Population

EC 390 - Development Economics

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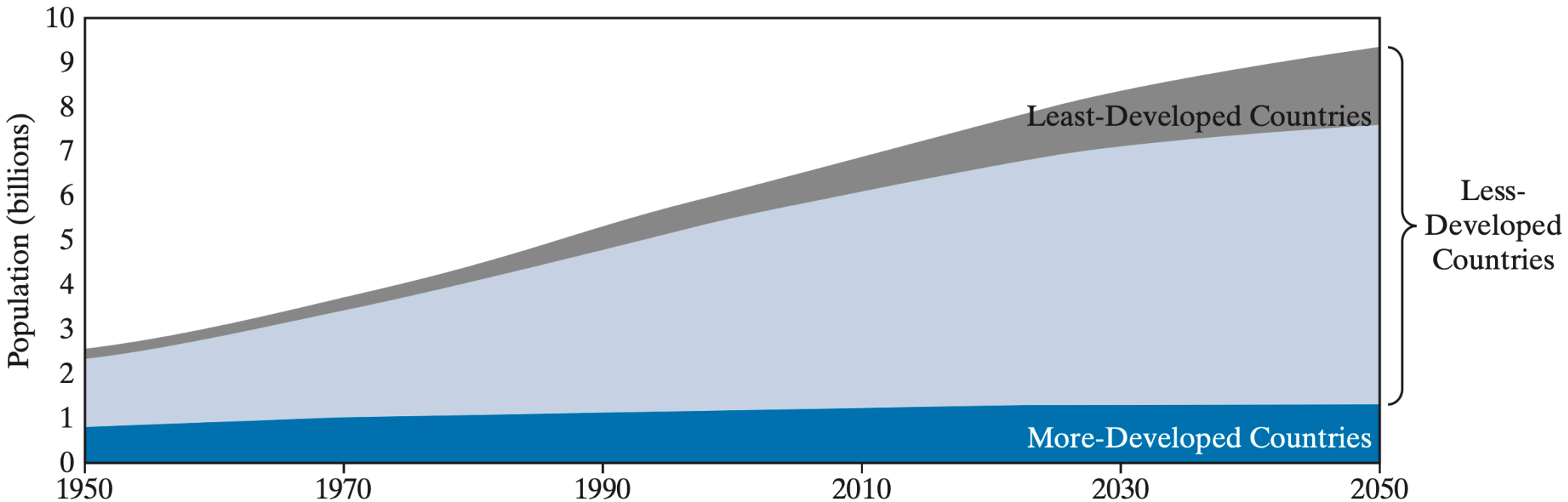
2025

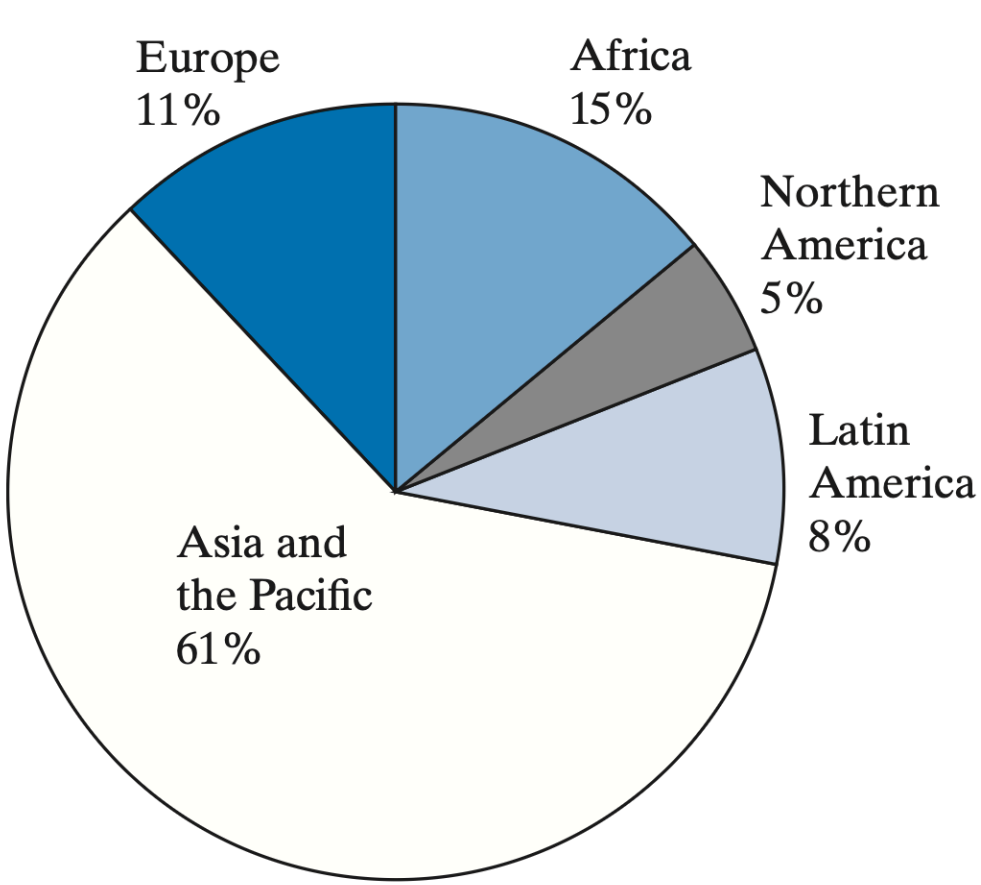
Theories of Population Growth

History of Population Growth

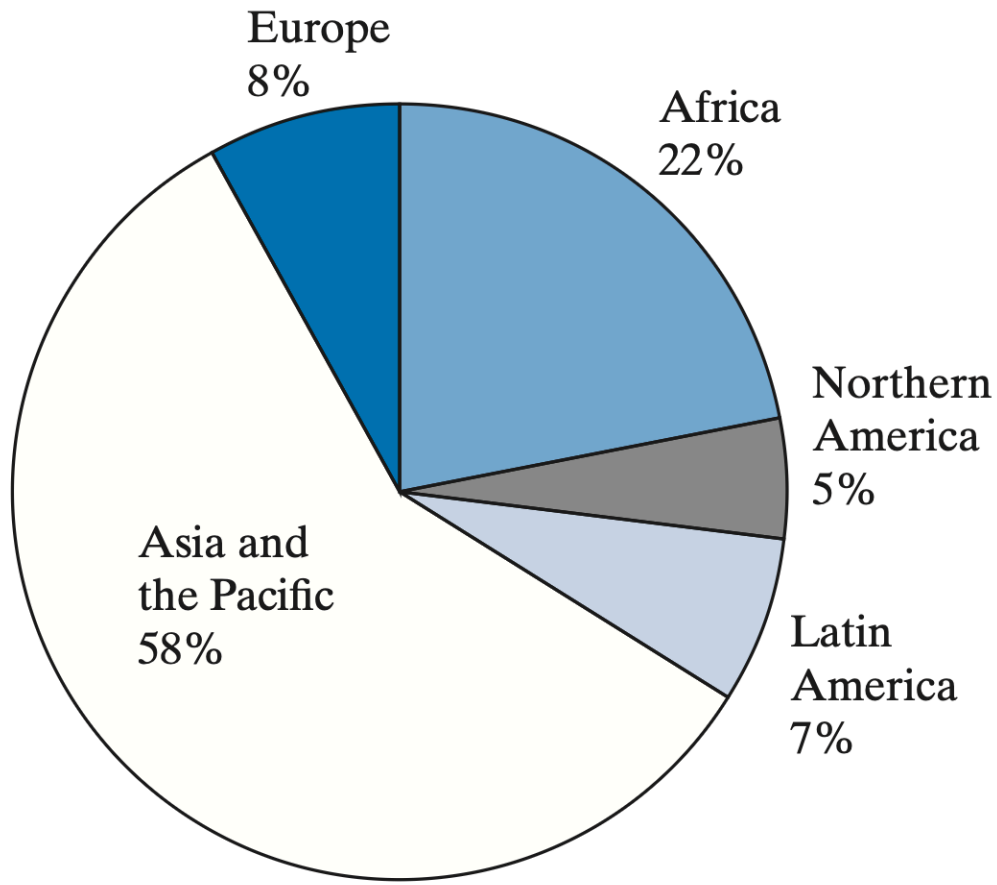


Source: Population Reference Bureau World Population Data Sheet 2012, page 4; data are drawn from United Nations Population Division, World Population Prospects: The 2010 Revision (2011), medium-variant estimates.

Which Areas Are Growing the Fastest?



