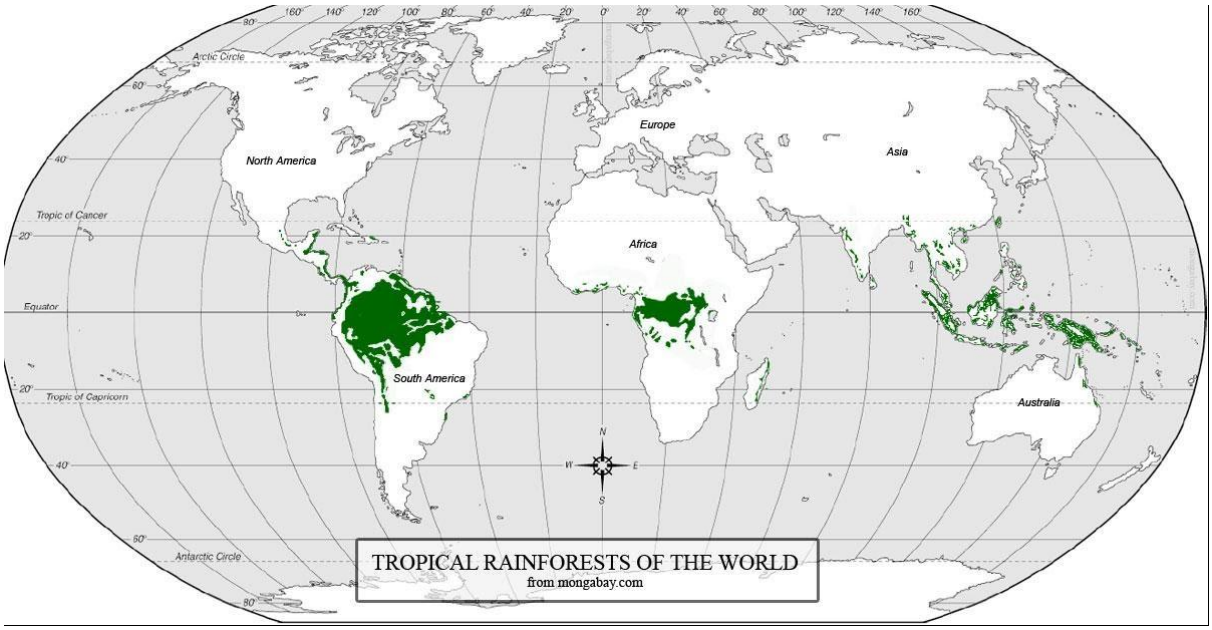
Deforestation

Special skills tested:

- Spatial Distribution
  - Evenly/unevenly distributed
  - Specify if there are clusters in the area
  - Northern, Southern, Eastern, Western
  - Specifics for each (Planned vs Already Existing, List different companies, Be precise about each company) etc.

Where are tropical rainforests found?



From: CD1 Tropical Rainforest

Causes for deforestation

This section is written in PEEL format (points in order)

- **Increase in demand for agriculture products**
  - Large areas of rainforest are cleared for large scale commercial agricultural activities.
  - These crops, such as palm oil, coffee, sugar and soy are sold to meet increasing local and global demands.
  - By 2010, about 242,200km^2 of the Amazon rainforests have been convert into soya bean farms. Besides being a major ingredient in food for cattle, soya beans are also processed into commercial products such as soya milk and tofu which can be sold in the local and global markets.

- Hence, commercial agriculture leads to a large area of tropical rainforests to be cleared in order to grow crops on a large scale for sale.

- **Increasing demand for beef production**
  - Deforestation occurs due to large areas of land needed for cattle ranching.
  - Large areas of rainforest are cleared to create land for large farms to raise cattle. Cattles require a large area of land to graze.
  - The need for more land to raise cattle is attributed to the increase in global demand for beef.
  - For example, 80% of the Amazon rainforest is cleared for cattle ranching as a large amount of beef from cattle in the Amazon is exported to countries such as USA and Britain.
  - Due to the rising demand for beef, large areas of land are cleared to establish cattle farms.

