ANOMALIES IN POPULATION PYRAMIDS

Pyramid Feature	Possible Reason
Bars are longer for people ages 18 to 25 than for people younger or older.	• A small city includes a large university. • A shortage of school funding causes families to move away when they have children.
Bars are longer for people ages 25 to 50 than for children.	• An economic crisis causes people to decide to have fewer children. • A government policy to slow population growth discourages births. • An epidemic causes many infants to die.
Bars are longer for people over the age of 65.	• A community in a warm climate attracts retirees. • A lack of jobs causes young people to move away.
Bars are longer for males than females.	• An oil boom attracts people for jobs that are traditionally done by men.

CALCULATING DEPENDENCY RATIO

Country	Population by Age Group	Calculation	Dependency Ratio
United States	• under 15: 18.8% • 15 to 64: 65.9% • over 64: 15.3%	$\frac{18.8 + 15.3}{65.9} = 0.52$	1 : 0.52
Niger	• under 15: 49.3% • 15 to 64: 48.1% • over 64: 2.6%	$\frac{49.3 + 2.6}{48.1} = 1.08$	1 : 1.08

Population Density

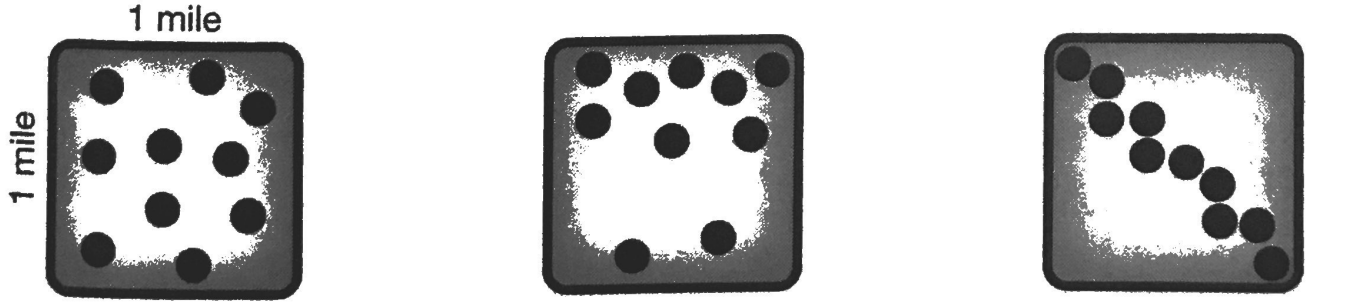
Population density measures the average number of people in an area. It is calculated by comparing the area's population to its size, and it is usually expressed in the number of people per square mile or square kilometer. Demographers study three types of population density.

Arithmetic Population Density

The most commonly used population density is the **arithmetic population density**, calculated by dividing a region's population by its total area. In July 2015, the United States had a population of approximately 321,368,864 in a total area of 3,841,999 square miles, so its arithmetic population density was 83.6 people per square mile, or 32.7 people per square kilometer. These figures are given in various styles. Two common ones are as 83.6/sq. mi. and 83.6/mi^2.

But arithmetic density says little about population distribution. Population density is simply an average number of people overall in an area. It does not indicate where in the area they live. The diagram below shows three areas with 10 people per square mile, but with different distributions:

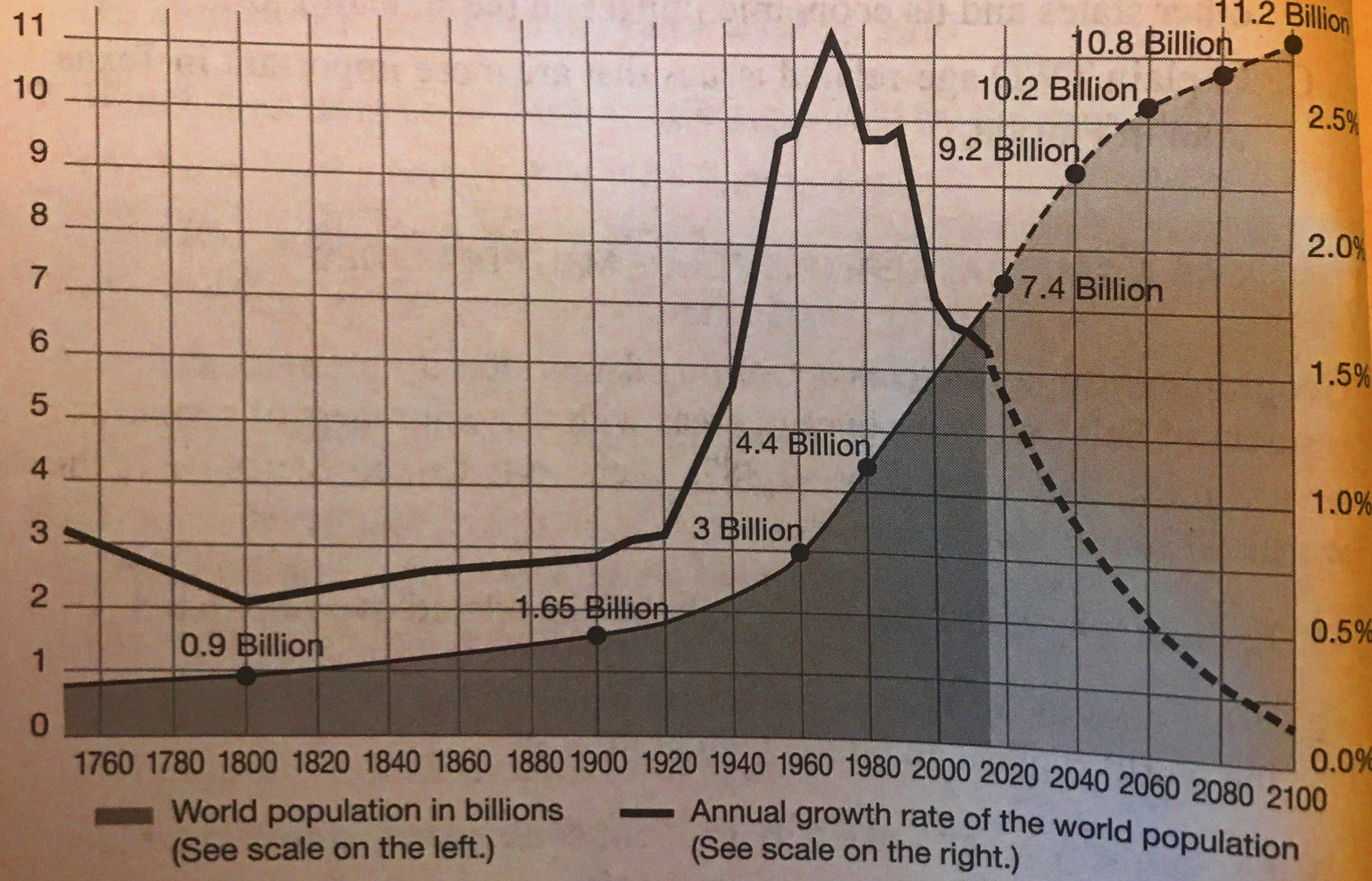
- In A, people are evenly dispersed throughout the area. This pattern is common in areas where each person or household lives on a large plot of land. At different scales and with different numbers, this basic pattern appears in many suburbs and many farming and ranching areas.
- In B, people are clustered, or nucleated, in one part of an area. This is a common pattern when people live near a central feature, such as a church, or are concerned about defense.
- In C, people are spread out in a line, known as a linear pattern. This pattern is common for people who live along a river or transit route.



ARITHMETIC AND PHYSIOLOGICAL POPULATION DENSITIES

Country	Arithmetic Density (people/sq. mi.)	Physiological Density (people/sq. mi.)	Arable Land
Iceland	8	687	1.2%
Australia	8	125	6.0%
Canada	9	192	4.7%
United States	84	498	16.8%
Egypt	226	8,078	2.8%
Japan	962	8,218	11.7%
Netherlands	1,044	3,505	31.0%
Bangladesh	2,914	4,938	59.0%
Singapore	19,982	2,498,197	0.8%

WORLD POPULATION GROWTH SINCE 1760



Source: Population projections come from "World Population Prospects: The 2015 Revision," UN Department of Economic and Social Affairs, 2015.