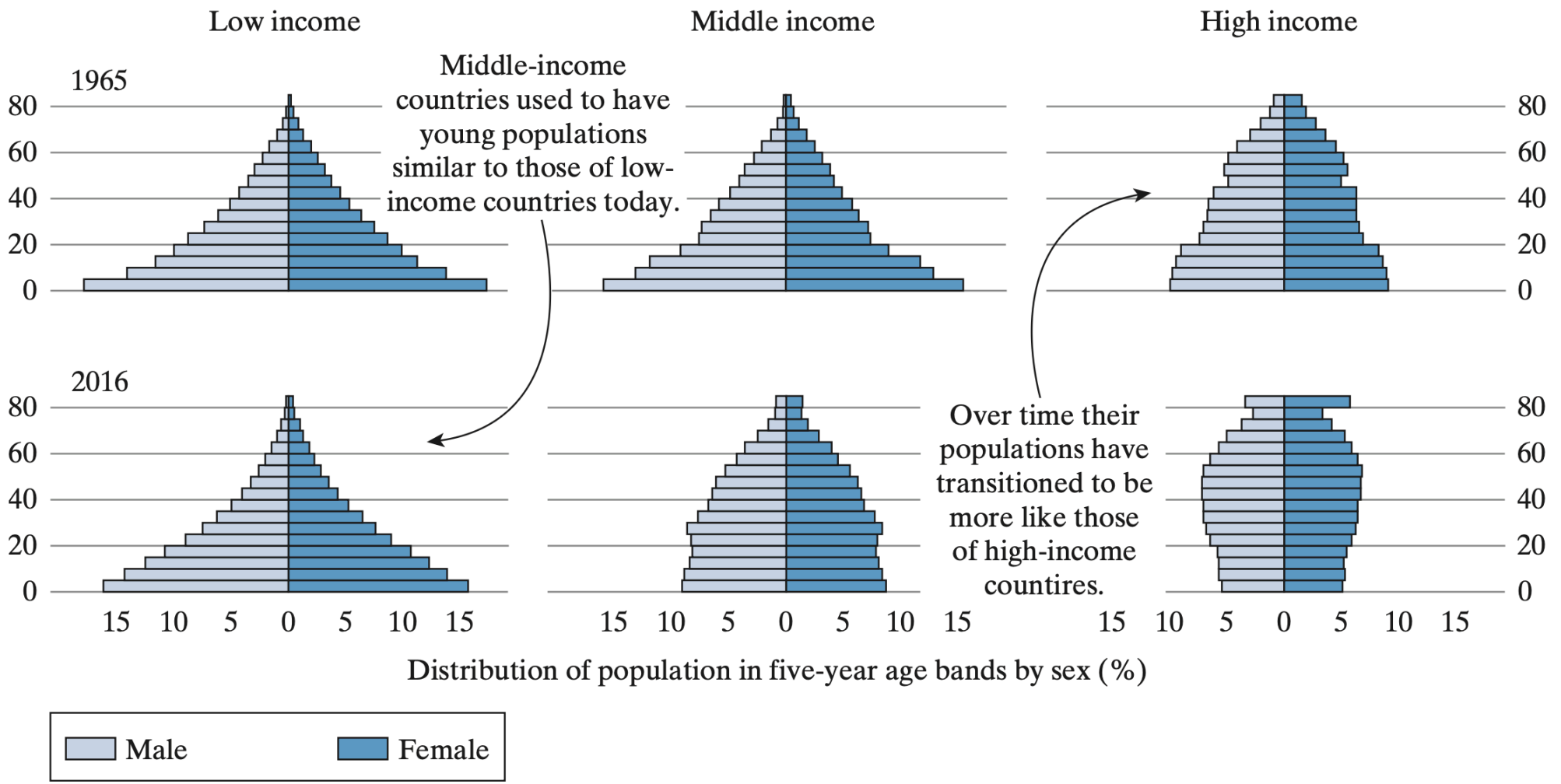
(a) Total population 2010: 6.89 billion



(b) Total population 2050: 9.5 billion

Source: Data from Population Reference Bureau, *World Population DataSheet*, 2010.

Population Distributions

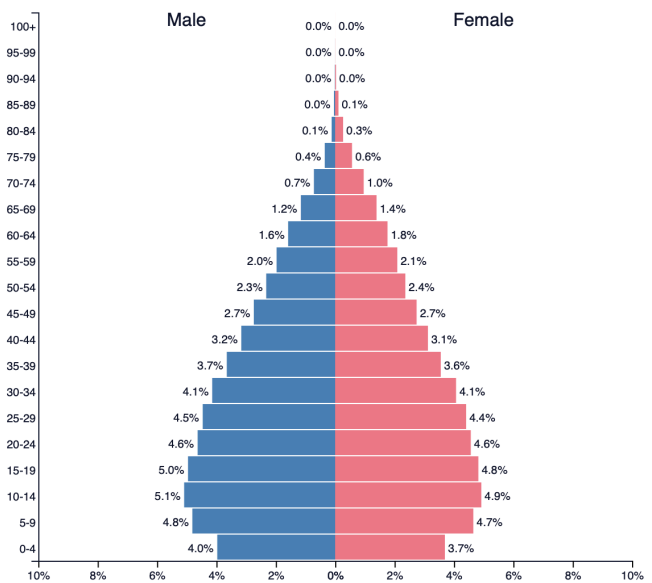


Source: 2018 Atlas of SDGs (World Bank, 2018), section 3, p. 10. Available at: http://documents.worldbank.org/curated/en/590681527864542864/Atlas-of-Sustainable-Development-Goals-2018-World-Development-Indicators

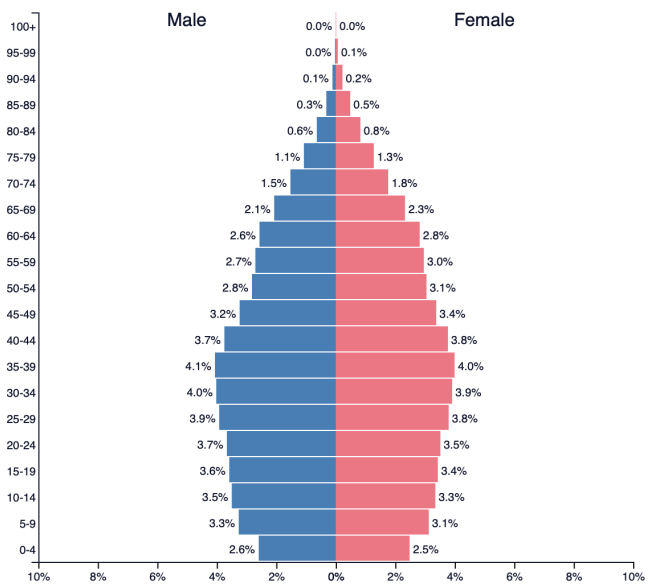
China and the One Child Policy

Population Differences

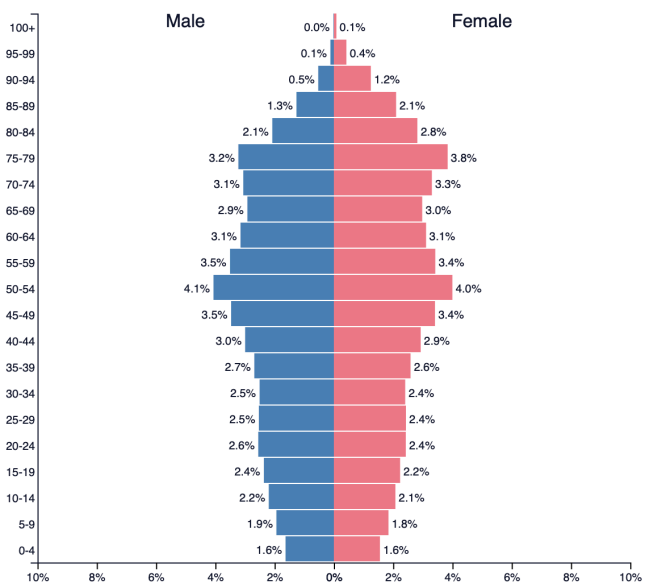
Phillipines (2025)



Costa Rica (2025)



Japan (2025)



