**Demographic Transition Theory/Model**

In [demography](https://en.wikipedia.org/wiki/Demography), **demographic transition** is a phenomenon and theory which refers to the historical shift from high [birth rates](https://en.wikipedia.org/wiki/Birth_rate) and high [infant death rates](https://en.wikipedia.org/wiki/Infant_mortality) in societies with minimal technology, education (especially of women) and economic development, to low birth rates and low death rates in societies with advanced technology, education and economic development, as well as the stages between these two scenarios. Although this shift has occurred in many [industrialized countries](https://en.wikipedia.org/wiki/Developed_country), the theory and model are frequently imprecise when applied to individual countries due to specific social, political and economic factors affecting particular populations.

However, the existence of some kind of demographic transition is widely accepted in the social sciences because of the well-established historical [correlation](https://en.wikipedia.org/wiki/Correlation) linking dropping [fertility](https://en.wikipedia.org/wiki/Fertility) to social and economic development. Scholars debate whether [industrialization](https://en.wikipedia.org/wiki/Industrialization) and higher incomes [lead to](https://en.wikipedia.org/wiki/Causation_%28sociology%29) lower population, or whether lower populations lead to industrialization and higher incomes. Scholars also debate to what extent various proposed and sometimes inter-related factors such as higher [per capita](https://en.wikipedia.org/wiki/Per_capita) income, lower [mortality](https://en.wikipedia.org/wiki/Mortality_rate), old-age security, and rise of demand for [human capital](https://en.wikipedia.org/wiki/Human_capital) are involved.

The theory is based on an interpretation of [demographic](https://en.wikipedia.org/wiki/Demography) history developed in 1929 by the American demographer Warren Thompson (1887–1973). [Adolphe Landry](https://en.wikipedia.org/wiki/Adolphe_Landry) of France made similar observations on demographic patterns and population growth potential around 1934. In the 1940s and 1950s [**Frank W. Notestein**](https://en.wikipedia.org/wiki/Frank_W._Notestein)developed a more formal theory of demographic transition. By 2009, the existence of a negative correlation between fertility and industrial development had become one of the most widely accepted findings in social science

The transition involves four stages

* In **stage I**, [pre-industrial society](https://en.wikipedia.org/wiki/Pre-industrial_society), death rates and birth rates are high and roughly in balance. All human populations are believed to have had this balance until the late 18th century, when this balance ended in Western Europe. In fact, growth rates were less than 0.05% at least since the [Agricultural Revolution](https://en.wikipedia.org/wiki/Neolithic_Revolution) over 10,000 years ago. Population growth is typically very slow in this stage, because the society is constrained by the available food supply; therefore, unless the society develops new technologies to increase food production (e.g. discovers new sources of food or achieves higher crop yields), any fluctuations in birth rates are soon matched by death rates.
* In **stage II**, that of a developing country, the death rates drop quickly due to improvements in food supply and sanitation, which increase life expectancies and reduce disease. The improvements specific to food supply typically include selective breeding and crop rotation and farming techniques. Other improvements generally include baking and access to ovens. For example, numerous improvements in public health reduce mortality, especially childhood mortality. Prior to the mid-20th century, these improvements in public health were primarily in the areas of food handling, water supply, sewage, and personal hygiene. One of the variables often cited is the increase in female literacy combined with public health education programs which emerged in the late 19th and early 20th centuries. In Europe, the death rate decline started in the late 18th century in northwestern Europe and spread to the south and east over approximately the next 100 years. Without a corresponding fall in birth rates this produces an [imbalance](https://en.wikipedia.org/wiki/Demographic_trap), and the countries in this stage experience a large increase in [population](https://en.wikipedia.org/wiki/Population).
* In **stage III**, birth rates fall due to various [fertility factors](https://en.wikipedia.org/wiki/Fertility_factor_%28demography%29) such as access to [contraception](https://en.wikipedia.org/wiki/Contraception), increases in wages, [urbanization](https://en.wikipedia.org/wiki/Urbanization), a reduction in [subsistence agriculture](https://en.wikipedia.org/wiki/Subsistence_agriculture), an increase in the status and education of women, a reduction in the value of children's work, an increase in parental investment in the education of children and other social changes. Population growth begins to level off. The birth rate decline in developed countries started in the late 19th century in northern Europe. While improvements in contraception do play a role in birth rate decline, contraceptives were not generally available nor widely used in the 19th century and as a result likely did not play a significant role in the decline then. It is important to note that birth rate decline is caused also by a transition in values; not just because of the availability of contraceptives.
* During **stage IV** there are both low birth rates and low death rates. Birth rates may drop to well below replacement level as has happened in countries like [Germany](https://en.wikipedia.org/wiki/Germany), [Italy](https://en.wikipedia.org/wiki/Italy), and [Japan](https://en.wikipedia.org/wiki/Japan), leading to a [shrinking population](https://en.wikipedia.org/wiki/Population_decline), a threat to many industries that rely on population growth. As the large group born during stage two ages, it creates an economic burden on the shrinking working population. Death rates may remain consistently low or increase slightly due to increases in lifestyle diseases due to low exercise levels and high [obesity](https://en.wikipedia.org/wiki/Obesity) and an aging population in [developed countries](https://en.wikipedia.org/wiki/Developed_countries). By the late 20th century, birth rates and death rates in developed countries leveled off at lower rates.
* Some scholars break out, from stage four, a "stage five" of below-replacement fertility levels. Others hypothesize a different "stage five" involving an increase in fertility.

