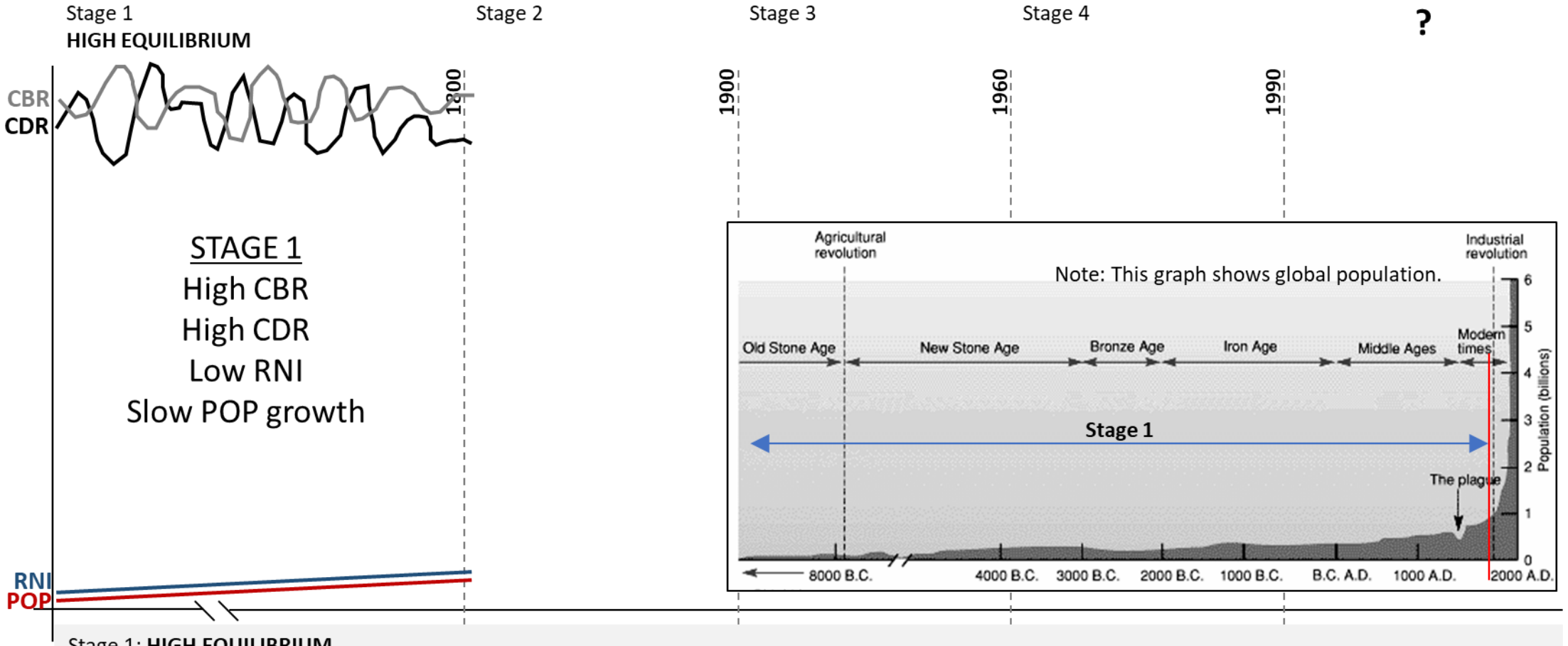
Added Info: The Demographic Transition Model for Western Europe and North America



Stage 1: **HIGH EQUILIBRIUM**

During the first stage, both the birth rates and the death rates are high. If the Rate of Natural Increase is the Crude Birth Rate minus the Crude Death Rate (RNI = CBR – CDR), then the RNI is also low… and the total population (POP) is also low. This describes the population trend for most of human history, with slight increases in growth as we learned how to domesticate plants and animals, how to irrigate, and how to use manure as a fertilizer (the first agricultural revolution). These new technologies allowed people to shift from hunter-gatherer/nomadic societies to sedentary ones… settled in one place, building permanent villages, towns, and eventually cities. In early human history, there were few large cities, but they were found in many places: Mesopotamia (Middle East), Indus River Valley (Pakistan/India), China, Mexico, North America and Africa. Most "big" cities in early history were small by today's standards – 25,000 - 50,000 people, but some exceeded 100,000. However, the population growth was slow as we had relatively little control over many of the forces of nature such as flooding, droughts, pests or diseases. In 1800, the total world population is estimated to have been 1 billion.