- **Increasing demand for timber products (e.g. paper)**
  - Deforestation occurs due need to cut down trees for timber.
  - Growing demand for timber products has increased logging activities in the tropical rainforest. The timber is used to make furniture, building materials and charcoal.
  - Other products obtained from cutting down trees include paper and disposable chopsticks. In China, the huge demand for timber for making disposable chopsticks and paper has resulted in heavy logging in the rainforests of Congo and Cameroon in Central Africa, Brazil and Indonesia.
  - Globally, commercial logging is responsible for destroying 50,000 km^2 of tropical rainforest every year.
  - The increasing demand for wooden products caused large scale logging to occur, leading to deforestation.

    Note: Points 3 and 4 are interchangeable

- **Increasing in mining activities**
  - Deforestation occurs to establish mines.
  - Precious metals and gemstones such as gold, copper and diamonds are found beneath many tropical rainforests. Hence, extensive areas of forests have to be cleared to mine for these metals and gemstones.
  - At the same time, forests are also cleared to construct roads to transport the mined materials.
  - For example, large area of tropical rainforest was cleared to set up the Carajas Mine in Brazil which has a variety of mineral reserves. In 2007, 296 million tonnes of iron ore were extracted from the mine, which is estimated to contain 18 billion tonnes of minerals including gold and copper.
  - For these mining activities to take place, large area of tropical rainforests will have to be cleared, leading to deforestation.

Solutions for deforestation

- **Public Education**
  - Change people's attitude and practices towards rainforests
  - Tell people of the importance and ways to contribute to conserving rainforests
  - Create awareness of the rich biodiversity in the rainforest and cause people to be more mindful about the way they use rainforest resources

  - In Singapore, field trips organised by the National Parks Board to Bukit Timah nature reserves help to make the public learn about the rainforest's rich biodiversity and value
- **Controlled logging**
  - Careful management of forests that are being logged
  - Allows logging only in certain areas and in a sustainable manner (e.g. only selected plant species can be logged)
  - Penalties such as fines and imprisonment are enforced on irresponsible timber companies that carry out illegal logging
  - Education and research programmes are arranged to inform said companies of the damage caused by deforestation and may also discuss measures to take to manage the extent of damage

  - In Brazil, certain areas are designated to allow businesses to log wood. Businesses must apply for a permit to log wood in these areas, and their activities are closely monitored by the government and these businesses have to pay royalties.
- **Protection of forested areas**
  - Setting of laws to protect an area from unfavourable activities that endanger the biodiversity and natural resources in the area
  - Indigenous & traditional communities living in the areas are preserved as well
  - Unsustainable logging and agricultural practices are banned in such areas through laws or other methods

  - In Singapore, logging is strictly prohibited and enforced by National Parks Board to preserve the few nature reserves and rich biodiversity (we have 23,000–28,000 species of terrestrial organisms

- **Reforestation**
  - Planting of trees in areas where the original forest has been cleared
  - Often involves non-profit organisations, companies, and local communities

  - E.g. the project *Reforestation in Peru* is organised by the Latin America Travel Association Foundation. They buy seedings from and pay local communities to plant trees. In 2011, 70,000 trees were planted by them.
  - **Note**: This specific method **DOES NOT** reduce rate of deforestation as deforestation is defined as "the large-scale man-made clearing of trees."