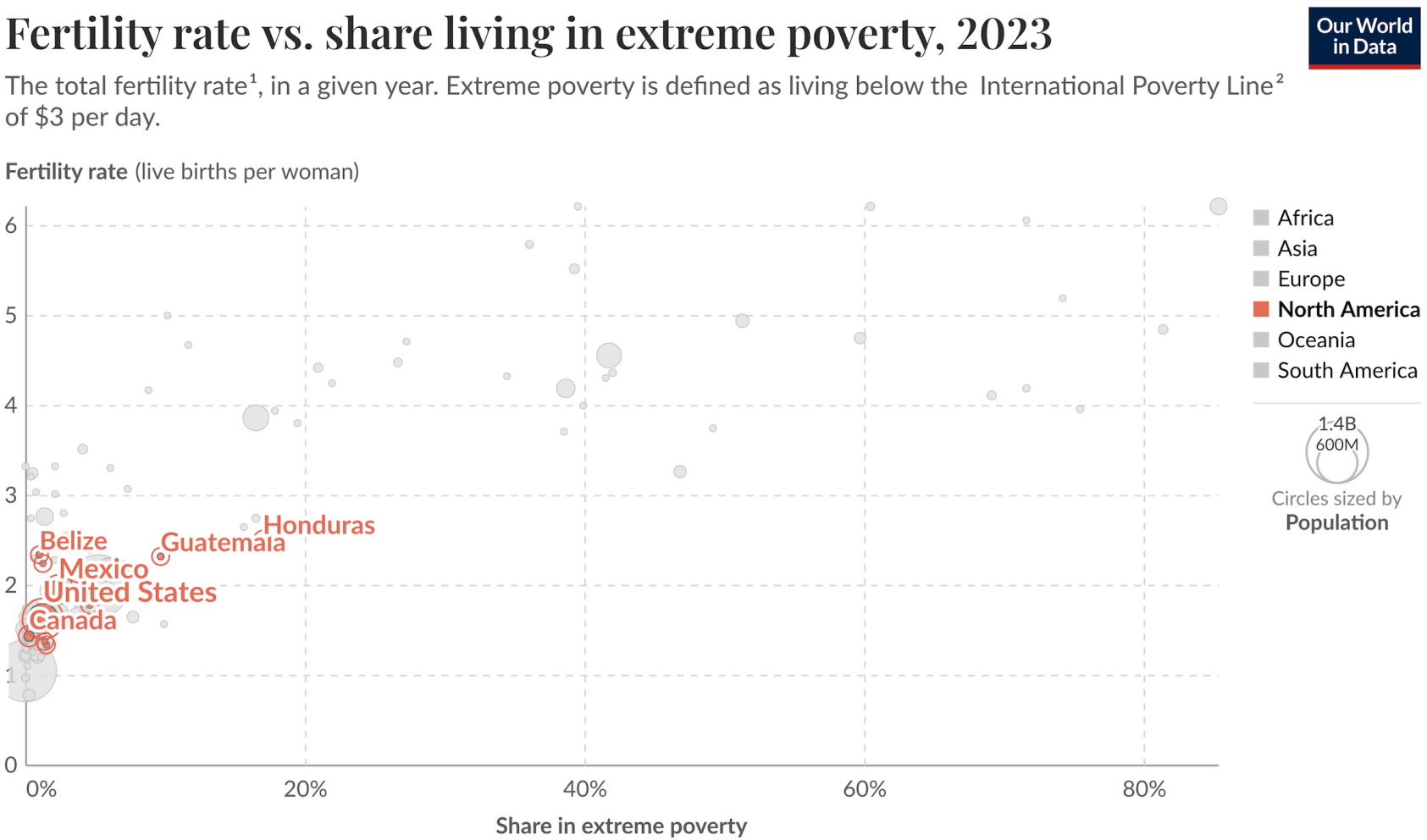
Age Structure and Dependency Burden

Every country, in every stage of development, has a dependency burden

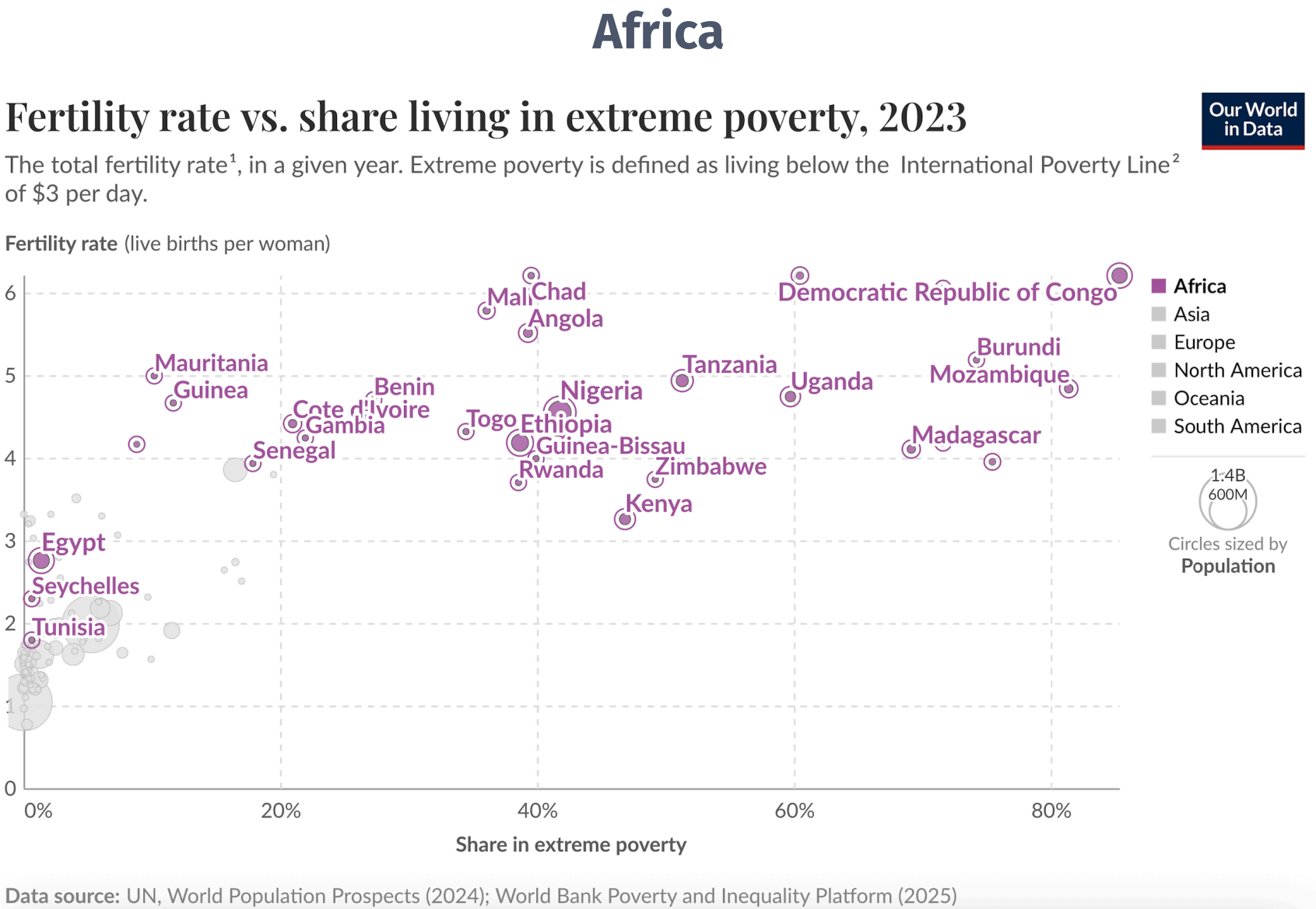
- **Definition:** The ratio of non-working aged individuals to working individuals
- In **Developed Nations**, population growth has slowed.
  - There is a **large dependency burden** due to the **large number of retirees** relative to working age individuals
- In **Developing Nations**, poopulation growth is usually high.
  - There is a **large dependency burden** due to the **large number of children** relative to working age individuals