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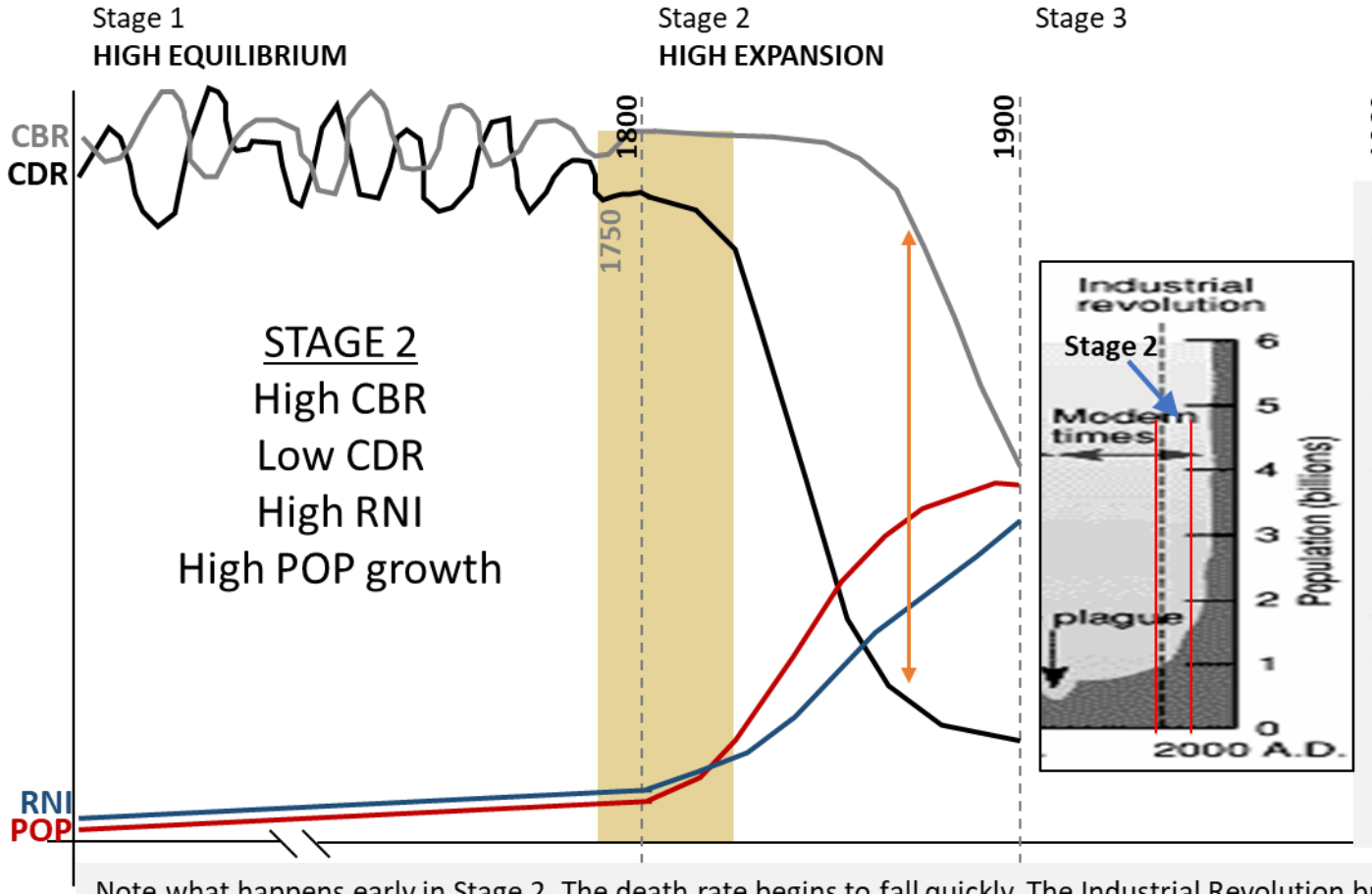
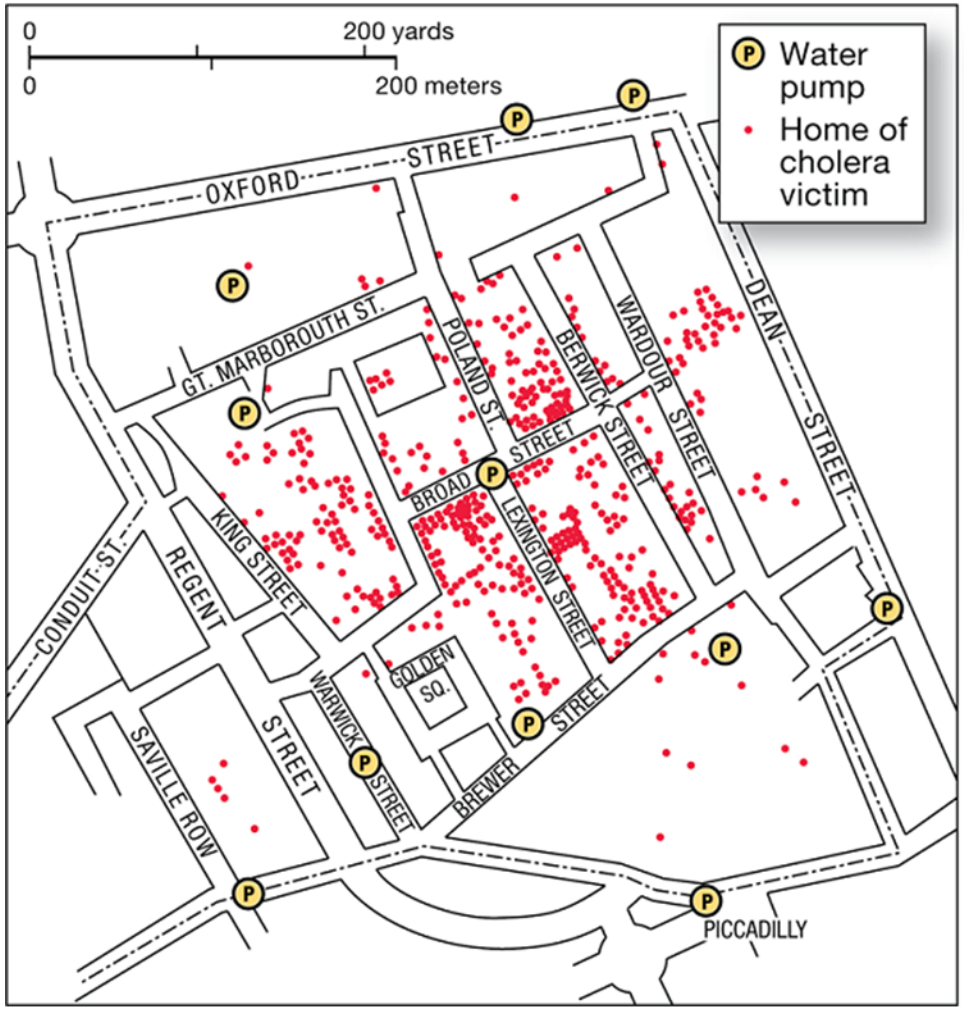


