

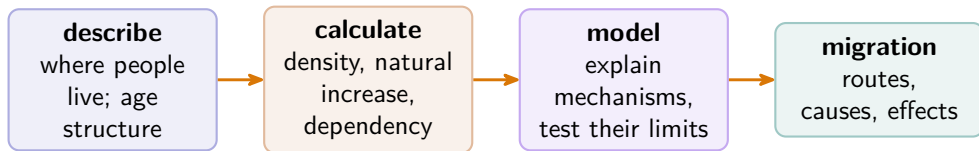
Population and Migration

AP Human Geography ■ Unit 2

AP Human Geography



Population and migration questions



Use **evidence about the specified places**, not a model's label alone.

1

Population Distribution and Density

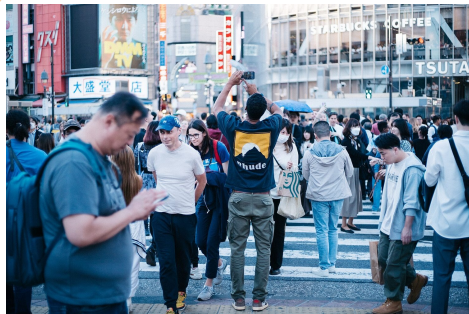
Distribution and resident density

Population distribution 人口分布

describes where people live; **population density** 人口密度 measures people per area.

Water, climate and landforms interact with employment, transport, politics and settlement history.

This crossing shows crowding at one moment. To calculate resident density, obtain a resident count and a defined land area.



Shibuya Crossing, Tokyo

Density denominators

Measure	Numerator and denominator
Arithmetic density 算术密度	$D_A = P/A_T$: residents divided by total land area.
Physiological density 生理密度	$D_P = P/A_R$: residents divided by arable land area.
Agricultural density 农业密度	$D_F = F/A_R$: farmers divided by arable land area.

A ratio identifies population relative to land. It cannot alone prove food shortage or farming efficiency.

Density calculation: attempt

Region A: 600 km²

120,000
residents

arable
100 km²

2,000
farmers

Original fictional Region A

- 1 Calculate all **three densities** with units.
- 2 Explain why their values **differ**.
- 3 What additional evidence would you need before claiming **food insecurity**?

Density calculation: worked check

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

arithmetic: all land

$$\begin{aligned} D_A &= \frac{120000 \text{ people}}{600 \text{ km}^2} \\ &= \mathbf{200 \text{ people/km}^2} \end{aligned}$$

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

physiological: arable

$$\begin{aligned} D_P &= \frac{120000 \text{ people}}{100 \text{ km}^2} \\ &= \mathbf{1200 \text{ people/km}^2} \end{aligned}$$

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

agricultural: farmers

$$\begin{aligned} D_F &= \frac{2000 \text{ farmers}}{100 \text{ km}^2} \\ &= \mathbf{20 \text{ farmers/km}^2} \end{aligned}$$

Physiological density uses the **smaller arable area**; agricultural density also changes the **numerator** to farmers.

Population pressure and public services

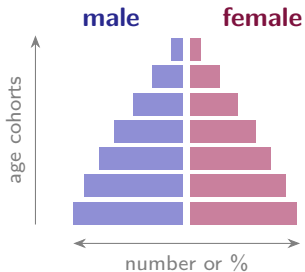
Situation	Mechanism and condition
Dense settlement	More demand for housing and water can strain supply; concentration can also support frequent public transport.
Sparse settlement	Long travel distances can raise the cost of providing clinics and schools per resident.
Carrying capacity	The supportable population depends on technology, consumption and resources. Imports and yields matter alongside arable area.

For Region A, investigate yields, imports and household food access before inferring shortage.

2

Population Composition

Reading age and sex structure



Population composition 人口构成 age structure and sex ratio.

- A **population pyramid** 人口金字塔: sexes on opposite sides, **age cohorts** 年龄组 vertically
- Read the **date**, **age bands** and **horizontal units** first
- A bulge may reflect earlier **births**, **migration** or **survival**

A large child cohort can imply future school demand, but forecasting needs assumptions about **migration** and **cohort survival**.

Schematic population pyramids

Large young cohorts
(wide base)
male female



Similar cohort sizes
(straight sides)



Fewer recent births
(narrow base)



age cohorts stack from young (bottom) to old (top)

schematic relative cohort sizes · shapes alone do not establish growth or a DTM stage

Compare the youngest cohorts with the middle. Shape alone cannot identify a DTM stage.

