | Phase 2 P65+: (4% -6.9%) | Phase 3 P65+: (7% - 19.9%) | Phase 4 P65+: (20% - 30%) | Total Number of Countries |
|--------------------------------|--------------------------|--------------------------------|----------------------------------|---------------------------------|------------------------------|
| Africa | 37 (65 %) | 18 (32 %) | 2 (4 %) | 0 (0 %) | 57 (100%) |
| Asia | 13 (25 %) | 21 (41 %) | 16 (31 %) | 1 (2 %) | 51 (100%) |
| Europe | 0 (0 %) | 0 (0 %) | 42 (93 %) | 3 (7 %) | 45 (100%) |
| Latin America and Caribbean | 1 (3 %) | 16 (42 %) | 21 (55 %) | 0 (0 %) | 38 (100%) |
| Northern America | 0 (0%) | 0 (0%) | 2 (100%) | 0 (0 %) | 2 (100%) |
| Oceania | 5 (29 %) | 8 (47 %) | 4 (24 %) | 0 (0%) | 17 (100%) |
| Total Number of Countries | 56 (27 %) | 63 (30 %) | 87 (41 %) | 4 (2 %) | 210 (100%) |

Source: PRB 2012 World Data Sheet; Figures in brackets refer to per cent in total of the region



Results of the analysis given in Table 1.3 and Figure 1.3 may be summarized as follows:

- 1) Overall the criterion suggested by [McCracken and Phillips \(2005\)](#) seems to succeed in classifying the countries in the world into different phases of the demographic transition model merely by using the simple indicator of population ageing, that is, the per cent population aged 65+.
- 2) It is seen that almost all countries (42 out of 45 countries) of the European region are observed to be in the Phase 3 of the demographic transition by the year 2012 and are said to be very old by age structure.
- 3) In rank order the countries of America (Latin America and Caribbean and also of Northern America) followed by Asia are seen to fall in the Phase 3 according to the aging process in comparison to other countries in the world.
- 4) Not surprisingly, all the countries of Africa which are in the early stages of the demographic transition with very low per cent of population 65+ are observed to be falling in the Phase 1 and Phase 2 of the demographic transition.

5) About 13 countries in Asia followed by 5 in Oceania are also seen to be having low per cent P65+ and thus belong to the Phase 1 of the demographic transition.

It can be concluded from the above analysis that about half of the countries (91 out of 210) of different regions in the world are observed to have presently facing the severe aging process by having "per cent of population 65+" as 7 per cent and above by the year 2012. About 63 out of 210 are also seen to have per cent of population 65+ as 4 per cent and above by the year 2012. Thus said the aging process is seen in full swing in the world countries by the year 2012 and reconfirming the statement '*Population aging is fast becoming a global phenomenon*' by all means.

The Role of Fertility, Mortality and Migration in Population Ageing

Fertility and mortality are said to be the main drivers of the population aging. It is believed by most that population ageing is mostly occurring due to an increase in the life expectancy at birth. However, it is realized that contrary to the above belief population ageing is mainly occurring in many of the countries due to a *sustained* decline in fertility that leads to relatively fewer children in the age group 0-14 and a rise in the population of the older age groups (Gavrilov and Heuveline, 2003).

An increase in life expectancy may be looked into two components one that acts against population ageing and the other that acts in favour of population ageing. Mortality declines in infants, children and people younger than the mean age of the population are observed to act against population ageing as according to Preston *et al.* (2001) its effect is similar to the effect of increased fertility. On the other hand, mortality declines that occur among the older age groups, especially of women are observed to act in favour of population ageing. Kinsella and Phillips (2005), however, interestingly, states that "as a nation's infant, childhood, and maternal mortality reach low levels, longevity gains at older ages become more prominent contributors to increased life expectancy". Population ageing may also be affected sometimes by the migration factor. While immigration of younger population to an area tends to slow down the population ageing, emigration of the working-age adults is seen to accelerate population ageing.

A Brief Summary of a Critical Review of the Articles on Ageing Process

An exhaustive review of the literature on ageing process is carried out by the present researcher. A brief overview is presented here as part of the study here, however, without going in detail and without giving the references made due to the limitations of the objectives of the study.

From the above section, without telling further it is realized that there is a great need for the researchers to examine the role of each of the above components namely fertility, mortality and migration to have a better understanding of the aging process taking place in different countries in the world. An exhaustive review of existing literature on "*ageing of the populations and the role of*

various factors affecting them of the developing countries" indicates that (1) unfortunately most of the studies concentrates in explaining the aging process at the country level due to lack of sufficient and reliable information on indicators of fertility and mortality at the below national level. (2) However, studies made using micro-level data seem to be very useful in understanding the ageing process, the limitations of the study in generalizing the findings may be well understood.

SUMMARY AND CONCLUSIONS

An attempt has been made in the present paper at first to present the theory behind the ageing process in general. Secondly it is attempted to show that the criterion suggested by [McCracken and Phillips \(2005\)](#) is very useful in understanding the ageing process presently taking place in different populations of the world and its sub-regions and sub-populations. The study comes to the important conclusion that in about 91 countries in the world (out of 210 for which data on P65+ is available for the year 2012 from the PRB World Data Sheet) the aging process is in full swing and about 63 countries are about to face the aging process in the coming future. It may not be a problem of the near future for 56 countries in the world which are in their first phase of the demographic transition, if one follows the criterion suggested by McCracken and Phillips.

REFERENCES

- Davies, A. and A. James, 2011. Geographies of ageing: Social processes and the spatial unevenness of population ageing. England. Ashgate Publishing Limited.
- Gavrilov, L. and P. Heuveline, 2003. Aging of population the encyclopedia of population. New York Macmillan Reference.
- Haub, C. and J. Gribble, 2011. The world at 7 billion. Population Bulletin, 66(2).
- Kinsella, K. and D. Phillips, R. , 2005. Global aging: The challenge of success. Washington DC: Population Reference Bureau.
- McCracken, K. and D.R. Phillips, 2005. International demographic transitions. London: Routledge Taylor and Francis Group.
- Notestein, F.W., 1945. Population: The long view. Chicago: Chicago University Press.
- Population Reference Bureau., 2012. 2012 world population data sheet. New York: Washington DC.
- Preston, S., P. Heuveline and M. Guillot, 2001. Demography: Measuring and modeling population processes. Oxford UK: Blackwell Publishers.
- Rowland, D.T., 2009. Global population aging: History and prospects.