Stage 2: **HIGH EXPANSION**

The high expansion stage of the demographic transition coincides with the beginning of the Industrial Revolution. Keep in mind that this model as commented on here applies – as the graph title notes – <u>only</u> to Western Europe and North America. Why? Industrialization – defined for this purpose as the shift to a manufacturing economy – began in England in the late 1700s, and diffused to Western Europe, the US and Canada in the early and mid-1800s. Very few other countries experienced rapid industrialization until much later. Even Central and Eastern Europe and Russia were late-comers, and much of the rest of the world was held as colonies of the major European powers and exploited for their resources. There were a number of very quick changes (relative to human history!) from the late 1700s to the early 1900s. Countries became much more urban, and much less rural (in 1800, the US population was about 95% rural; in 1900 it was about 60% rural/40% urban). The new factories were in the cities, which were growing rapidly as there were plentiful jobs… and the population was also growing rapidly. Why?

Note what happens early in Stage 2. The death rate begins to fall quickly. The Industrial Revolution brought about many changes, and among the first were new technologies that made farming easier and faster, enabled us to use land we couldn't before, and required fewer and fewer people over time to produce more and more food. But… the birth rates does not drop until later, in no small part because the past reminds us that there were good times and bad times, and it takes years before it becomes obvious that we are living longer and that more of our children are surviving (decline in infant mortality and early childhood deaths). Historically, a family having 7 or 8 children might see 3 or 4 of them live in adulthood. If more of them survive, the family doesn't need to have as many children… and, having a lot of children in the city is expensive. As a result, through most of Stage 2, the population grows very rapidly. The "gap" (where the orange arrow is) between births and deaths shows us how rapidly population growth is occurring… the larger the gap, the bigger the difference between the crude birth rate and the crude death rate, and, the higher the Rate of Natural Increase. Only by the end of Stage 2 is that gap starting to narrow again, but even that takes some time as those earlier generations with many children will still have a lot of children of their own, even if they each, as a family, have fewer. This is the "demographic momentum."



The Industrial Revolution also saw numerous other changes that affected society.

Better farming methods and more useable land meant that more food was available… more food = a healthier population.

As farming became more mechanized, fewer people were needed – even though they were growing more food on more land. This is called "the substitution of capital for labor" – when we use various tools to make work easier and faster, and often reduces how many people are needed to do the same amount of work (and, even more than what could be done before!).

This created what Marx called "a surplus army of labor." Part of that is the surplus from the farm workers that were no longer needed on the farm… they could now engage in other work. And as children grew up in the growing urban places, they too were "surplus" workers, and, like the former farm workers, could work in the factories. The industrial growth rate at this time was phenomenal; anyone who needed work was nearly guaranteed work (though, keep in mind it wasn't always pleasant, safe, clean or permanent… or very high-paying).

As the cities grew in population, they also grew in land area. In many cities, this often led to draining swampy areas and wetlands nearby to build on. One unintended effect of draining s wetlands near the city was reducing insect populations that could carry diseases (such as mosquitoes). Reducing those disease vectors also led to a healthier environment.

Seminal work done by Dr. Snow in 1854 began the modern discipline of medical geography or epidemiology. His work led to understanding how a disease can travel through a population from one source (the middle P in the map at left); in this case a commonly used water pump in London's Soho neighborhood. From this came the realization that:

- "Potable" (fresh drinking) water had to be kept separate from waste,
- The building of the gravity sewer system in London (and, soon thereafter, many other cities) to remove human waste from environment we live in, and,
- The removal of waste (garbage collection), away from the lived-in environment. This is often referred to as the Sanitary Movement.

This did not solve all of the environmental issues of urban places – they were still highly polluted environments – but it did help to create a healthier city.

