

Population and Migration Patterns and Processes

AP Human Geography

Population Distribution and Density

People are spread very unevenly across Earth. **Population distribution** describes where people live; **population density** measures how crowded a place is. Physical conditions influence settlement alongside jobs, transport, politics and history. Important concentrations occur in **mid-latitudes**, **low-lying land**, coasts, and river valleys with water and fertile soil.



Shibuya Crossing, Tokyo: a photograph shows crowding at one moment, not resident population per square kilometre

Geographers use three density measures:

- **Arithmetic density** – total people ÷ total land area.
- **Physiological density** – people ÷ area of **arable** (farmable) land; a measure of population relative to arable land. Imports, yields and diets also affect food supply.
- **Agricultural density** – farmers ÷ arable land; a low value can reflect mechanisation, but this ratio alone does not measure efficiency.

Uneven distribution creates **consequences**: high concentrations can raise demand for housing and water but also support shared transport and services. Sparse settlement can increase service costs per resident. Outcomes depend on infrastructure and investment.

Try it – original density dataset. Region A has 120,000 residents, 600 square kilo-

metres of total land, 100 square kilometres of arable land and 2,000 farmers. Calculate the three measures before checking.

Worked check. Each ratio answers a different question.

$$D_A = \frac{P}{A_T}$$

$$D_A = \frac{120000 \text{ people}}{600 \text{ km}^2} = 200 \text{ people/km}^2$$

$$D_P = \frac{P}{A_R}$$

$$D_P = \frac{120000 \text{ people}}{100 \text{ km}^2} = 1200 \text{ people/km}^2 \text{ of arable land}$$

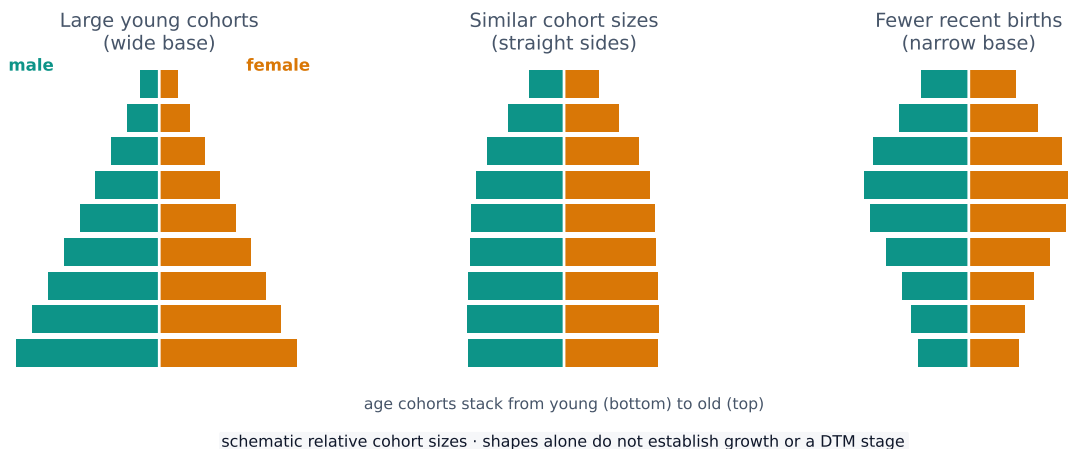
$$D_F = \frac{F}{A_R}$$

$$D_F = \frac{2000 \text{ farmers}}{100 \text{ km}^2} = 20 \text{ farmers/km}^2 \text{ of arable land}$$

The high physiological value identifies a large population relative to local arable area. It does not prove food shortage without evidence about yields, imports and access. Carrying capacity is the population supportable under particular technology, consumption and resource conditions, not a fixed timeless number.

Population Composition

Population composition is the make-up of a population by **age** and **sex**.
It is shown on a **population pyramid** – back-to-back bar charts of males and females in five-year **age cohorts** .



Schematic age structures, not forecasts: age rises upwards; bar width represents relative cohort size

A wide base shows a large young cohort relative to older cohorts, often consistent with recent high fertility. Similar cohort sizes can be consistent with slower growth. A narrow base indicates fewer recent births relative to older cohorts. Migration, mortality and past birth fluctuations can also shape the bars. Check whether widths show numbers or percentages, and use births, deaths and migration to test a forecast. Shape alone cannot establish a DTM stage.

The **dependency ratio** is an age-based indicator: people aged 0–14 plus people aged 65+, divided by those aged 15–64, multiplied by 100. It is not a count of employed workers supporting actual nonworkers. Some younger or older people work; some working-age adults do not.

Try it – original age dataset. A town has 3,000 people aged 0–14, 6,000 aged 15–64 and 1,000 aged 65+. Calculate total and elderly dependency ratios. Explain one limit of interpreting them as financial burdens.

