

Population Density

Learning Outcome 2.1.3 Compare different approaches to measuring density.

Density was defined in Chapter 1 as the frequency with which something exists within a given unit of area. Population density is the number of humans living within an area. Here are three measures of population density frequently used by geographers.

Arithmetic Density

Geographers most frequently use **arithmetic density**, which is the total number of objects in an area (Figure 2-7). In population geography, arithmetic density refers to the total number of people divided by total land area. To compute the arithmetic density, divide the population by the land area. Table 2-1 shows several examples.

Arithmetic density enables geographers to compare the number of people living in different regions of the world (Figure 2-8). Thus, arithmetic density answers the “where” question. However, to explain why people are not uniformly distributed across Earth’s surface, other density measures are more useful.



▲ **FIGURE 2-7 HIGH ARITHMETIC DENSITY** Leeuwarden, the Netherlands.

Pause & Reflect 2.1.3 What regions of the world have relatively high arithmetic densities?

TABLE 2-1 | Density Measures for Four Countries

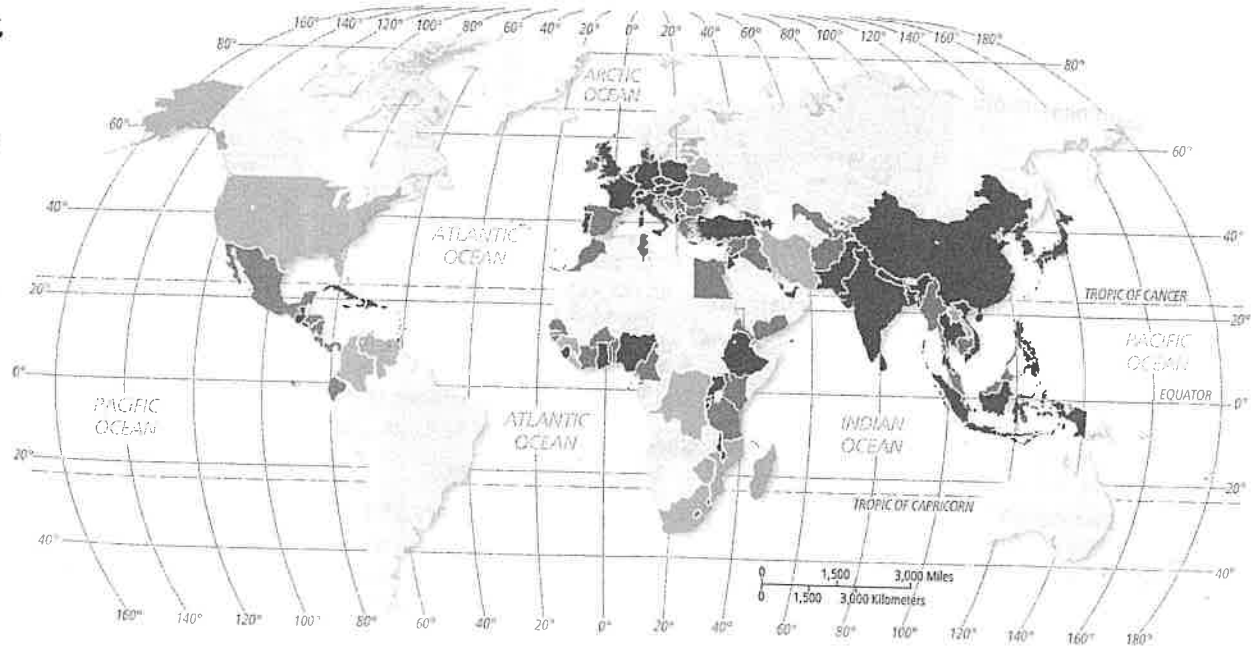
Country	Arithmetic Density	Physiological Density	Agricultural Density	Percentage Farmers	Percentage Arable Land
Canada	4	85	0.8	2	5
Egypt	97	3,350	208	25	4
The Netherlands	511	1,668	9	2	30
United States	36	215	0.4	1	17

► **FIGURE 2-8 ARITHMETIC DENSITY, 2018** Geographers

rely on the arithmetic density to compare conditions in different countries because the two pieces of information—total population and total land area—are easy to obtain.

Persons per square kilometer

- 100 and above
- 50–99
- 25–49
- below 25
- no data



Physiological Density

Looking at the number of people per area of a certain type of land in a region provides a more meaningful population measure than arithmetic density. Land suited for agriculture is called **arable land**. The number of people per unit area of arable land is called the **physiological density** (Figure 2-9).

Comparing physiological and arithmetic densities helps geographers understand the capacity of the land to yield enough food for the needs of the people. In Egypt, for example, the large difference between the physiological density and arithmetic density, as shown in Table 2-1, indicates that most of the country's land is unsuitable for intensive agriculture. In fact, all but 5 percent of Egyptians live in the Nile River valley and delta because it is the only area in the country that receives enough moisture (by irrigation from the river) to allow intensive cultivation of crops.

Agricultural Density

Two countries can have similar physiological densities but produce significantly different amounts of food because of different economic conditions. **Agricultural density** is the ratio of the number of farmers to the amount of arable land (Figure 2-10). Table 2-1 shows several examples.

Measuring agricultural density helps account for economic differences. Developed countries have lower agricultural densities because technology and finance allow a few people to farm extensive land areas and feed many people.