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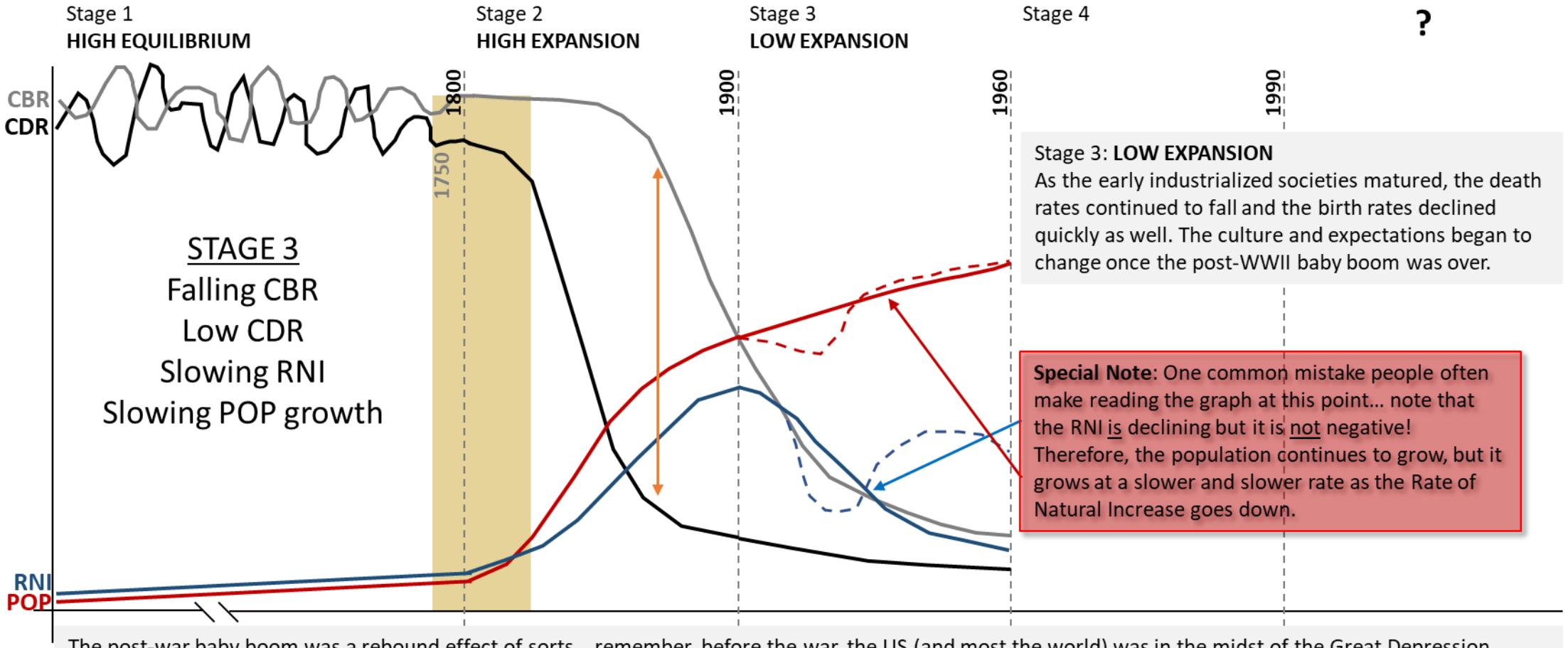

Stage 3: **LOW EXPANSION**
As the early industrialized societies matured, the death rates continued to fall and the birth rates declined quickly as well. The culture and expectations began to change once the post-WWII baby boom was over.

Special Note: One common mistake people often make reading the graph at this point… note that the RNI is declining but it is not negative! Therefore, the population continues to grow, but it grows at a slower and slower rate as the Rate of Natural Increase goes down.

The post-war baby boom was a rebound effect of sorts… remember, before the war, the US (and most the world) was in the midst of the Great Depression, followed almost immediately by World War II. These were not optimistic times. The birth rate curves shown here are generalized… the thin blue dashed line might better represent the US from the depression through WWII and into the optimism in the 1950s. But, society began to change, and the baby boom ended about 1962. The war also increased our medical knowledge, and people were living even longer, and infant mortality continued to decline.

The 1960s saw the beginning of several major changes to culture, society and industry. During the war years, women had often taken the place of men in factories and other occupations because the men were "off to war." Women became increasingly dissatisfied with being pushed back into traditional roles (homemaker, secretary, nurse, teacher), and more women began to consider other careers, go to college, and… wait. Couples began marrying later, and having children later, and, most importantly (in this context) having fewer children. The "nuclear family" – Mom, Dad, and two to three children, Mom usually at home and Dad as the breadwinner – evolved into a very different family, sometimes unmarried (POSSLQs – persons of the opposite sex sharing living quarters), some married but without children (DINKs – dual income no kids), and quite often with only one child, maybe two. POSSLQs and DINKs were actual designations, by the way (and there were others). Despite the failure of states to ratify the Equal Rights Amendment, women entered the workforce in large numbers.