Worked check. Let Y , W and O denote these three age groups.

$$D = \frac{Y + O}{W} \times 100$$

$$D = \frac{3000 + 1000}{6000} \times 100 = 66.7$$

There are about 67 people in the two dependent-age groups per 100 working-age people.

$$D_O = \frac{O}{W} \times 100$$

$$D_O = \frac{1000}{6000} \times 100 = 16.7$$

There are about 17 older people per 100 working-age people. Employment, income, health and public provision are additional evidence needed to assess support costs.

Population Dynamics

Populations change through births, deaths, and migration. Key rates (per 1,000 people per year):

- **Crude birth rate (CBR)** and **crude death rate (CDR)** .
- **Rate of natural increase (RNI)** = $(\text{CBR} - \text{CDR}) \div 10$, as a percentage – it ignores migration.
- **Total fertility rate (TFR)** – the number of children a woman would have if current age-specific fertility rates persisted through her reproductive years. It is a period estimate, not a count of every woman’s completed family. About **2.1** is **replacement level** in low-mortality populations; the threshold varies with mortality and sex ratios at birth.

The **doubling time** is approximately 70 divided by a constant positive annual percentage growth rate. Using RNI alone assumes migration is excluded. Zero or negative growth has no finite doubling time under those assumptions. Fertility below replacement does not require immediate population decline: a large reproductive-age cohort can sustain births (population momentum), and immigration can add population.

Try it – original annual rates. A fictional country has CBR 37 and CDR 12 per 1,000 per year. Find natural increase and approximate doubling time, assuming unchanged rates and no migration.

$$r_N = \frac{CBR - CDR}{10}$$
$$r_N = \frac{37 - 12}{10} = 2.5\% \text{ per year}$$
$$T_d \approx \frac{70}{r_N}$$
$$T_d \approx \frac{70}{2.5} = 28 \text{ years}$$

Extension. Another fictional country starts with 100,000 residents, records 800 births, 1,100 deaths, 2,000 immigrants and 700 emigrants during the year. Does negative natural increase mean its population falls?

$$\Delta P = (B - D) + (I - E)$$

$$\Delta P = (800 - 1100) + (2000 - 700) = 1000 \text{ people}$$

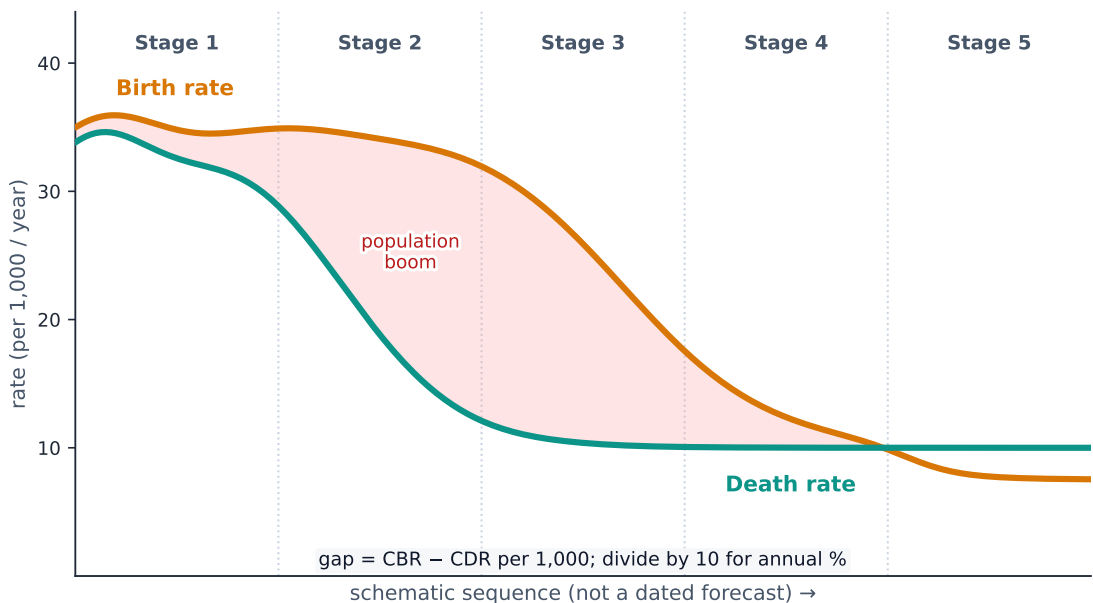
Natural change is -300 , net migration is $+1,300$, and total population rises to 101,000. The crude rate denominator is commonly the midyear population; do not silently substitute the starting population when interpreting official rates.