To understand relationships between population and resources in a country, geographers examine a country's physiological and agricultural densities together. For example, the physiological densities of both Egypt and the Netherlands are high, but the Dutch have a much lower agricultural density than the Egyptians. Geographers conclude that both the Dutch and Egyptians put heavy pressure on the land to produce food, but the more efficient Dutch agricultural system requires fewer farmers than does the Egyptian system.

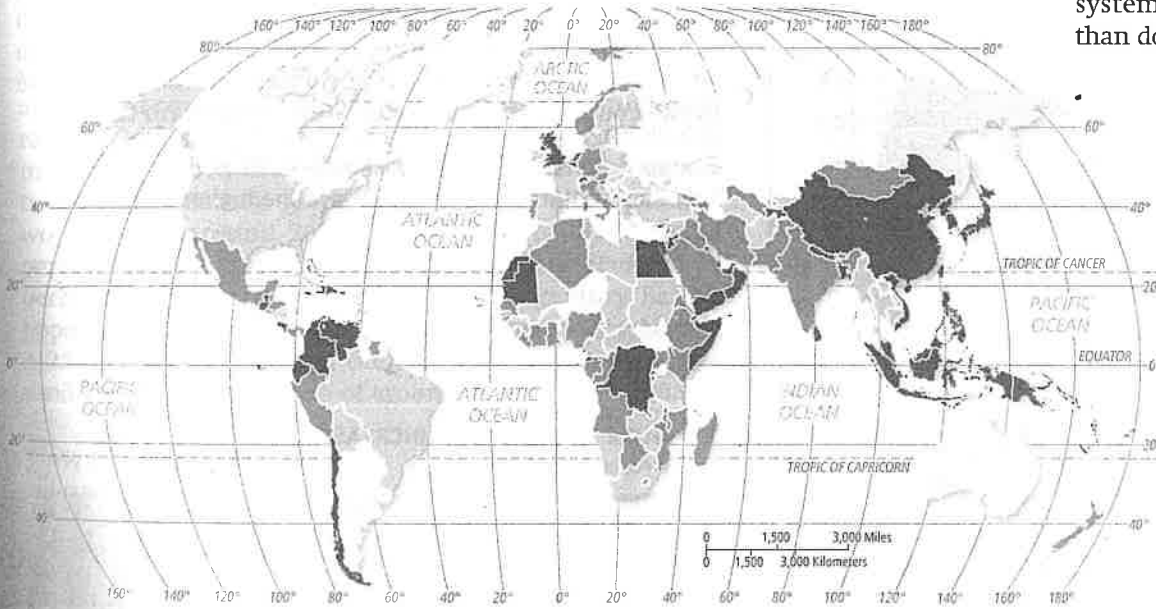


FIGURE 2-9
PHYSIOLOGICAL DENSITY, 2018 Physiological density provides insights into the relationship between the size of a population and the availability of resources in a region.
Source: Population Reference Bureau

Persons per square kilometer of arable land

- 1,000 and above
- 500–999
- 200–499
- below 200
- no data

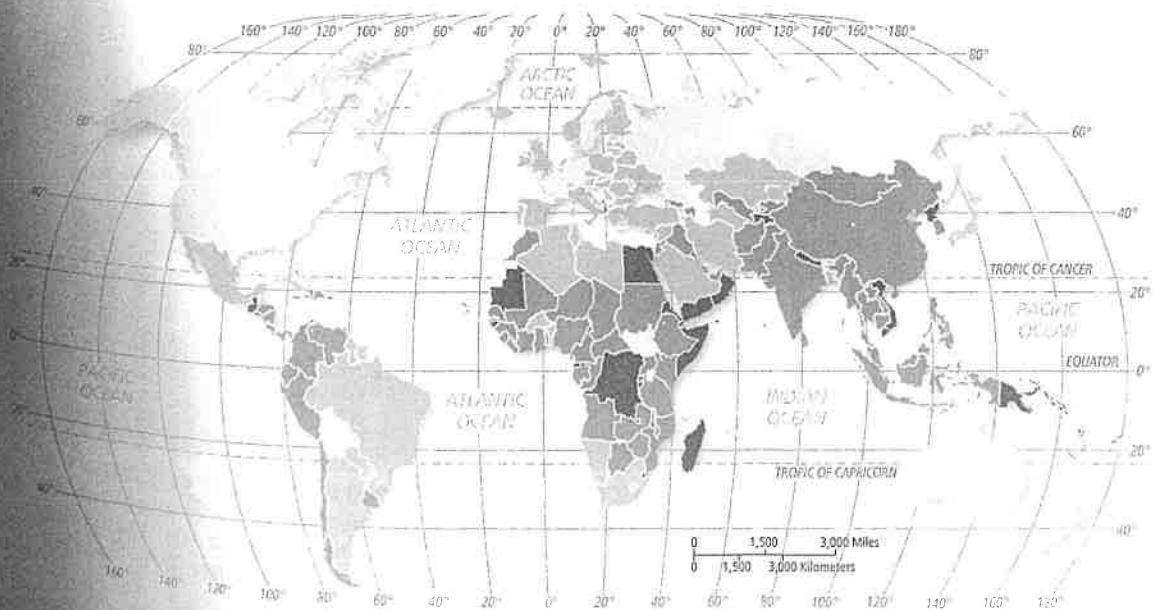


FIGURE 2-10
AGRICULTURAL DENSITY, 2018 Agricultural density helps account for economic differences between countries.
Sources: Population Reference Bureau and World Bank

1. Compare Europe with South and Southeast Asia in terms of arithmetic, physiological, and agricultural density. What explains the main difference between these regions?

Farmers per square kilometer of arable land

- 500 and above
- 100–499
- 10–99
- below 10
- no data