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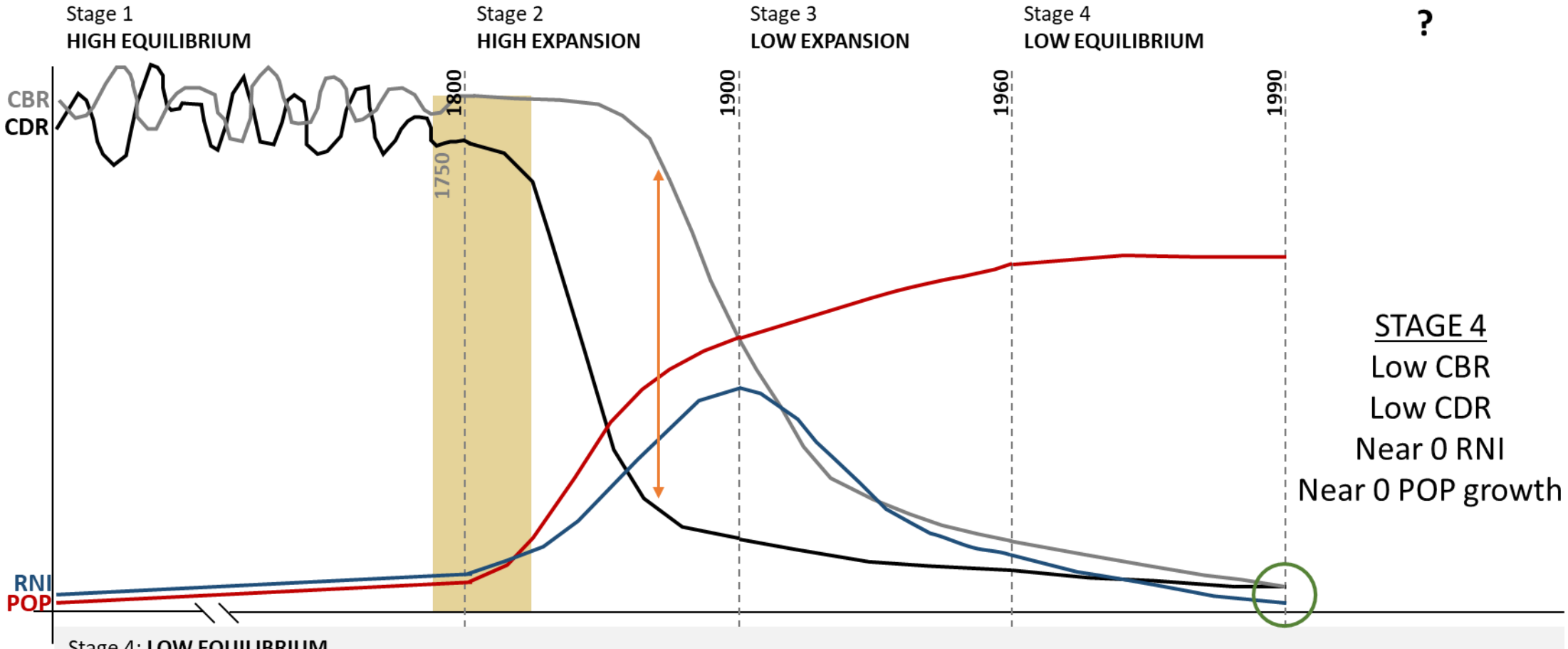

Stage 4: **LOW EQUILIBRIUM**

Note that this is the last stage of the original model as first described by Warren (1929) and refined by Notestein (1945). Of particular note here is the "meeting" of the Crude Birth Rate lines and the Crude Death Rate Lines (inside the green circle). If the CBR and the CDR are equal, then the RNI = 0. This is also referred to as Zero Population Growth. ZPG has been seen as a goal by population geographers since the 1960s when there was great concern that the human population was growing far too fast for the earth's resources to be able to support us in the future (this is still a worry for many).

If the birth rates and death rates are equal, and the rate of natural increase is 0, then the population is stable (not growing, not decreasing), or at equilibrium. This equilibrium differs from Stage 1 because in the first stage, the population is stable because the birth rates and death rates are both high (mostly because we were at the mercy of Mother nature)… in Stage 4, the birth rates and death rates are both low, due to cultural changes such as career goals and voluntary efforts such family planning.

There are several countries that are very close to ZPG. The US RNI is still above 0, so we are still growing (slowly).