Poverty and Fertility

North America

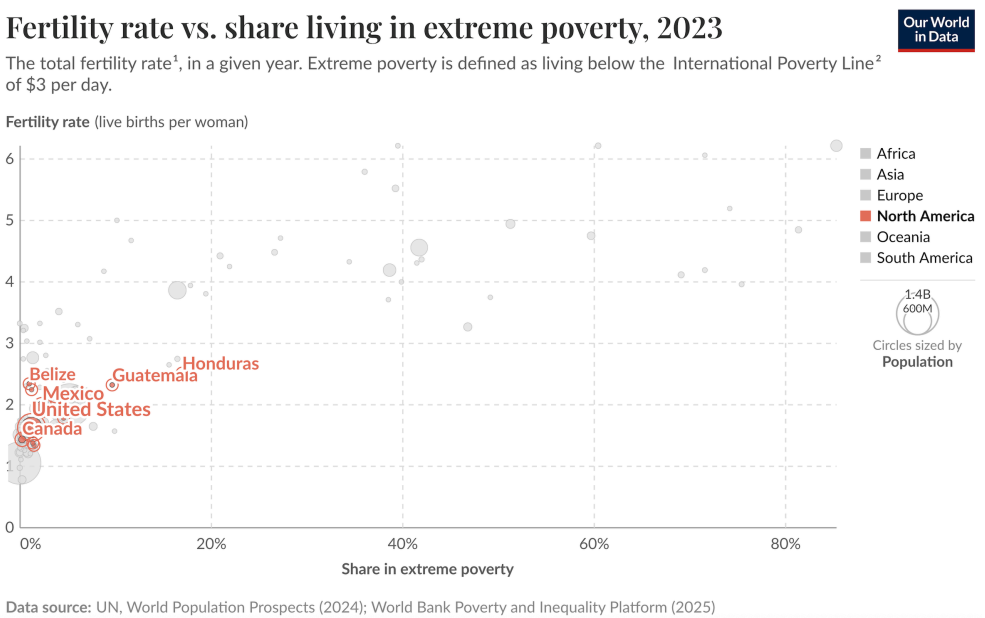


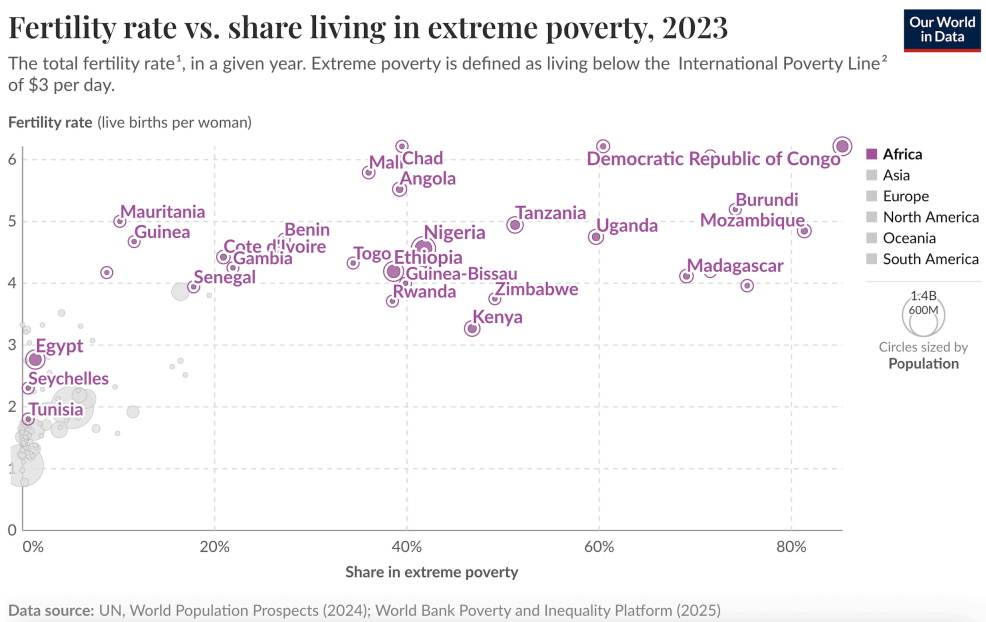
Poverty and Fertility



Poverty and Fertility

What is the relationship between poverty and fertility?





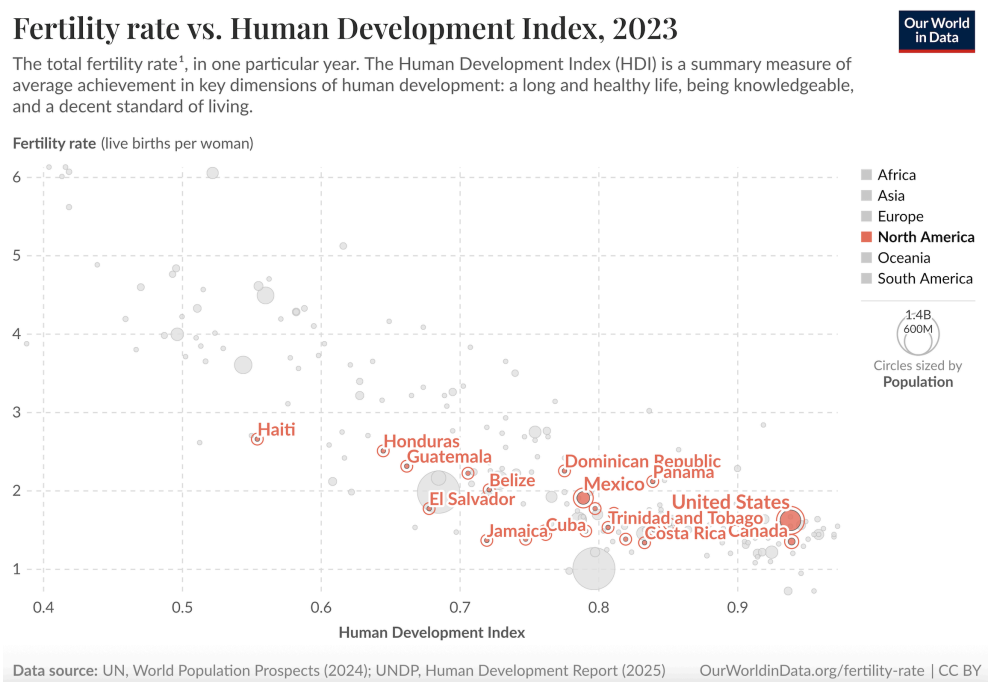
North America

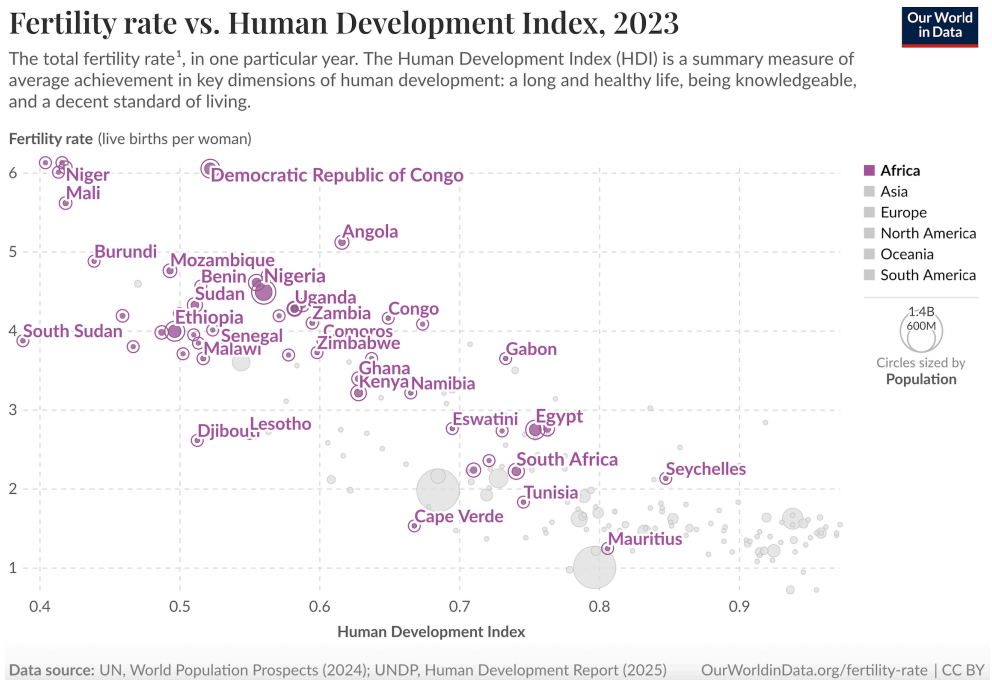
Africa

Positive Correlation but causality is unclear

Development and Fertility

Not surprisingly development and fertility are negatively correlated





North America

Africa

Consequences of High Fertility

The latest empirical research points out that high fertility is a concern with possible severe consequences

- Fast population growth tends to lower per capita economic growth
- Increased poverty and inequality
- Reduced education
- Health outcomes (risky pregnancies and dangers in frequent births)
- Food shortages
- Environmental issues (increased pollution)
- International migration

Microeconomics of Fertility Decisions

Microeconomic Theory of Fertility

Empirical evidence to support the idea that **economic conditions cause fertility rates to be high**