As with all models, this is an idealized picture of population change in these countries. The model is a generalization that applies to these countries as a group and may not accurately describe all individual cases. The extent to which it applies to less-developed societies today remains to be seen. Many countries such as [China](https://en.wikipedia.org/wiki/China), [Brazil](https://en.wikipedia.org/wiki/Brazil) and [Thailand](https://en.wikipedia.org/wiki/Thailand) have passed through the Demographic Transition Model (DTM) very quickly due to fast social and economic change. Some countries, particularly African countries, appear to be stalled in the second stage due to stagnant development and the effects of under-invested and under-researched tropical diseases such as malaria and [AIDS](https://en.wikipedia.org/wiki/AIDS) to a limited extent.

**Stage I**

In pre-industrial society, death rates and birth rates were both high, and fluctuated rapidly according to natural events, such as drought and disease, to produce a relatively constant and young population. Family planning and contraception were virtually nonexistent; therefore, birth rates were essentially only limited by the ability of women to bear children. Emigration depressed death rates in some special cases (for example, Europe and particularly the Eastern United States during the 19th century), but, overall, death rates tended to match birth rates, often exceeding 40 per 1000 per year. Children contributed to the economy of the household from an early age by carrying water, firewood, and messages, caring for younger siblings, sweeping, washing dishes, preparing food, and working in the fields. Raising a child cost little more than feeding him or her; there were no education or entertainment expenses. Thus, the total [cost of raising children](https://en.wikipedia.org/wiki/Cost_of_raising_a_child) barely exceeded their contribution to the household. In addition, as they became adults they become a major input to the family business, mainly farming, and were the primary form of insurance for adults in old age. In India, an adult son was all that prevented a widow from falling into destitution. While death rates remained high there was no question as to the need for children, even if the means to prevent them had existed.

During this stage, the society evolves in accordance with [Malthusian](https://en.wikipedia.org/wiki/Malthusian_growth_model) paradigm, with population essentially determined by the food supply. Any fluctuations in food supply (either positive, for example, due to technology improvements, or negative, due to droughts and pest invasions) tend to translate directly into population fluctuations. [Famines](https://en.wikipedia.org/wiki/Famine) resulting in significant mortality are frequent. Overall, [population dynamics](https://en.wikipedia.org/wiki/Population_dynamics) during stage I is comparable to those of animals living in the wild. According to Edward Revocatus, this is the earlier stage of demographic transition in the world and also characterized by primary activities such as small fishing activities, farming practices, pastoralism and petty businesses.

**Stage II**



World population 10,000 BC-2017 AD

This stage leads to a fall in death rates and an increase in population. The changes leading to this stage in Europe were initiated in the [Agricultural Revolution](https://en.wikipedia.org/wiki/British_Agricultural_Revolution) of the eighteenth century and were initially quite slow. In the twentieth century, the falls in death rates in developing countries tended to be substantially faster. Countries in this stage include [Yemen](https://en.wikipedia.org/wiki/Yemen), [Afghanistan](https://en.wikipedia.org/wiki/Afghanistan), the [Palestinian territories](https://en.wikipedia.org/wiki/Palestinian_territories) and [Iraq](https://en.wikipedia.org/wiki/Iraq) and much of [Sub-Saharan Africa](https://en.wikipedia.org/wiki/Sub-Saharan_Africa) (but do not include [South Africa](https://en.wikipedia.org/wiki/South_Africa), [Zimbabwe](https://en.wikipedia.org/wiki/Zimbabwe), [Botswana](https://en.wikipedia.org/wiki/Botswana), [Swaziland](https://en.wikipedia.org/wiki/Swaziland), [Lesotho](https://en.wikipedia.org/wiki/Lesotho), [Namibia](https://en.wikipedia.org/wiki/Namibia), [Kenya](https://en.wikipedia.org/wiki/Kenya), [Gabon](https://en.wikipedia.org/wiki/Gabon) and [Ghana](https://en.wikipedia.org/wiki/Ghana), which have begun to move into stage III.