Role of Women in Society

Cultural, economic, political, and environmental realities have always shaped decisions about whether to have children. Since these conditions have varied across time and cultures, so have birth rates. How people viewed the role of women in a society has been a particularly important factor influencing TFR. Over the past 250 years, as countries industrialized, people moved from rural areas to urban areas and found work in factories. Many women became factory workers or domestic help. They lived in small apartments or small houses in cities, and families became smaller. Urban families did not need children to work their farmland—and they were living in already crowded spaces.

When factories became common in the early 19th century, children worked in them alongside adults. But in the later part of the century, governments passed laws prohibiting child labor and began opening public schools. As young women obtained more schooling, they began to expand their work opportunities. The longer they stayed in school, the fewer children they had, a trend that continues to the present day, as the chart on Ghana shows.

TFR AND SCHOOLING FOR GIRLS IN GHANA

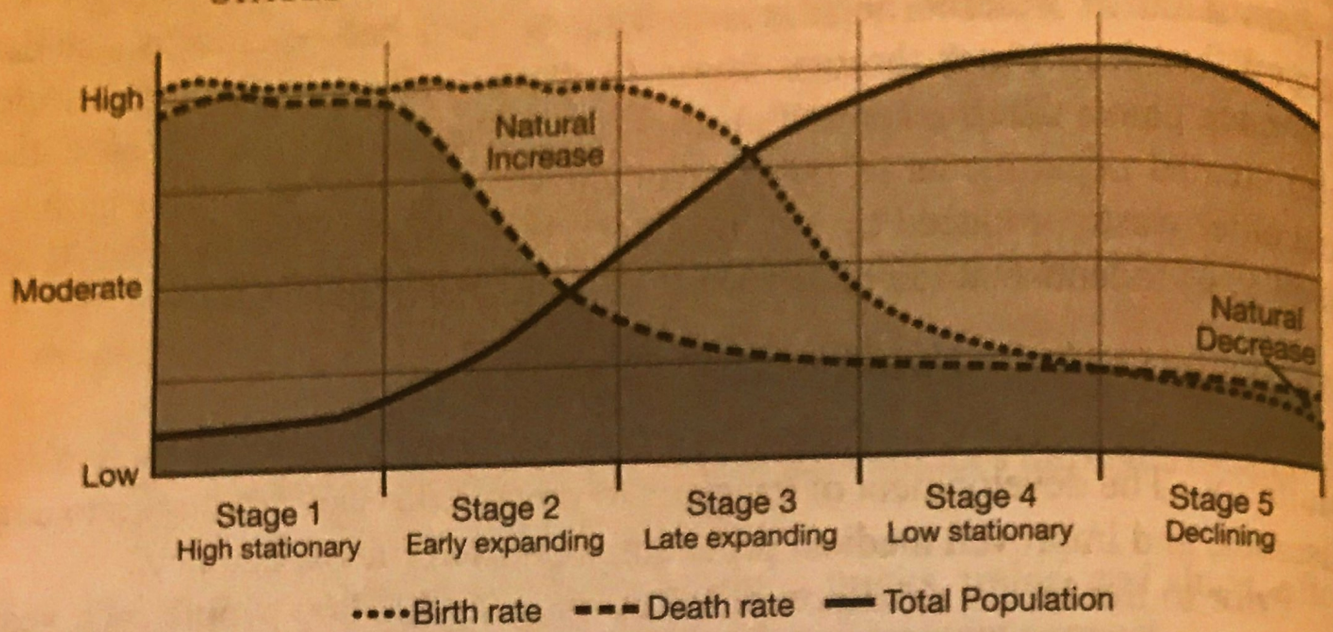
Years of Schooling	TFR, 1990	TFR, 2007
0	7.0	6.1
4	6.4	5.0
8	5.6	3.7
12	2.7	2.0

Source: worldbank.org.