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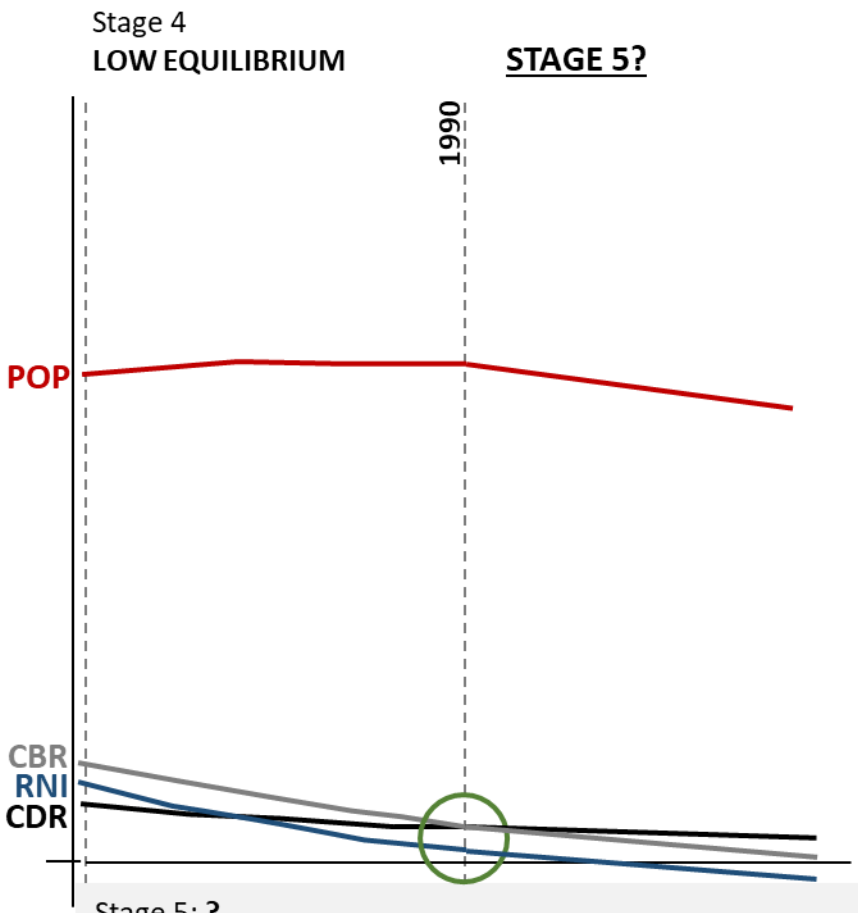
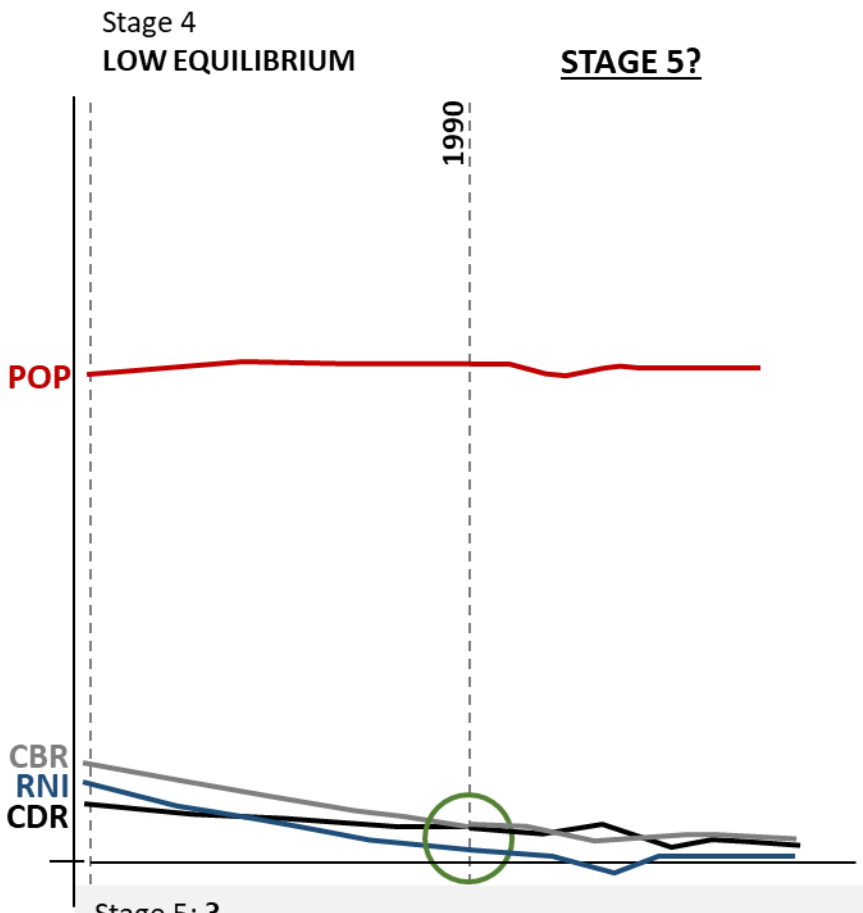


Stage 5: **?**
The original model did not have a Stage 5, but many have tried to predict what it might be. In this scenario, note that the birth rates fall below the death rates. This means that (1) the population has fallen below the replacement rate (and, possibly, below the replacement fertility rate), and (2) the Rate of Natural Increase is negative. In this case, the total population (POP) would be decreasing.



Stage 5: **?**
In this scenario, note that the birth rate and death rate curves fluctuate a bit, and eventually settle at an equilibrium. For a short period of time, the population may increase and/or decrease slightly and then become stable. On average, the population would be close to equilibrium. For many population geographers, the goal globally would be to have an equilibrium population.

Why is an equilibrium population – reaching a global ZPG – desirable? As of 08/26/2020, there are an estimated 7.8 billion people on Earth. There are concerns about how many people the planet can sustain before we begin running out of critical resources, and not just ones we often think of first, like oil. More importantly, there are areas in the world that are under great stress with regard to water and soil resources… enough fresh water for people to drink, cook with, and grow crops (ignoring the needs of other industries), and either the lack of good soils or soils that are becoming damaged from overuse, over-application of agricultural chemicals and other pollutants, damaged by erosion, or lost to development.