Pyramid interpretation: worked reasoning

Observation	Supported interpretation and limit
Wide base	Many young people relative to older cohorts; consistent with recent high fertility, but not proof of a current growth rate.
Similar cohort sizes	Consistent with smaller changes between successive birth cohorts; migration and mortality still matter.
Narrow base	Fewer recent births relative to older cohorts. Total decline requires checking births, deaths and migration.

Age-based dependency: attempt

Age group	Original fictional town
0–14	3,000 people
15–64	6,000 people
65+	1,000 people

Calculate the total **dependency ratio** 抚养比 and elderly dependency ratio per 100 working-age people.

Does the result count actual workers supporting actual nonworkers? Explain.

Age-based dependency: worked check

Let $Y = 3000$ (young), $W = 6000$ (working age) and $O = 1000$ (older) denote the three age groups.

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

total dependency ratio

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

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

old-age dependency ratio

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

About **67 dependent-age people**, including 17 older people, per 100 working-age people. Age is a **proxy**: employment, income and health are not measured.

3

Population Dynamics

Birth, death and fertility measures

Indicator	Meaning
Crude birth rate (CBR) 粗出生率	Annual live births per 1,000 population.
crude death rate (CDR) 粗死亡率	Annual deaths per 1,000 population.
Rate of natural increase (RNI) 自然增长率	Births minus deaths, excluding migration. Annual percent: $r_N = (CBR - CDR)/10$.
Total fertility rate (TFR) 总和生育率	Children per woman if current age-specific fertility rates persisted throughout her reproductive years.

Natural increase and doubling: attempt

CBR = 37
births per
1,000 per year

CDR = 12
deaths per
1,000 per year

Original fictional country

- 1 Calculate **RNI** as an annual percentage.
- 2 Estimate **doubling time** 倍增时间 if this positive rate stays constant and migration is excluded.
- 3 Explain why using **25** as a percentage would be incorrect.

Natural increase and doubling: worked check

$$r_N = \frac{CBR - CDR}{10}$$

CBR and CDR per
1,000; r_N in % per year

$$r_N = \frac{37 - 12}{10} = \mathbf{2.5\% \text{ per year}}$$

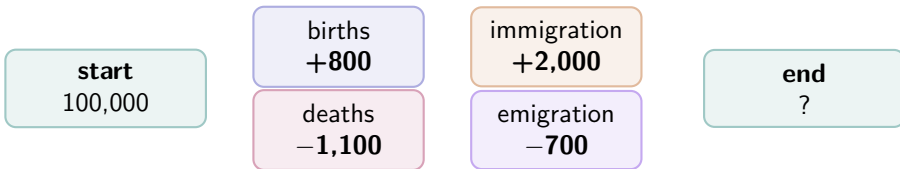
$$T_d \approx \frac{70}{r_N}$$

rule of 70: constant positive growth

$$T_d \approx \frac{70}{2.5} = \mathbf{28 \text{ years}}$$

The difference is **25 per 1,000**, equivalent to 2.5 per 100. Zero or negative growth has **no finite doubling time** under this assumption.

Natural decrease and total growth: attempt



Original fictional country, one year

- 1 Calculate **natural change**, **net migration**, **total change** and the **ending population**.
- 2 Evaluate: "Deaths exceed births, so the population must shrink."

Population balance: worked check

Births and deaths produce **natural change**; immigration and emigration produce **net migration**.

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

natural change + net migration

$$\begin{aligned}\Delta P &= (800 - 1100) + (2000 - 700) \\ &= \mathbf{1000} \text{ people}\end{aligned}$$

$$P_1 = P_0 + \Delta P$$

ending population

$$\begin{aligned}P_1 &= 100000 + 1000 \\ &= \mathbf{101000} \text{ people}\end{aligned}$$

Natural change is -300 ; net migration is $+1300$: the population **grows despite natural decrease**. Official crude rates commonly use a midyear denominator.

Replacement fertility and population momentum

Replacement level 更替水平 about **2.1 children per woman** in low-mortality populations; it varies with mortality and sex ratios at birth.

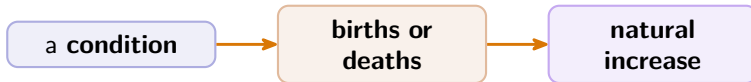
Population momentum many people entering reproductive ages sustain births even when each woman has fewer children.

- Below-replacement TFR does **not** require immediate decline; immigration can also add people
- **RNI** measures current births minus deaths; **TFR** summarises age-specific fertility
- Neither alone measures **total growth** including migration

Urban and rural RNI: exam attempt

2023 AP Human Geography, Set 1, Question 1(D) (paraphrased)

Explain one reason why **urban and rural RNI** may differ within the same country.