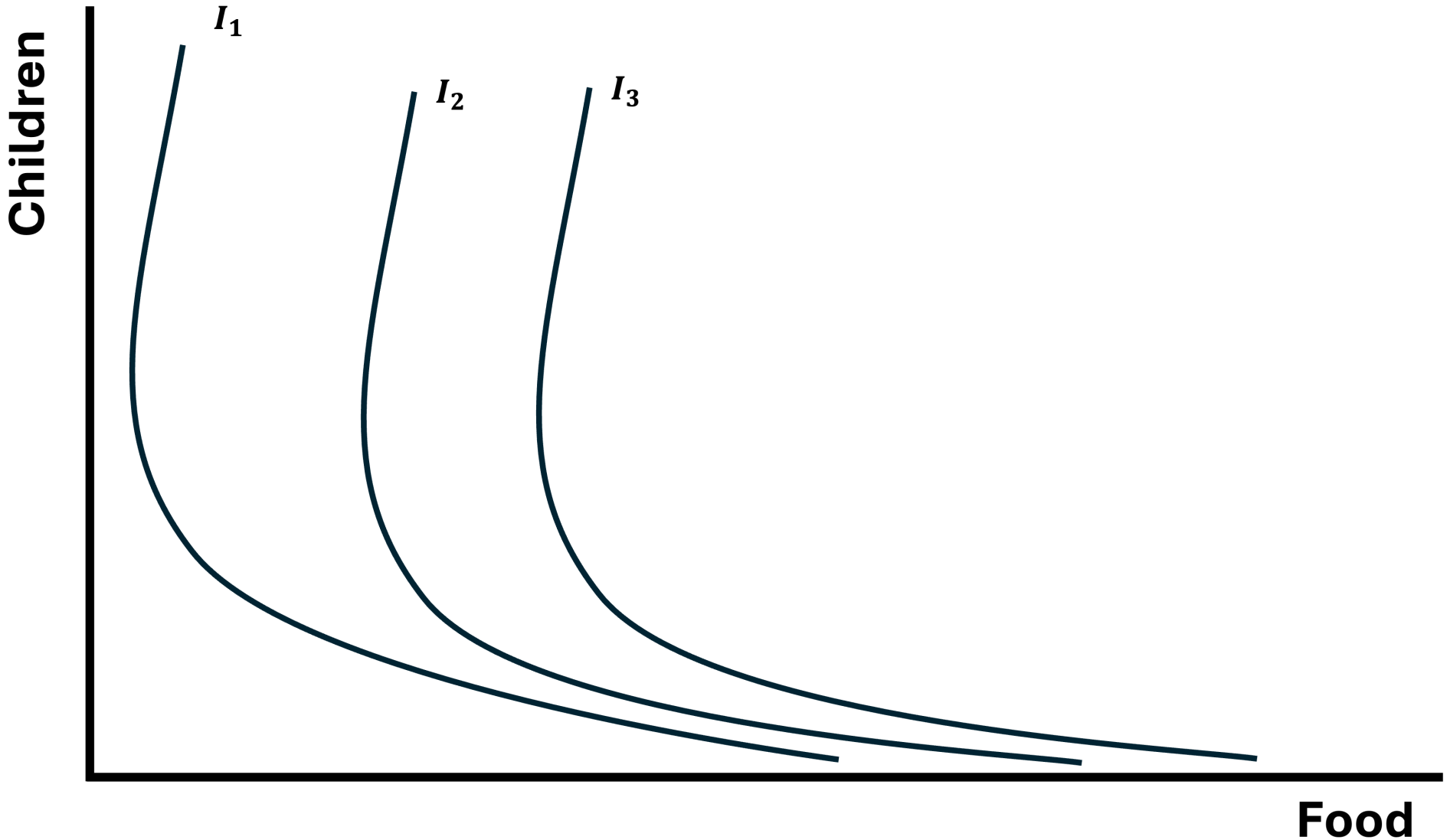
- Families have a **limited amount of resources**, which can be used to support children or parents (a budget)
- The more children parents decide to have, the **less resources** parents have for themselves
- Parents have a tradeoff to consider: **children provide benefits, but they also have a cost**

Microeconomic Theory of Fertility

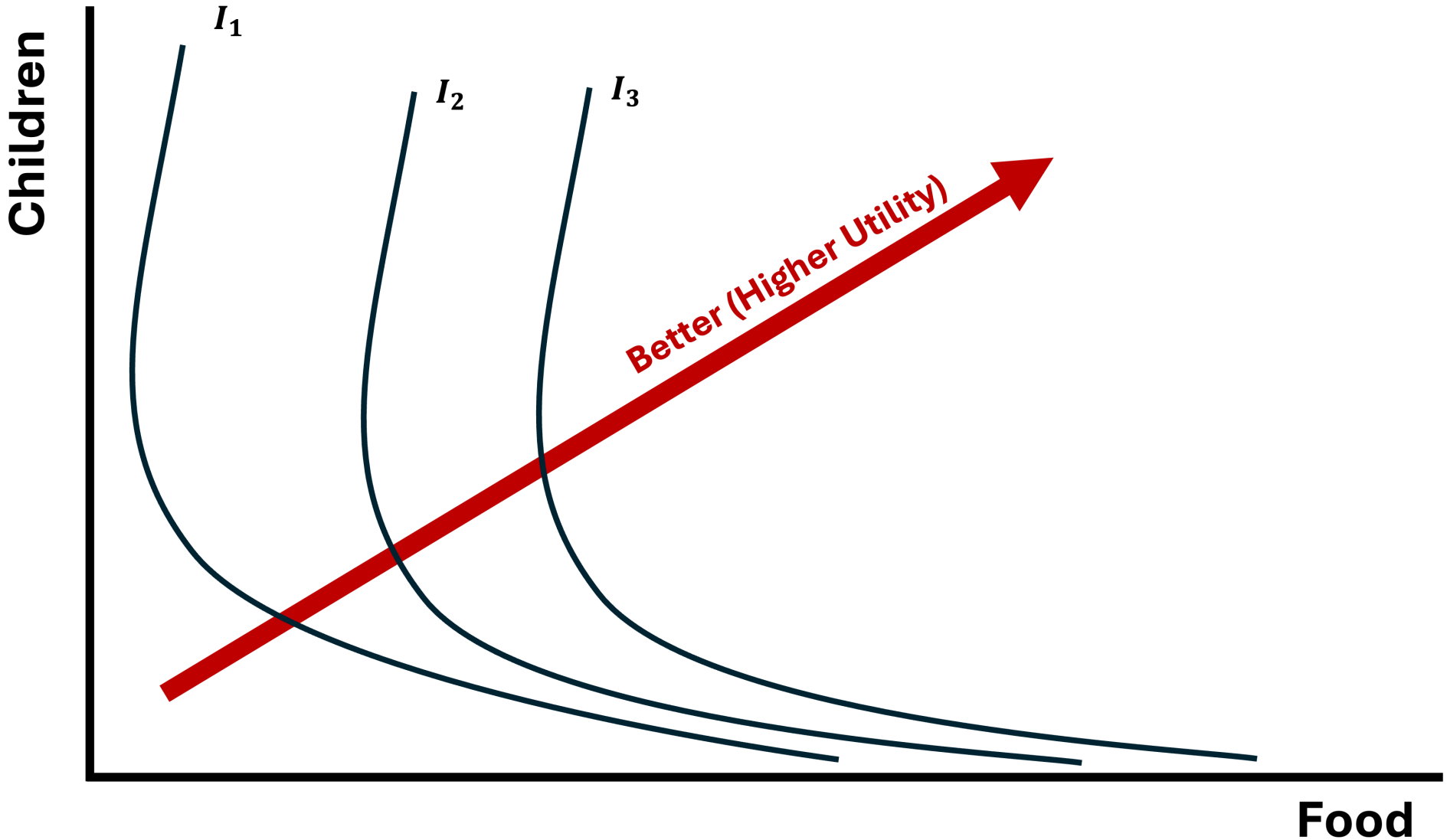
Consider the following example

- Suppose a household has an income of $30
- There are only two goods to consider:
  - **Food** and **Children**
  - **Food** is a **normal good** with price equal to $5
  - **Children** are an **inferior good** with price equal to $6
- The household has preferences over **food** and **children**, which we represent with **indifference curves**

Indifference Curves



Indifference Curves (Higher Utility)