Exam connection – 2023 AP Human Geography, Set 1, Question 1(D).

“Explain ONE reason why the rate of natural increase (RNI) in urban areas may vary significantly from RNI in rural areas in the same country.” (2023) One possible explanation, consistent with the official scoring guidance: *“In cities the cost of living – housing, schooling, childcare – is higher, so urban families tend to have fewer children. Fewer births lower the crude birth rate, so the urban RNI falls below the rural RNI, where children still help with farm work.”* Notice the shape: the command word **Explain** wants a cause-and-effect chain, so you must name the reason **and** follow it all the way to the RNI. “Cities are expensive” alone leaves the link to births and RNI unexplained. Apply the question’s specific scoring guidance rather than a universal mark rule.

The Demographic Transition Model

The **Demographic Transition Model (DTM)** models a historical pattern of changing birth and death rates. The **five stages** below are a common extension of the four-stage model. They are not a compulsory sequence or a dated prediction for every country.



Death rate falls first, then birth rate; the gap between them is the population boom

1. **Stage 1** – high, fluctuating CBR and CDR; slow growth (pre-industrial).

2. **Stage 2** – CDR falls (better food, medicine, sanitation) while CBR stays high; population **booms**.
3. **Stage 3** – CBR falls (urbanisation, education, women in work); growth slows.
4. **Stage 4** – low CBR and CDR; small natural change; total population also depends on migration and age structure.
5. **Stage 5** – CBR falls **below** CDR; natural decrease. Net immigration can still produce total population growth.

The linked **epidemiological transition** describes how the main causes of death shift from **infectious disease** to **chronic, degenerative disease** as mortality patterns change. Infectious and chronic diseases can coexist; outbreaks and unequal access to care complicate a simple sequence.

Malthusian Theory

In 1798 **Thomas Malthus** argued that population grows **exponentially** while food supply grows only **linearly**, so population would outrun food and be checked by famine, disease, and war.

Critics say Malthus underestimated **technology**: the Green Revolution and modern farming raised food output enormously. **Neo-Malthusians** update the worry to include water, energy, and other finite resources. Food insecurity also depends on poverty, distribution, conflict and access, not only global production. Evaluate the assumptions of each argument against evidence rather than treating either as a universal forecast.

Original evaluation task. Harvest output rises, yet some households cannot afford food; drought reduces local water supply. Rising yields challenge a fixed linear-food assumption, but income and distribution may still limit food access. Local water constraints require separate supply-and-demand evidence. The observations do not establish one universal explanation.

Population Policies

Governments try to influence population growth with policies:

- **Pro-natalist** policies encourage births (cash bonuses, parental leave, childcare) where populations are aging or shrinking – for example, a hypothetical government subsidising childcare.
- **Anti-natalist** policies discourage births where growth is seen as too fast – for example, a hypothetical programme intended to reduce births through voluntary family planning.

Immigration policies also affect population size and composition. A hypothetical expansion of temporary nurse visas may fill vacancies if qualifications are recognised, while selecting particular ages and occupations. Evaluate actual arrivals, departures and visa duration; admission targets alone do not establish permanent settlement or

total growth.

Original policy evaluation. A government offers childcare subsidies; five years later births rise, while a large cohort enters reproductive ages. Lower childcare costs might enable more desired births per woman; alternatively, more potential parents can increase births with unchanged fertility rates. Compare age-specific fertility or TFR and reproductive-age cohort sizes. The birth count alone does not establish a policy effect; timing, economic conditions and other policies also matter.

Policies have **unintended consequences**: fertility reductions can contribute to later aging; sex-selective behaviour can interact with birth restrictions and son preference. Outcomes depend on implementation and social conditions. A later pro-natal policy is one possible response, not an inevitable requirement.