In Ghana between 1990 and 2007, as young women gained more education, the number of children they had decreased. This suggests that young women who spent more time in school chose to delay marriage.

The United States showed a similar pattern of delayed marriage. As educational opportunities increased for women between 1950 and 2010, the median marriage age of women increased from just over 20 years of age to nearly 27. The average age at which women gave birth to their first child increased as well.

STAGES OF THE DEMOGRAPHIC TRANSITION MODEL



CHARACTERISTICS OF THE DTM STAGES

Factor	1. High Stationary	2. Early Expanding	3. Late Expanding	4. Low Stationary	5. Declining
Birth Rate	High, but fluctuating as need for farm labor changes	High, but fluctuating to reflect desires for big families	Declining as urbanization decreases the need for child labor	Low, but enough to keep the population stable	So low it falls below the death rate
Death Rate	High, but fluctuating to reflect diseases and poor sanitation	Rapidly declining as nutrition, sanitation, and medicine improve	Declining, but not as fast as in previous stage	Low and stable	Low, sometimes increasing as the population ages
Population Change	Very low growth because births and deaths are both high	Rapid growth as death rates fall faster than birth rates	Rapid but slowing growth as birth rates decline	Very low growth because births and deaths are both low	Very low decline as births fall below deaths
Examples Today	Scattered isolated groups	• Mali • South Sudan	• Mexico • Turkey • Indonesia	• United States • China	• Japan • Germany
Population Structure	Very young	Very young	Young, with rising life expectancy	Balanced, with more aging	Very old

EPIDEMIOLOGICAL TRANSITION MODEL STAGES		
Stage	**Description**	**Effects on Population**
1. Pestilence and Famine	Parasitic or infectious diseases, accidents, animal attacks, or human conflicts cause most deaths.	A high death rate and low life expectancy
2. Receding Pandemics	The number of pandemics (widespread diseases that affect large populations) declines as a result of improved sanitation, nutrition, and medicine.	A decreasing death rate and increasing life expectancy
3. Degenerative and Human-Created Diseases	Infectious and parasitic diseases continue to decrease, but diseases associated with aging, such as heart disease and types of cancer—increase as people live.	Death rate stabilizes at a low level and life expectancy increases
4. Delayed Degenerative Diseases	Stage 4 is an extension of Stage 3, but the age-related diseases are put off as medical procedures delay the onset of these diseases through advanced procedures. Diseases such as Alzheimer's and dementia increase.	Death rate reaches its lowest level and life expectancy reaches a peak
5. Reemerging of Infectious and Parasitic Diseases	Infectious and parasitic diseases increase as some bacteria and parasites become resistant to antibiotics and vaccines.	Life expectancy decreases

In 1798, Thomas Malthus published one of the most provocative books on population growth ever written, *An Essay on the Principles of Population.* Malthus, a member of the clergy and an early economist, focused on one of the underlying concerns of geography: the relationship between people and the earth.

Malthus in His Time

Malthus lived during a period when people were optimistic that new technology would make life better—but Malthus feared it would not. He analyzed the relationship between agricultural output and the growing number of people, and concluded that society was on a path toward massive starvation.

He believed that food production would increase arithmetically, growing steadily, but by the same amount each generation. In contrast, he believed that people would not limit the number of children they had, so the population would increase exponentially, multiplying by the same amount each generation. Since population would grow faster than food production, the world's population would soon be unsupportable. If people could not limit population growth voluntarily, widespread and massive starvation would.

Malthus Today

Geographers and other social scientists have debated the usefulness of Malthus's ideas about population growth, known as **Malthusian theory**, since he first published them. Food production grew more quickly than Malthus predicted, so famine did not reach the scale he feared. People today who have adapted his basic ideas to modern conditions are known as **Neo-Malthusians**. They argue that global overpopulation is a serious problem and an even greater threat for the future. They point out continued population growth will lead to the depletion of nonrenewable resources such as petroleum and metals, pollution of air and water, and shortages of food, all of which could bring social, political, economic, and environmental catastrophe.