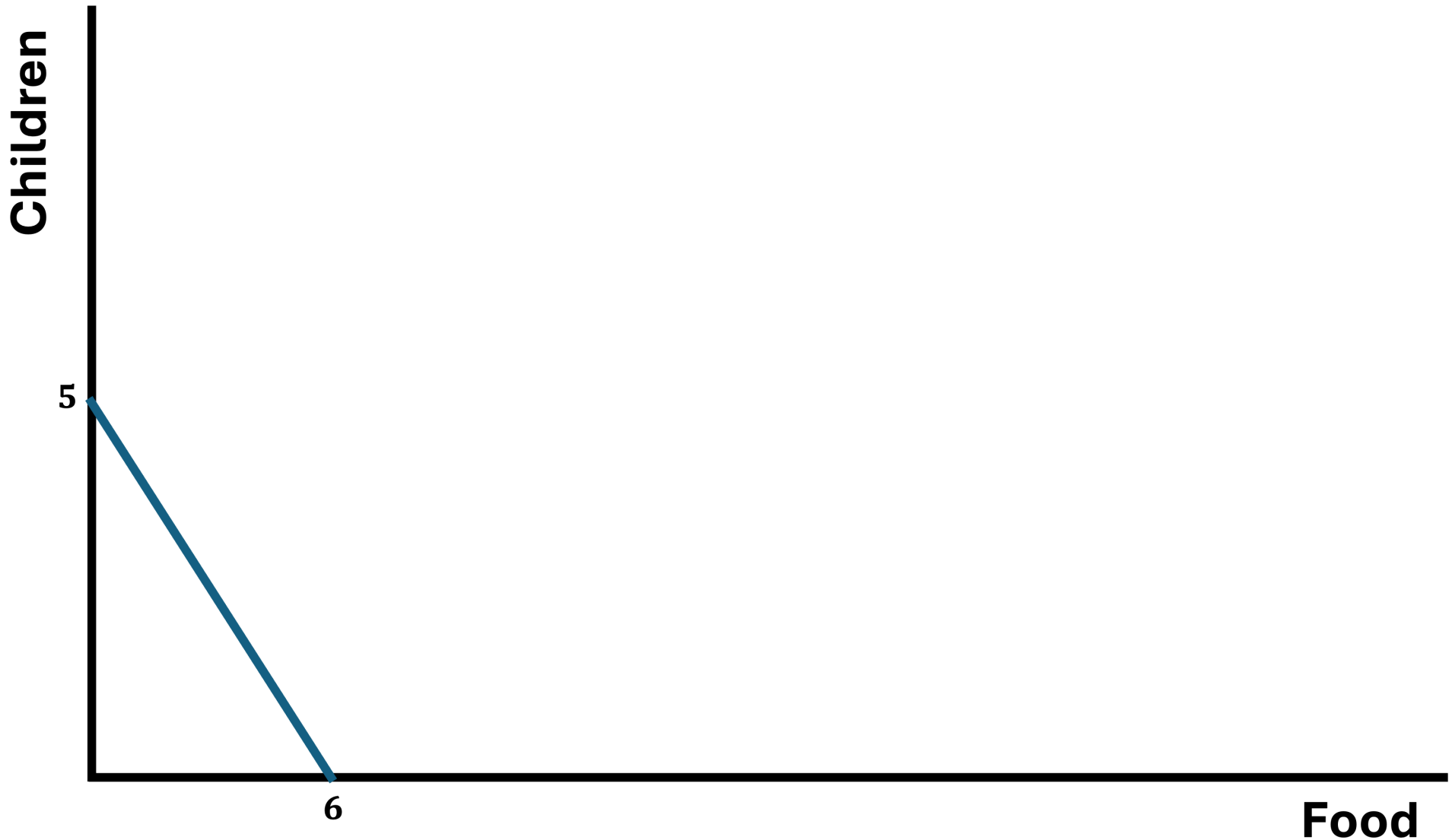


Finding the Budget Line

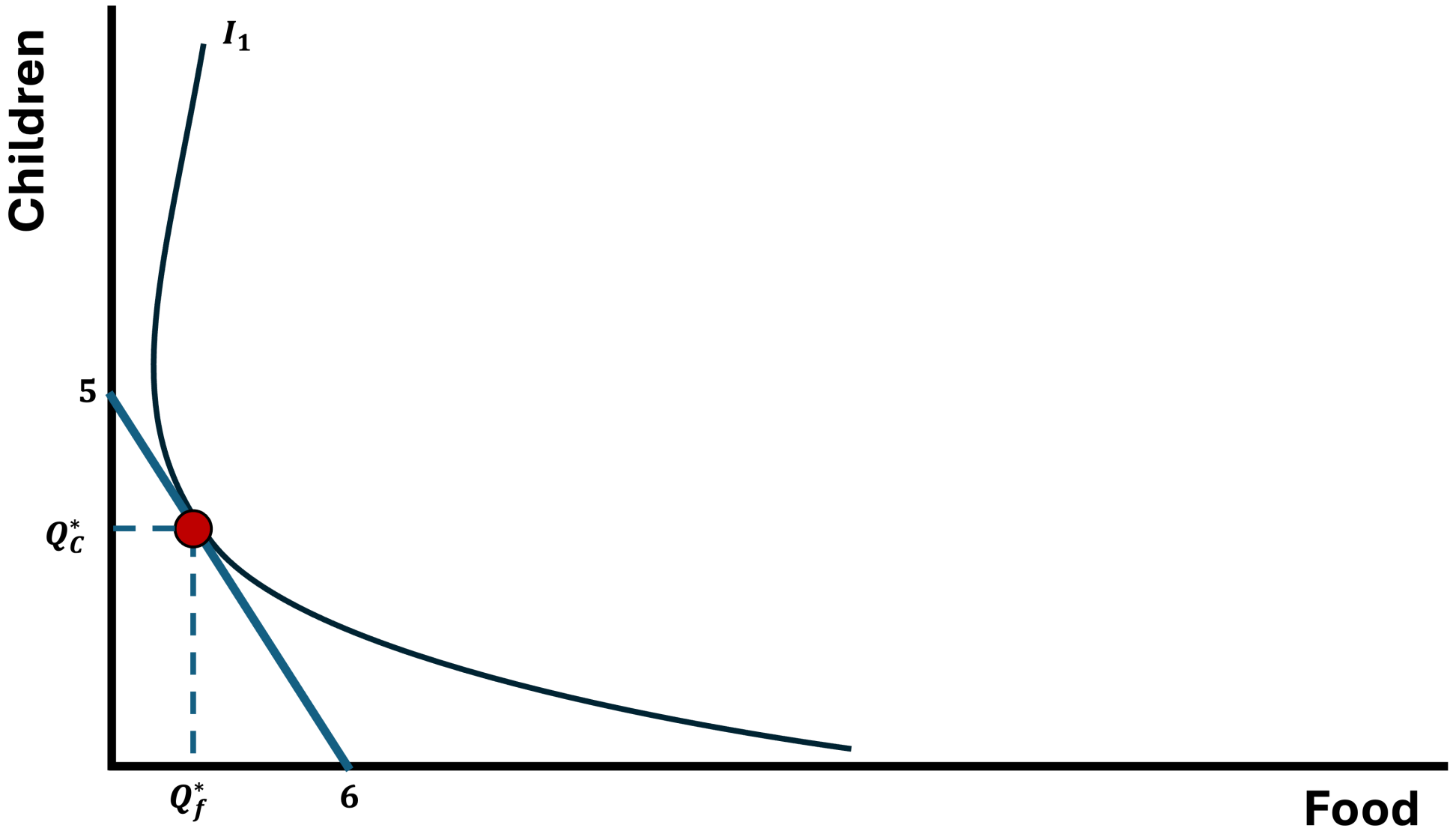
We know the household has a total of **$30** to spend and they can spend it either on **Food** or **Children**

- If they buy only **Food**, they can afford **6 units** → $\frac{30}{5} = 6$
- If they "buy" only **Children**, they can afford **5 kids** → $\frac{30}{6} = 5$
- With these two points, we can draw the **budget line**