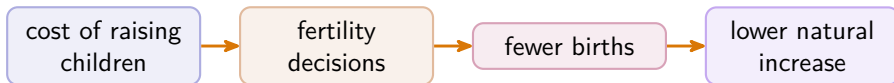


Write a **mechanism**. Do not substitute net migration for RNI. Use the original paper for exact wording.

Urban and rural RNI: one explanation

One explanation

Higher housing and childcare costs in an urban area may encourage families to have fewer children. Fewer births can lower CBR and, other things equal, reduce RNI compared with a rural area.

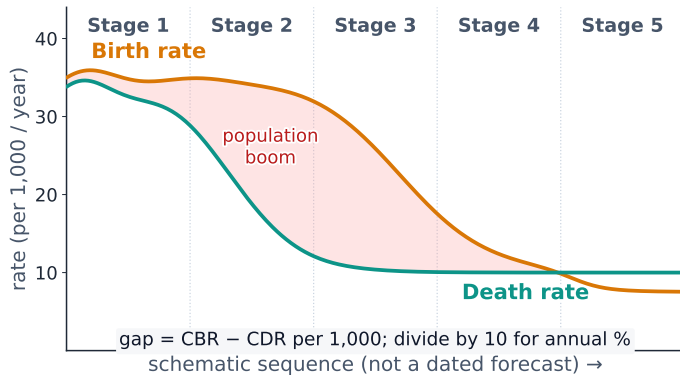


The official 2023 scoring guidance includes cost-of-living explanations. This is a **possible mechanism**, not a rule for every city or a guaranteed mark.

4

The Demographic Transition Model

Birth and death rates in the DTM



The vertical gap is natural change per 1,000; divide by 10 for annual percent.
Migration is excluded.

Demographic transition stages

Stage	Rate pattern and natural change
1	High, fluctuating births and deaths; typically small natural change.
2	Deaths fall while births remain high; a large positive birth–death gap.
3	Birth rates fall; the positive gap narrows.
4	Both rates low; natural change is small.
5 (extension)	Birth rate below death rate; natural decrease, not necessarily total decline.

The **Demographic Transition Model (DTM)** 人口转变模型 describes a pattern, not an obligatory sequence.

Explaining the transition and its limits

Mortality falls with...

safer **water**, **sanitation**, **nutrition** and **healthcare**

Fertility changes with...

costs of children, **schooling**,
reproductive agency, **family planning**

- These changes can occur at **different times**
- The DTM comes from **historical experience** and simplifies variation; conflict, epidemics, policy and migration can reshape it

Your turn

CBR 8, CDR 11: infer **natural decrease**. You still need **net migration** to decide whether total population falls.

Changing causes of death

Pattern	Explanation and qualification
Earlier mortality decline	Clean water and improved nutrition can reduce infectious deaths and premature mortality.
Longer survival	Chronic conditions can form a larger share of deaths as more people survive to older ages.
Limits	Infectious and chronic disease burdens can coexist. Outbreaks, inequality and access to care complicate a single sequence.

The **epidemiological transition** 流行病学转变 explains changing mortality patterns; it does not imply that infectious diseases disappear.

5

Malthusian Theory

Malthus: assumptions and critique

Argument	Reasoning
Malthus, 1798	Population could grow exponentially 指数式, while food grew linearly 线性; population could exceed food supply.
Technology critique	Higher yields, improved transport and agricultural innovation can change the assumed food trajectory.
Neo-Malthusians	Extend resource concerns to water, soil, energy and environmental limits.

Neo-Malthusians 新马尔萨斯主义者 extend resource concerns beyond food. Food access also depends on income, distribution and conflict. An assumed growth curve is not an observed universal law.

Resource explanation: attempt and evaluation

harvest
output **rises**

some households
cannot afford food

drought reduces
the **water supply**

Original scenario

- 1 Explain why increasing output challenges a **fixed linear-food assumption**.
- 2 Explain why it does **not** prove that every resource constraint or food-access problem has disappeared.

Resource explanation: worked evaluation

Observation	Inference and missing evidence
Harvest output rises	A fixed linear-food assumption may fail if technology changes yields. Compare production with population and consumption.
Households cannot afford food	Food exists but access is unequal. Investigate prices, income and distribution before blaming total output.
Drought reduces water	Water can constrain production or settlement even when harvests elsewhere rise. Examine local supply, demand and alternatives.