The decline in the death rate is due initially to two factors:

* First, improvements in the food supply brought about by higher yields in agricultural practices and better transportation reduce death due to starvation and lack of water. Agricultural improvements included [crop rotation](https://en.wikipedia.org/wiki/Crop_rotation), [selective breeding](https://en.wikipedia.org/wiki/Selective_breeding), and [seed drill](https://en.wikipedia.org/wiki/Seed_drill) technology.
* Second, significant improvements in public health reduce mortality, particularly in childhood. These are not so many medical breakthroughs (Europe passed through stage two before the advances of the mid-twentieth century, although there was significant medical progress in the nineteenth century, such as the development of [vaccination](https://en.wikipedia.org/wiki/Vaccination)) as they are improvements in water supply, [sewerage](https://en.wikipedia.org/wiki/Sanitary_sewer), food handling, and general personal [hygiene](https://en.wikipedia.org/wiki/Hygiene) following from growing scientific knowledge of the causes of disease and the improved education and social status of mothers.

A consequence of the decline in mortality in Stage Two is an increasingly rapid growth in population growth (a.k.a. "[population explosion](https://en.wikipedia.org/wiki/Population_explosion)") as the gap between deaths and births grows wider and wider. Note that this growth is not due to an increase in fertility (or birth rates) but to a decline in deaths. This change in population occurred in north-western Europe during the nineteenth century due to the [Industrial Revolution](https://en.wikipedia.org/wiki/Industrial_Revolution). During the second half of the twentieth century less-developed countries entered Stage Two, creating the worldwide rapid growth of number of living people that has demographers concerned today. In this stage of DT, countries are vulnerable to become [failed states](https://en.wikipedia.org/wiki/Failed_States_Index) in the absence of progressive governments.

Another characteristic of Stage Two of the demographic transition is a change in the [age structure](https://en.wikipedia.org/wiki/Population_pyramid) of the population. In Stage One, the majority of deaths are concentrated in the first 5–10 years of life. Therefore, more than anything else, the decline in death rates in Stage Two entails the increasing survival of children and a growing population. Hence, the age structure of the population becomes increasingly youthful and starts to have big families and more of these children enter the reproductive cycle of their lives while maintaining the high fertility rates of their parents. The bottom of the "[age pyramid](https://en.wikipedia.org/wiki/Population_pyramid)" widens first where children, teenagers and infants are here, accelerating population growth rate. The age structure of such a population is illustrated by using an example from the [Third World](https://en.wikipedia.org/wiki/Third_World) today.

**Stage III**

In Stage III of the Demographic Transition Model (DTM), death rates are low and birth rates diminish, as a rule accordingly of enhanced economic conditions, an expansion in women's status and education, and access to contraception. The decrease in birth rate fluctuates from nation to nation, as does the time span in which it is experienced. Stage Three moves the population towards stability through a decline in the birth rate. Several [fertility factors](https://en.wikipedia.org/wiki/Fertility_factor_%28demography%29) contribute to this eventual decline, and are generally similar to [those associated with sub-replacement fertility](https://en.wikipedia.org/wiki/Sub-replacement_fertility#Causes), although some are speculative:

* In rural areas continued decline in childhood death means that at some point parents realize they need not require so many children to be born to ensure a comfortable old age. As childhood death continues to fall and incomes increase parents can become increasingly confident that fewer children will suffice to help in family business and care for them in old age.
* Increasing [urbanization](https://en.wikipedia.org/wiki/Urbanization) changes the traditional values placed upon fertility and the value of children in rural society. Urban living also raises the cost of dependent children to a family. A recent theory suggests that urbanization also contributes to reducing the birth rate because it disrupts optimal mating patterns. A 2008 study in Iceland found that the most fecund marriages are between distant cousins. Genetic incompatibilities inherent in more distant outbreeding make reproduction harder.
* In both rural and urban areas, the cost of children to parents is exacerbated by the introduction of compulsory education acts and the increased need to educate children so they can take up a respected position in society. Children are increasingly prohibited under law from working outside the household and make an increasingly limited contribution to the household, as school children are increasingly exempted from the expectation of making a significant contribution to domestic work. Even in equatorial Africa, children (age under 5) now required to have clothes and shoes, and may even require school uniforms. Parents begin to consider it a duty to buy children(s) books and toys, partly due to education and access to family planning, people begin to reassess their need for children and their ability to grow them.