Budget Line



Optimal Choice

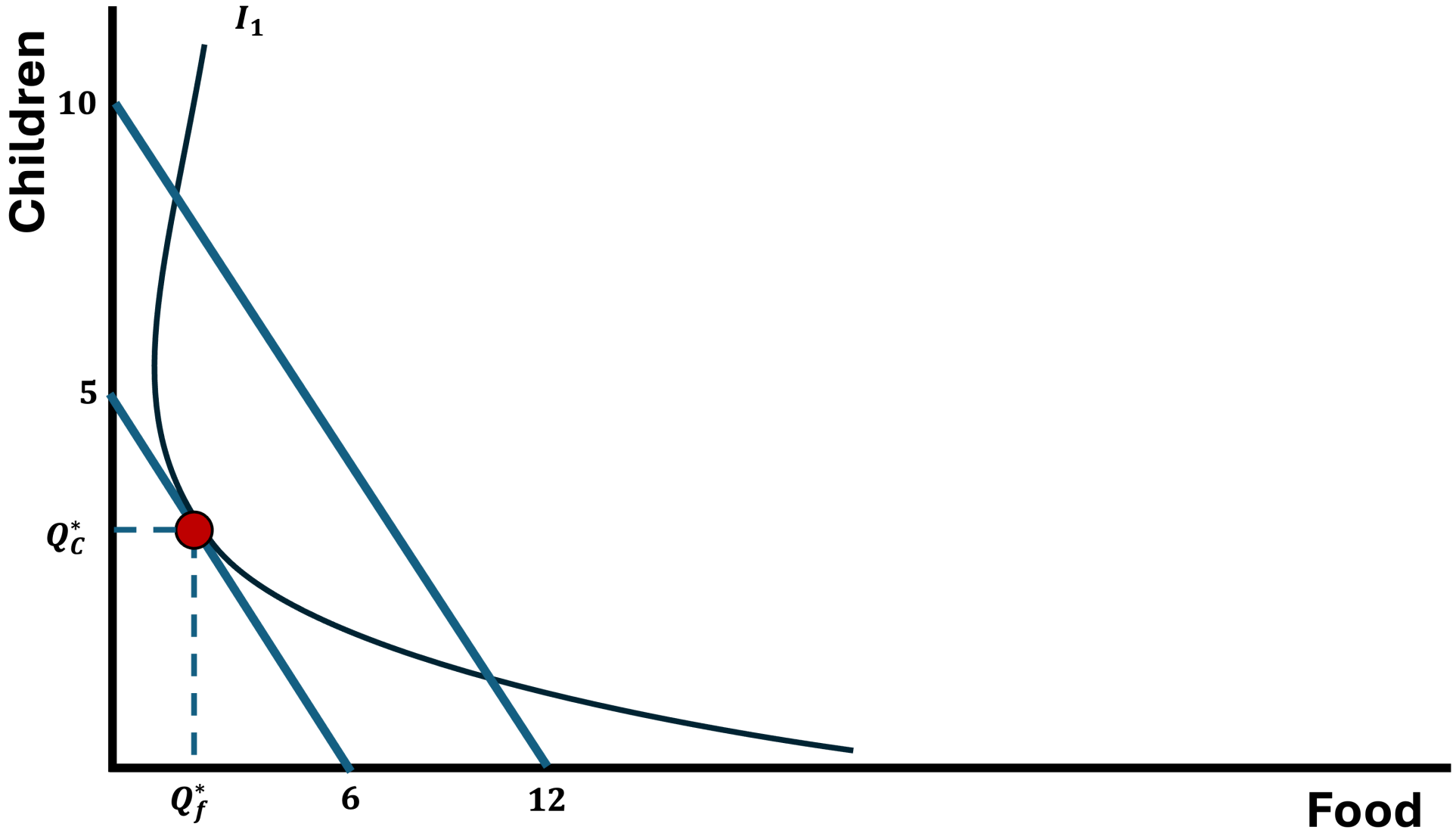


Higher Budget

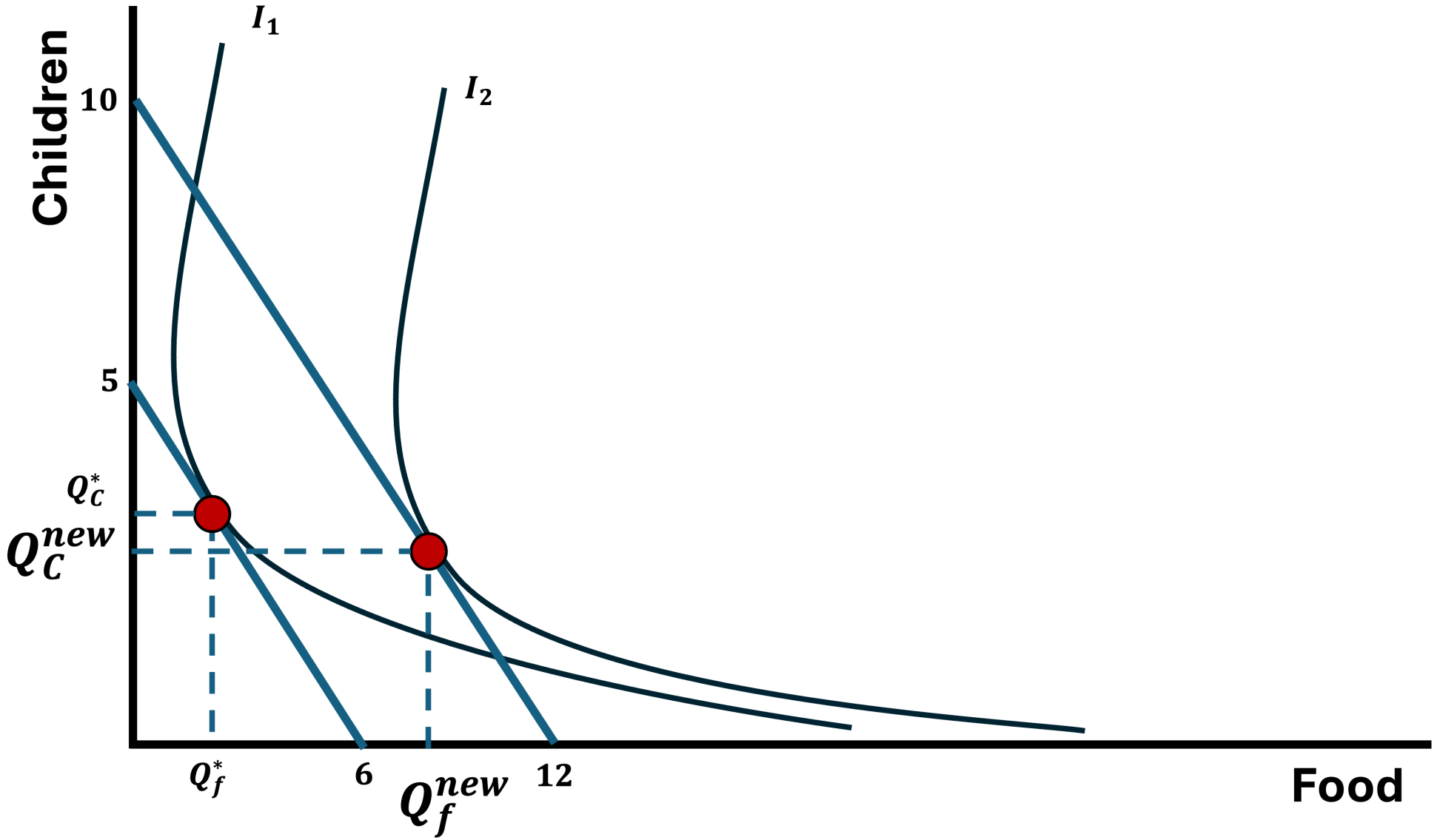
Now let's say that the **households income increaes** to $60

- The price of **both goods remains the same**
- Now, if they buy only **Food**, they can afford **12 units** → $\frac{60}{5} = 12$
- And, if they "buy" only **Children**, they can afford **10 kids** → $\frac{60}{6} = 10$
- With these two points, we can draw the **new** budget line