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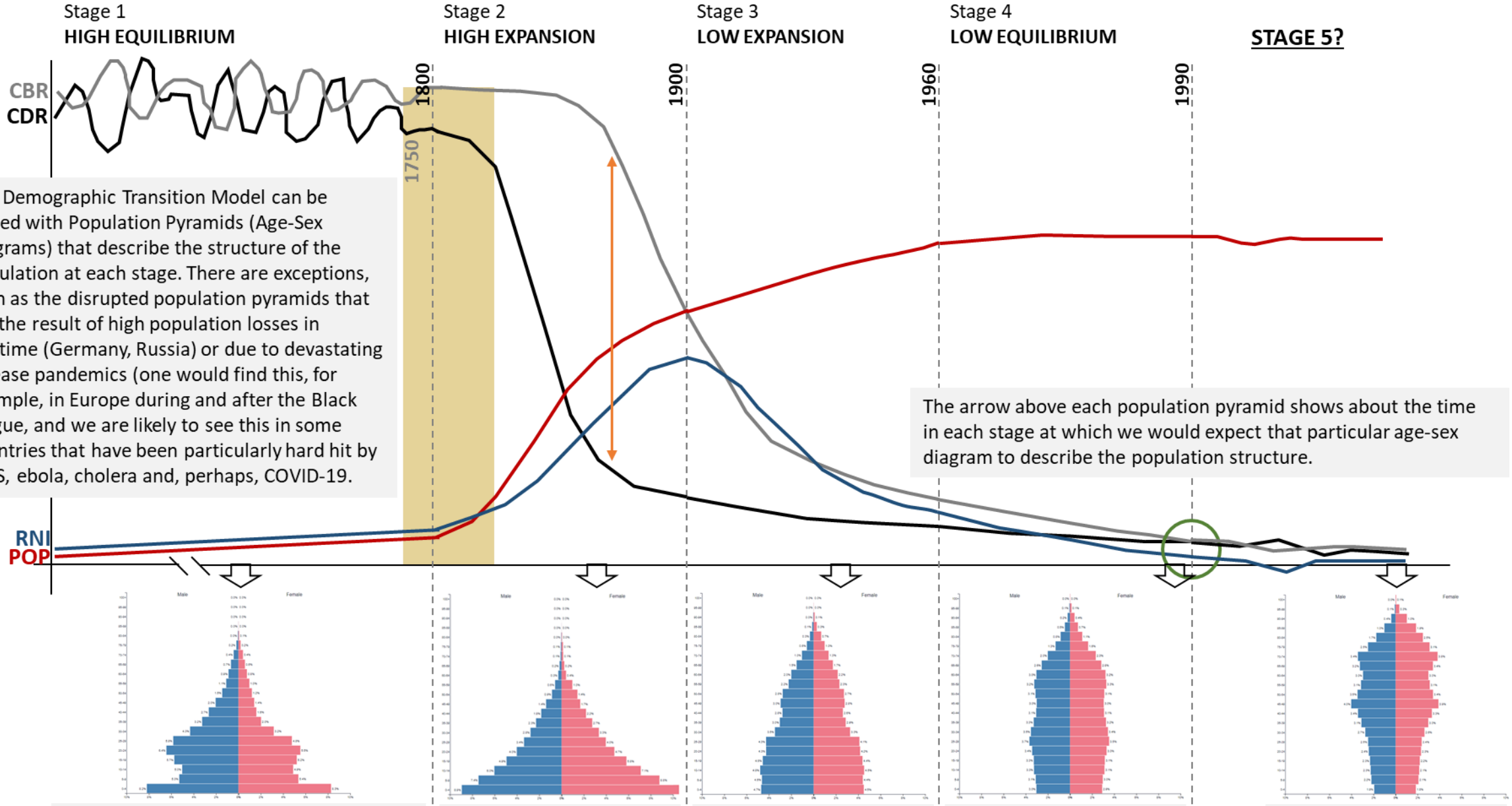


The Demographic Transition Model can be paired with Population Pyramids (Age-Sex Diagrams) that describe the structure of the population at each stage. There are exceptions, such as the disrupted population pyramids that are the result of high population losses in wartime (Germany, Russia) or due to devastating disease pandemics (one would find this, for example, in Europe during and after the Black Plague, and we are likely to see this in some countries that have been particularly hard hit by AIDS, ebola, cholera and, perhaps, COVID-19.

The arrow above each population pyramid shows about the time in each stage at which we would expect that particular age-sex diagram to describe the population structure.

No or very low growth: high infant mortality, high incidence of early deaths, low life expectancy (note how much shorter this pyramid is)… high birth rates.