A major factor in reducing birth rates in stage 3 countries such as Malaysia is the availability of family planning facilities, like this one in Kuala Terengganu, Terengganu, Malaysia.

* Increasing literacy and employment lowers the uncritical acceptance of childbearing and motherhood as measures of the status of women. Working women have less time to raise children; this is particularly an issue where fathers traditionally make little or no contribution to child-raising, such as [southern Europe](https://en.wikipedia.org/wiki/Southern_Europe) or [Japan](https://en.wikipedia.org/wiki/Japan). Valuation of women beyond childbearing and motherhood becomes important.
* Improvements in contraceptive technology are now a major factor. Fertility decline is caused as much by changes in values about children and gender as by the availability of contraceptives and knowledge of how to use them.

The resulting changes in the age structure of the population include a decline in the youth [dependency ratio](https://en.wikipedia.org/wiki/Dependency_ratio) and eventually [population aging](https://en.wikipedia.org/wiki/Population_aging). The population structure becomes less triangular and more like an elongated balloon. During the period between the decline in youth dependency and rise in old age dependency there is a [demographic window](https://en.wikipedia.org/wiki/Demographic_window) of opportunity that can potentially produce economic growth through an increase in the ratio of working age to dependent population; the [demographic dividend](https://en.wikipedia.org/wiki/Demographic_dividend).

However, unless factors such as those listed above are allowed to work, a society's birth rates may not drop to a low level in due time, which means that the society cannot proceed to stage Three and is locked in what is called a [demographic trap](https://en.wikipedia.org/wiki/Demographic_trap).

**Stage IV**

This occurs where birth and death rates are both low, leading to total population stability. Death rates are low for a number of reasons, primarily lower rates of diseases and higher production of food. The birth rate is low because people have more opportunities to choose if they want children; this is made possible by improvements in contraception or women gaining more independence and work opportunities. The DTM is only a suggestion about the future population levels of a country, not a prediction.

Countries that are at this stage (2 < [Total Fertility Rate](https://en.wikipedia.org/wiki/Total_Fertility_Rate) < 2.5 in 2015) include: Antigua and Barbuda, Argentina, Bahrain, Bangladesh, Bhutan, Cabo Verde, El Salvador, Faroe Islands, Grenada, Guam, India, Indonesia, Kosovo, Libya, Malaysia, Maldives, Mexico, Myanmar, Nepal, New Caledonia, Nicaragua, Palau, Peru, Seychelles, Sri Lanka, Suriname, Tunisia, Turkey and Venezuela.

**Present Day Context of Demographic Transition Theory**

It is seen that the DTM is applicable to demographic transition of many countries. Some of such countries are as follows:

Britain

Between 1750 and 1975 England experienced the transition from high levels of both mortality and fertility, to low levels. A major factor was the sharp decline in the death rate due to infectious diseases, which has fallen from about 11 per 1,000 to less than 1 per 1,000. By contrast, the death rate from other causes was 12 per 1,000 in 1850 and has not declined markedly. The agricultural revolution and the development of transport, initiated by the construction of canals, led to greater availability of food and coal, and enabled the [Industrial Revolution](https://en.wikipedia.org/wiki/Industrial_Revolution) to improve the standard of living. Scientific discoveries and medical breakthroughs did not, in general, contribute importantly to the early major decline in infectious disease mortality.

India

As of 2013, India is in the later half of the third stage of the demographic transition, with a population of 1.23 billion. It is nearly 40 years behind in the demographic transition process compared to [EU countries](https://en.wikipedia.org/wiki/EU_countries), [Japan](https://en.wikipedia.org/wiki/Japan), etc. The present demographic transition stage of India along with its higher population base will yield a rich [demographic dividend](https://en.wikipedia.org/wiki/Demographic_dividend) in future decades.