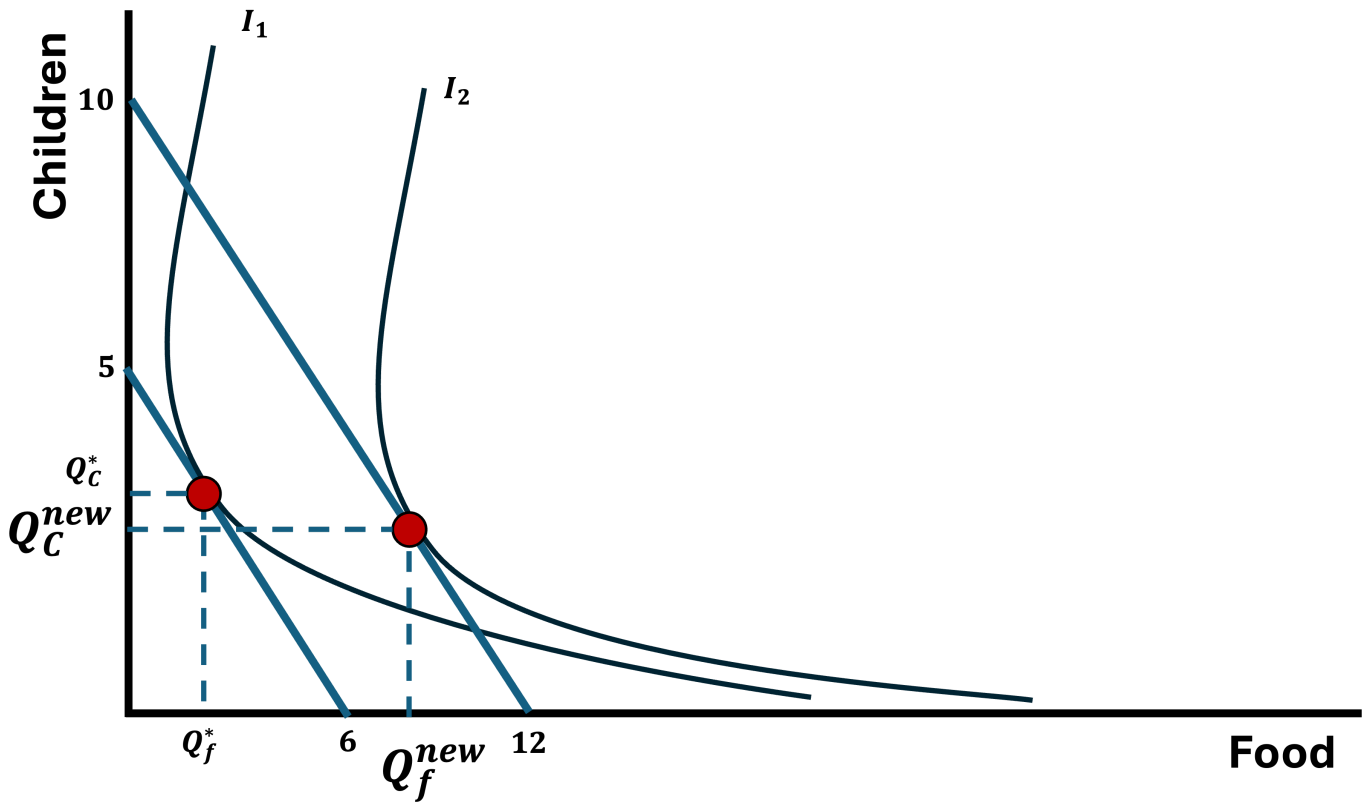
Higher Budget



Optimized Choice (Again)



Microeconomics of Fertility Decisions



- When income increased, the household **was better off buying more food and fewer children**
- The household got wealthier, and kids are an inferior good

Children as an Inferior Good?

This is generally what we observe

- As income per capita increases, birth rates fall
- Parents face a trade-off:
  - There is a finite amount of resources
  - **Example** Income is limited
    - Do you **have a lot of children and invest very little in each?**
    - Do you **have few kids and invest a lot in each?**
- This is known as the **"Quality vs Quantity Trade-Off"**

Demographic Transition

Fertility Rates Eventually Decline

All contemporary developed nations have more or less passed through the same **four stages of modern population history**

Stage 01. **High Birth Rates and High Death Rates**

Stage 02. **High Birth Rates with Decline in Death Rates (Transition)**

Stage 03. **Declining Birth Rates and Low Death Rates**

Stage 04. **Low Birth Rates and Low Death Rates**

Demographic Transtion Stages

All contemporary developed nations have more or less passed through the same **four stages of modern population history**

Stage 01. High Birth Rates and High Death Rates

- Populations grow very slowly because **both birth rates and death rates are high** and roughly balance each other
- High mortality comes from poor sanitation, limited medical care, and frequent famines or epidemics

Stage 02. High Birth Rates with Decline in Death Rates (Transition)

Stage 03. Declining Birth Rates and Low Death Rates

Stage 04. Low Birth Rates and Low Death Rates

Demographic Transtion Stages

All contemporary developed nations have more or less passed through the same **four stages of modern population history**

Stage 01. **High Birth Rates and High Death Rates**

Stage 02. **High Birth Rates with Decline in Death Rates (Transition)**

- Increased access to medicine, sanitation, and stronger food supply sources **reduce death rates sharply**
- Birth rates remain high for a while, **causing a population boom or "demographic explosion"**

Stage 03. **Declining Birth Rates and Low Death Rates**

Stage 04. **Low Birth Rates and Low Death Rates**

Demographic Transtion Stages

All contemporary developed nations have more or less passed through the same **four stages of modern population history**

Stage 01. **High Birth Rates and High Death Rates**

Stage 02. **High Birth Rates with Decline in Death Rates (Transition)**

Stage 03. **Declining Birth Rates and Low Death Rates**

- As living standards rise, education and urbanization lead **families to have fewer children**
- **Population growth slows and stabilizes**, creating the conditions typical of modern developed economies

Stage 04. **Low Birth Rates and Low Death Rates**

Demographic Transtion Stages

All contemporary developed nations have more or less passed through the same **four stages of modern population history**

Stage 01. **High Birth Rates and High Death Rates**

Stage 02. **High Birth Rates with Decline in Death Rates (Transition)**

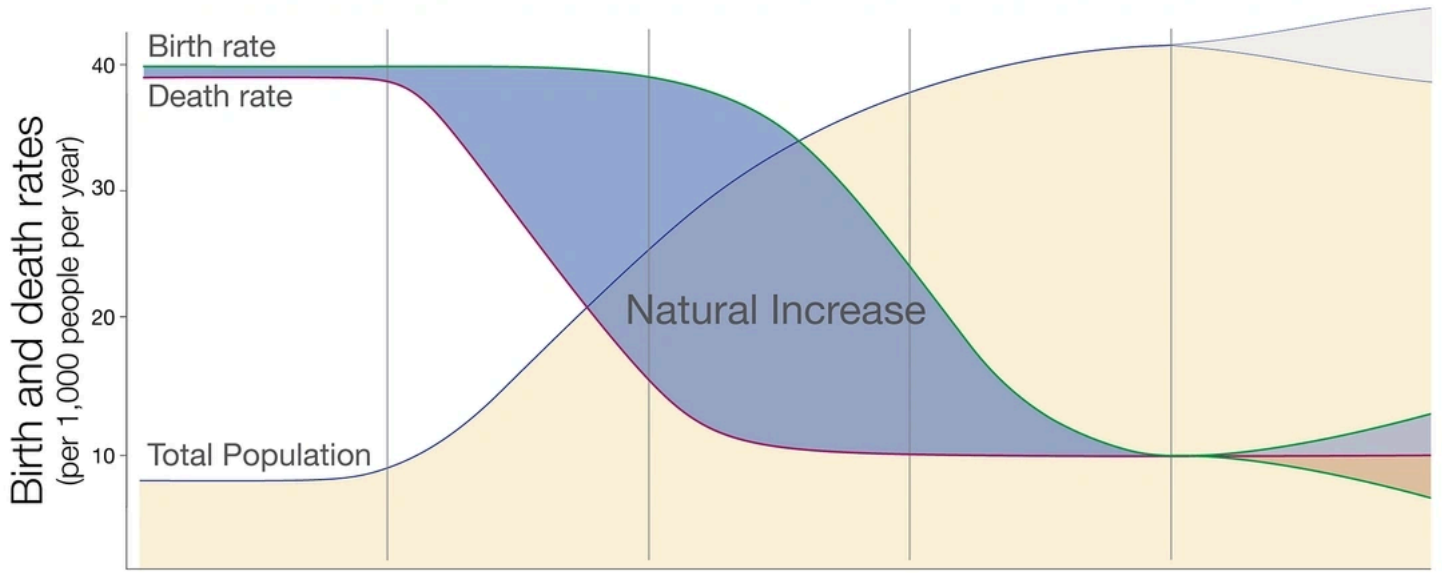
Stage 03. **Declining Birth Rates and Low Death Rates**

Stage 04. **Low Birth Rates and Low Death Rates**

- Societies experience stable or even shrinking populations as **fertility may fall below replacement levels**
- **Aging populations and slower growth become key** social and economic challenges

The five stages of the demographic transition

The demographic transition is a model that describes why rapid population growth is a temporary phenomenon.



	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Birth rate	High	High	Falling	Low	Yet to be seen (Possibly falling further, possibly rising again)
Death rate	High	Falls rapidly	Falls more slowly	Low	Low
Natural increase	Stable or slow increase	Rapid increase	Increase slows down	Falling and then stable	Little change
Population Pyramid