6

Population Policies

Population policies and mechanisms

Policy aim	Original hypothetical example
Pro-natalist 鼓励生育	Subsidised childcare reduces a cost of raising children; fertility may respond, depending on family goals and other barriers.
Anti-natalist 限制生育	A voluntary family-planning programme intended to reduce births expands access to contraception and information.

Distinguish the stated aim, implementation and observed outcome. Voluntary access and coercive restrictions are different policy instruments.

Policy evaluation: attempt



Original scenario

- 1 Can the **birth count alone** prove that the policy raised fertility?
- 2 Identify the **missing indicator** and one plausible **alternative explanation**.

Policy evaluation: worked check

Two explanations fit the reported rise in births.

Policy mechanism

Cheaper childcare could enable more desired births **per woman**.

Test: age-specific fertility rates or TFR before and after.

Cohort mechanism

More people enter reproductive ages; births rise even if **fertility rates** do not.

Test: the size of reproductive-age cohorts.

A birth count alone establishes **neither**. Timing, other policies and economic conditions also matter for attribution.

Immigration policy and population composition

Hypothetical policy

A government expands **temporary visas for nurses**.

✓ can increase immigration and ease **specific vacancies**, if qualifications are recognised

age and occupational **selection** can change composition

✗ temporary visas need not create **permanent settlement**

To evaluate: examine **arrivals, departures**, visa duration and employment. Admission targets alone do not establish growth; births, deaths and emigration still count.

Unintended consequences and choices

- Lower fertility can contribute to later **aging**
- Birth restrictions can interact with **son preference** and sex-selective behaviour; a skewed sex ratio is **not automatic** for every family-planning programme

responses governments can combine

childcare

participation

retirement policy

migration

productivity

A pro-natal response is **one option**, not a necessary later stage. Evaluate effects on **particular groups and periods**.

7

Women, Aging, and Demographic Change

Education, employment and fertility

longer **schooling**
can delay first births

paid work
changes the
opportunity
cost of childcare

**reproductive
agency** and
voluntary
family planning

- These depend on childcare support, norms, health access and employment conditions
- A negative association across places does **not prove a causal effect** for each woman
- Opportunities can also change women's **migration routes**; healthcare access affects maternal survival

Aging populations: responses and trade-offs

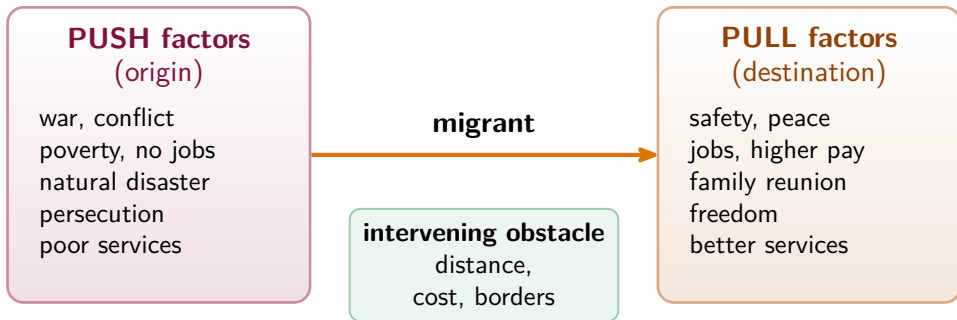
Response	Possible effect and condition
Later retirement	Can increase labour participation, but health and job demands vary.
Immigration	May fill vacancies; outcomes depend on migrant skills, recognition and housing capacity.
Childcare support	Can reduce barriers to desired births; new births do not fill current workforce vacancies.
Productivity and care	Technology and care investment can change support costs and output per worker.

aging populations 人口老龄化 have a rising share aged 65+. A higher elderly dependency ratio does not alone prove falling employment.

8

Causes and Types of Migration

Push factors, pull factors and constraints



Identify the **origin** and **destination** before classifying a reason. A pull factor does not prove that movement is **unconstrained**.

Migration causes: overlapping dimensions

Concept	Meaning and original example
Migration 迁移	Residence changes can be permanent or temporary; AP also includes seasonal livestock movement.
push factors 推力	Reasons to leave the origin, such as loss of a local job.
pull factors 拉力	Reasons to choose a destination, such as joining family.
Intervening obstacle	Travel costs or visa restrictions constrain movement.
Intervening opportunity	A closer job offer diverts a planned move.