United States

Greenwood and Seshadri (2002) show that from 1800 to 1940 there was a [demographic shift](https://en.wikipedia.org/wiki/Demographic_shift) from a mostly rural US population with high fertility, with an average of seven children born per white woman, to a minority (43%) rural population with low fertility, with an average of two births per white woman. This shift resulted from technological progress. A sixfold increase in real wages made children more expensive in terms of forgone opportunities to work and increases in agricultural productivity reduced rural demand for labor, a substantial portion of which traditionally had been performed by children in farm families.

A simplification of the DTM theory proposes an initial decline in mortality followed by a later drop in fertility. The changing demographics of the U.S. in the last two centuries did not parallel this model. Beginning around 1800, there was a sharp fertility decline; at this time, an average woman usually produced seven births per lifetime, but by 1900 this number had dropped to nearly four. A mortality decline was not observed in the U.S. until almost 1900—a hundred years following the drop in fertility.

However, this late decline occurred from a very low initial level. During the 17th and 18th centuries, crude death rates in much of colonial North America ranged from 15 to 25 deaths per 1000 residents per year (levels of up to 40 per 1000 being typical during stages one and two). Life expectancy at birth was on the order of 40 and, in some places, reached 50, and a resident of 18th century Philadelphia who reached age 20 could have expected, on average, additional 40 years of life.

This phenomenon is explained by the pattern of colonization of the United States. Sparsely populated interior of the country allowed ample room to accommodate all the "excess" people, counteracting mechanisms (spread of communicable diseases due to overcrowding, low real wages and insufficient calories per capita due to the limited amount of available agricultural land) which led to high mortality in the Old World. With low mortality but stage 1 birth rates, the United States necessarily experienced exponential population growth (from less than 4 million people in 1790, to 23 million in 1850, to 76 million in 1900.)

The only area where this pattern did not hold was the American South. High prevalence of deadly endemic diseases such as malaria kept mortality as high as 45–50 per 1000 residents per year in 18th century North Carolina. In [New Orleans](https://en.wikipedia.org/wiki/New_Orleans), mortality remained so high (mainly due to [yellow fever](https://en.wikipedia.org/wiki/Yellow_fever)) that the city was characterized as the "death capital of the United States" – at the level of 50 per 1000 population or higher – well into the second half of the 19th century.

Today, the U.S. is recognized as having both low fertility and mortality rates. Specifically, birth rates stand at 14 per 1000 per year and death rates at 8 per 1000 per year.[[42]](https://en.wikipedia.org/wiki/Demographic_transition#cite_note-42)

**Critical Evaluation of Demographic Transition Theory**

It must be remembered that the DTM is only a model and cannot necessarily predict the future. It does however give an indication of what the future birth and death rates may be for an underdeveloped country, together with the total population size. Most particularly, of course, the DTM makes no comment on change in population due to migration. It is not applicable for high levels of development, as it has been shown that after a [HDI](https://en.wikipedia.org/wiki/Human_Development_Index) of 0.9 the fertility increases again.

DTM does not account for recent phenomena such as [AIDS](https://en.wikipedia.org/wiki/AIDS); in these areas HIV has become the leading source of mortality. Some trends in waterborne bacterial infant mortality are also disturbing in countries like [Malawi](https://en.wikipedia.org/wiki/Malawi), [Sudan](https://en.wikipedia.org/wiki/Sudan) and [Nigeria](https://en.wikipedia.org/wiki/Nigeria); for example, progress in the DTM clearly arrested and reversed between 1975 and 2005.

DTM assumes that population changes are induced by industrial changes and increased wealth, without taking into account the role of social change in determining birth rates, e.g., the education of women. In recent decades more work has been done on developing the social mechanisms behind it.

DTM assumes that the birth rate is independent of the death rate. Nevertheless, demographers maintain that there is no historical evidence for society-wide fertility rates rising significantly after high mortality events. Notably, some historic populations have taken many years to replace lives after events such as the [Black Death](https://en.wikipedia.org/wiki/Black_Death).

Some have claimed that DTM does not explain the early fertility declines in much of Asia in the second half of the 20th century or the delays in fertility decline in parts of the Middle East. Nevertheless, the demographer [John C Caldwell](https://en.wikipedia.org/wiki/John_Caldwell_%28demographer%29) has suggested that the reason for the rapid decline in fertility in some [developing countries](https://en.wikipedia.org/wiki/Developing_country) compared to Western Europe, the United States, Canada, Australia and New Zealand is mainly due to government programs and a massive investment in education both by governments and parents.