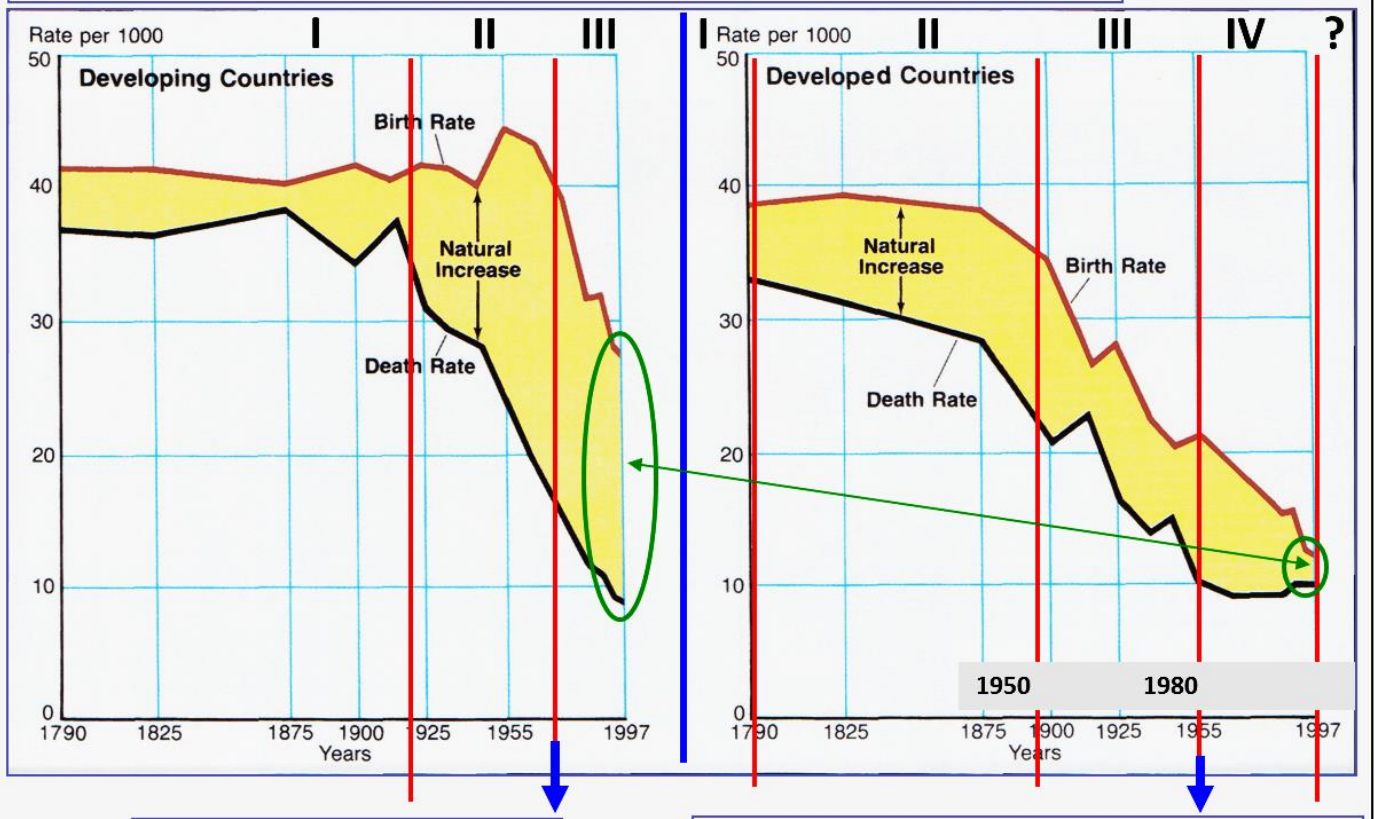
Rapidly growth: increasing life expectancy and declining early deaths, very high birth rates.

Moderate to low growth: increasing life expectancy, falling birth rates.

No growth: very high life expectancy, low birth rates (at replacement rate).

Decreasing population: death rates increase as population ages, very low birth rates.

Differing Demographic Transitions



Ex: *Subsaharan Africa*

Ex: *Indonesia*, *Thailand*, Singapore, South Korea… "The Asian Tigers"

Why this model doesn't work for most countries…

NOTE: Looking at this for relatively newer developed economies like the "Asian Tigers" (Hong Kong, Singapore, South Korea, and Taiwan)… the time frame is considerably collapsed. What occurred from 1850 to the 1990s in the US, occurred seemingly overnight in these countries, since about 1960 – in about 50-60 years.

One good example of how rapidly these changes occurred is to look at South Korea. In 1950, South Korea had limited industrialization, and the country was still largely rural and agricultural. Hyundai was a small company almost unheard of outside South Korea. The company did not start building cars until 1975, and they did not import cars to the US until 1986. Hyundais were, at first, cheap knock-offs of Japanese cars… and although they were reasonably reliable, they were terrible to own because it was extremely hard to get parts for them. Fast forward to 2020… Hyundai cars are among the top-ranked cars for consumer satisfaction by the J. D. Powers Associates polling firm, and are as sophisticated as any other mainstream car on the road today. Other South Korean firms have also become major global players (Samsung!), and South Korea today is a highly developed, highly urbanized country.

Why this model doesn't work for most countries… Different countries are at different stages of development. The patent system (protecting inventions) was a way of keeping industrial knowledge contained. Outside the US, Canada, and Western Europe, few countries had access to industrialization, either the knowledge or the money. History also played a role… keep in mind that almost all of Africa had been divided into colonies ruled by Europe until <u>after</u> World War II (and some into the 1970s), and were used almost solely for their natural resources (metals, minerals, gems, oil, agricultural lands).

The first major change, somewhat unintentional, came about by way of the Medical Revolution after WWII. The goal was to reduce infant mortality and early deaths due to treatable diseases, but it often resulted in rapidly growing populations in countries that are struggling to feed, house and employ their citizens. While the death rates dropped, many of these were still traditional, agricultural economies and have maintained high birth rates.