Movement types can overlap

Type	What the label identifies
International / internal	Crosses a country border / stays within a country.
Rural-to-urban / step	A spatial route / a sequence through intermediate destinations.
Chain / guest worker	A family or community network / a temporary labour arrangement.
Transnational	Movement and continuing ties across countries.
Transhumance	Seasonal movement of herders and livestock between grazing areas.

Ravenstein's laws are historical generalisations, not rules for every migrant.

Migration classification: attempt

Original scenario

A nurse plans to **follow her cousin** abroad for a **temporary job**. **Visa costs** delay the move. She accepts a job in a **closer city** on the way.

network mechanism

labour arrangement

obstacle

opportunity

Your turn

- 1 Find each label in the case. Can one case have **several labels**?
- 2 Distinguish **daily commuting** from a **seasonal herder** moving with livestock.

Migration classification: worked check

Evidence	Interpretation
Cousin already abroad	Chain migration: an existing network helps shape the destination.
Temporary labour arrangement	Guest-worker migration; temporary does not mean daily commuting.
Visa costs	Intervening obstacle constrains the intended journey.
Closer job accepted	Intervening opportunity changes the planned destination.
Seasonal herder	Transhumance; the AP course includes this seasonal movement.

Forced movement and protection categories

Category	Important distinction
Voluntary migration 自愿迁移	Involves agency, although choices can be constrained by economic conditions.
Forced migration 强迫迁移	Includes enslavement and displacement through conflict or disasters.
refugees 难民	Outside their country and meet an applicable refugee definition; crossing a border alone is insufficient.
Internally displaced person	Forced to leave home but remains within their own country.
Asylum seeker	Requests international protection; the claim awaits determination.

Migration photograph and evidence



Source title: Hungarian Immigrants
Cleveland

Describe visible details, then separate them from claims requiring other records.

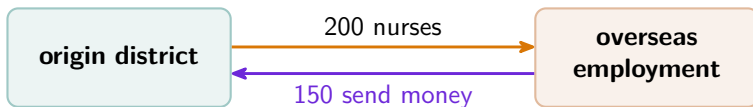
A photograph alone cannot establish motives, legal status or city-wide economic effects.

Use migration records, testimony and employment or census data to investigate those questions.

9

Effects of Migration

Migration effects: original attempt



Your turn

- 1 One possible **benefit** and one possible **cost** to the origin; one possible benefit to the **destination**.
- 2 State a **condition** for each effect.
- 3 What evidence would you need before claiming a **housing shortage** or a fall in **healthcare staffing**?

Migration effects: worked explanation

Effect	Mechanism and condition
remittances 侨汇	Money sent home can help recipient households pay for housing or schooling; receipt and use vary.
brain drain 人才外流	Losing nurses can reduce origin staffing if training and recruitment do not replace them.
Destination employment	Arrivals can fill vacancies if qualifications are recognised and jobs are available.
Housing and services	Extra demand can strain supply if provision does not expand. Migrant counts alone do not prove a shortage.

Political, cultural and demographic effects

political

admission policies,
disputes over
services

cultural

language networks,
religious institutions,
businesses

demographic

depends on **who**
moves: workers,
retirees, displaced
families

- Outcomes depend on **reception and institutions**
- Do not assume every origin ages or every destination gains young workers

Use the specified **population, scale and period**; neither hostility nor integration is universal.

10

Exam tips

Population reasoning: retrieval

- 1 Why can physiological density be high without proving food shortage?
- 2 Why can population grow when births are fewer than deaths?
- 3 Why does a narrow pyramid base not prove current total decline?
- 4 What distinguishes an intervening opportunity from a pull factor at the planned destination?

Population reasoning: checks

Question	Reasoning
Food supply	Imports, yields and household access also matter.
Natural decrease	Net immigration may more than offset births minus deaths.
Pyramid shape	Age structure records past processes; current births, deaths and migration determine total change.
Opportunity	An intermediate option diverts the planned move; a pull factor attracts to the specified destination.

Exam response checklist

- 1 Read the command word, place, group and period.
- 2 Describe the evidence with its units before inferring a mechanism.
- 3 Link a cause to the requested outcome; do not stop at a label.
- 4 State assumptions that change the conclusion, especially migration and cohort size.

Check yourself

Original transfer task

Country B has **low TFR**, **more deaths than births**, and **substantial immigration**. A student predicts that its population **must decline**.

Your turn

- 1 Explain **two reasons** why that prediction is not established by the information.
- 2 Name the **data needed** to determine this year's total change.
- 3 Why can a single **photograph** of migrants not establish whether they are refugees?