Women, Aging, and Demographic Change

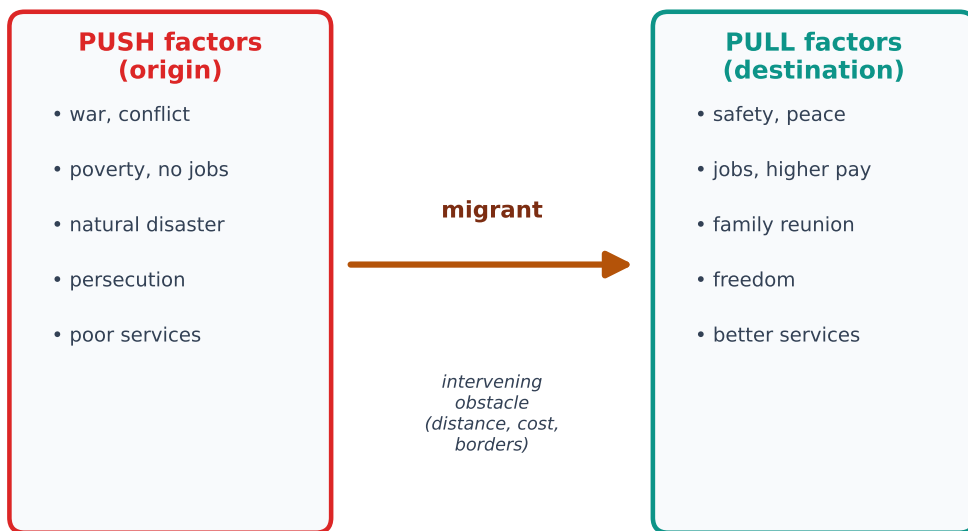
Female **education, employment**, reproductive agency and access to healthcare can influence fertility. Longer schooling may delay first births; paid work can change the costs of childcare. Outcomes also depend on desired family size, childcare support, norms and access to voluntary family planning. Association across places alone does not establish causation for individuals.

Women's access to study and employment can also change migration routes; healthcare access can influence maternal survival and mortality. Historical migration generalisations need to be tested against these changing social and economic roles.

At the other end, **aging populations** (a rising share aged 65+) bring their own challenges: higher pension and healthcare costs, possible labour shortages, and a higher elderly dependency ratio. The workforce need not shrink if participation, retirement patterns or migration change. Countries respond with later retirement, immigration, or pro-natal policies.

Causes and Types of Migration

Migration involves a change of residence and may be permanent or temporary. The AP course also includes seasonal livestock movement (transhumance); distinguish such movement from daily commuting. It is driven by **push factors** (reasons to leave: war, poverty, disaster) and **pull factors** (reasons to arrive: jobs, safety, family).



AP HuG · U2 · migration push and pull factors

Migration decisions weigh push factors against pull factors, across an intervening obstacle

- **Voluntary migration** involves agency, for example moving for work, education or family. Economic pressures can constrain choices.
- **Forced migration** includes coercion such as enslavement and displacement by conflict or disaster. **Refugees** are outside their country and meet an applicable refugee definition, including protection from persecution under the Refugee Convention; regional definitions can be broader. Crossing a border alone is insufficient. An internally displaced person (IDP) remains within their country after forced displacement. An asylum seeker requests international protection with a claim awaiting determination; this is not a finding that the claim is accepted or rejected.
- **Ravenstein's laws** are historical generalisations about distance, stages and economic attraction, not laws applying to every migrant.

Other course-required types can overlap: **chain migration** follows family or community networks; **step migration** proceeds through intermediate destinations; a **guest worker** moves under temporary labour arrangements; **transnational migration** involves movement and ties across countries; **transhumance** is seasonal movement of livestock and herders between grazing areas. Internal and rural-to-urban describe spatial routes rather than motives.

Original classification task. A nurse follows a cousin to another country for a temporary job, but accepts work in a closer city on the way. The cousin's network is a chain mechanism, the temporary labour arrangement is a guest-worker example, and the closer job is an intervening opportunity. Visa costs can be an intervening obstacle. Several labels can describe one case.

Migration can be **international** (between countries) or **internal** (within a country, such as rural-to-urban).



Source title: Hungarian Immigrants Cleveland. The photograph alone cannot establish motives, legal status or population-wide effects

Effects of Migration

Migration reshapes both the **origin** and the **destination**.

- The **destination** gains workers and cultural diversity but may face pressure on housing and services and social tension.
- The **origin** may lose skilled workers (a **brain drain**) but gain **remittances** – money migrants send home, a major income source for many countries.
- Migration can change age and sex structure, depending on who moves. A workforce migration, a retirement migration and a displaced family group need not have the same effects.



The same historical image illustrates people, not measured labour-market or demographic effects; use records to establish those effects

Original effects task. A fictional district loses 200 nurses to overseas jobs; 150 send money home. Identify a benefit and a cost to the origin, then specify evidence needed to assess the destination.

Worked explanation. Remittances can help recipient households pay for housing or schooling. The loss of nurses may reduce staffing if training and recruitment do not replace them. The destination may fill vacancies, but the effect depends on recognition of qualifications and job allocation. Evidence about vacancies, wages, housing capacity and public investment is needed; the migrant count alone proves none of these outcomes. Political responses can include disputes over admissions or services; cultural changes can include new language networks and food businesses. Avoid assuming hostility or integration is universal.

Exam tips

Use the stated population, area and time period. Distinguish natural increase from total growth. Check the population pyramid's axes and scale before explaining a pattern. Describe what the evidence shows before proposing a mechanism. For migration, separate movement type, cause, legal category and effects; answer the specified place and group rather than assuming every question requires both endpoints.