Reforestation does **NOTHING** to reduce the number of trees cut down. What it reduces is the **NET DECREASE IN THE NUMBER OF TREES.**

- **<u>Advantages and disadvantages of each solution for deforestation</u>**
- **Public Education**
  - Advantages
    - Far-reaching effects, especially in the long term
    - Help to change people's mindsets, increase awareness, understanding and appreciation of forests
    - Knowledge and awareness can lead to action and participation from the community
  - Disadvantages
    - Turning environmental awareness into personal behaviour is difficult
    - Raising awareness is difficult in countries with low literacy rates
- **Controlled Logging**
  - Advantages
    - Greater control of logging has led to a decrease in deforestation
    - Reduce logging rate - less trees are cut down - lower rate of deforestation
  - Disadvantages
    - Identifying and logging selected trees is time-consuming and tedious - difficult to implement
    - Areas designated for controlled logging may still be threatened by illegal loggers as illegal loggers are hard to track
- **Protection of forested areas**
  - Advantages
    - Important in conserving indigenous ecosystems and native biodiversity
    - Protected areas useful for educational and recreational purposes
    - Some indigenous lands are protected and the indigenous people's way of life is sustained
  - Disadvantages
    - Protected areas are not fenced - still vulnerable to human impact
    - Officers responsible for monitoring protected areas may give in to corruption and allow loggers and miners to illegally enter protected areas (like Brazil) – In the town of Boca de Acre, a group of loggers cut down 180 square kilometers of forest, bribing five employees of the Brazilian Environmental Protection Agency (Ibama) to protect their operations.
    - Not enough forest rangers to patrol the huge rainforests - families illegally settling in protected areas

        - Need to balance development and biodiversity in small urban settings like Singapore
- **Reforestation**
    - Advantages
        - Soil fertility can be improved in the long term - helps sustain plant growth in the area
        - Reduce erosion, maintain water cycle, preserve rainforest habitat and biodiversity
        - Create new jobs for local communities (e.g. producing seedlings to plant or tour guiding)

    - Disadvantages
        - Expensive and time-consuming – takes **4000 years** for a forest to regain natural identity.
        - Depends on availability of native plants
        - Again, it does **not** reduce the rate of deforestation but only reduces the net decrease in the number of trees

Water Shortage

Definition of Water Shortage:

The supply of available freshwater is less than the demand of freshwater in a particular nation or region.

Difference between the Water terms

Water security	When a country has adequate and sustainable fresh water for human consumption and use more than 2,500 m^3 per capita per year
Water vulnerability	If freshwater availability is between 1,701 and 2,500 m^3
Water stress	If freshwater availability is between 1,001 and 1,700 m^3
Water scarcity	When freshwater availability falls below 1,000 m^3

Supply factors (Supply of Water < Water usage)

- **Supply Factor 1: Seasonal rainfall**
  - Countries with seasonal rainfall have periods of time where precipitation is either very high or very low or negligible. During the dry season, people who rely on rainfall as their primary source of water will therefore have a lower supply of water, which may cause the demand for freshwater to exceed the supply of available freshwater.
  - E.g. Taiwan: Even though it has high rainfall (2500 m^3 a year), 80% of annual precipitation falls between May and October, meaning Taiwan gets half a year of heavy rains, then half a year of droughts. Supply cannot meet its demand – 271 litres per person a day

- **Supply Factor 2: Droughts/Climate Change**
  - Dry areas get drier due to increased evaporation rates (from soil)
  - Higher frequency of extreme weather events, such as drought
  - Prolonged periods with little to negligible precipitation.
  - Reduce Water Supply in some areas → Supply of freshwater is not able to meet demand for freshwater.
  -
- **Supply Factor 3: Diversion of Water**
  - Diversion of water from one place to another could potentially lead to reduced supply of water in the place of origin, resulting in the place of origin unable to meet the demand for water.
  - Aral Sea: Soviet Government decided to divert the sea in the 1960s -> irrigate the desert region surrounding the Sea in order to favour agriculture rather than supply the Aral Sea basin. Aral Sea originally had 749.20 km^3 of water, in 2006 it became 112.31 km^3 of water

- **Supply Factor 4: Water Pollution**
  - Introduction of chemicals and other pollutants which tarnish the supply of freshwater, which pollute the water and make it **unusable and unsuitable for consumption**, which reduces our water supply.
  - Ganges River: During the religious festival season, 70 million people bathe in the Ganges, resulting in a lot of food, water and leaves. In Varanasi alone, an estimated 40000 bodies are cremated every year into ganga into many of which are only half-burnt.

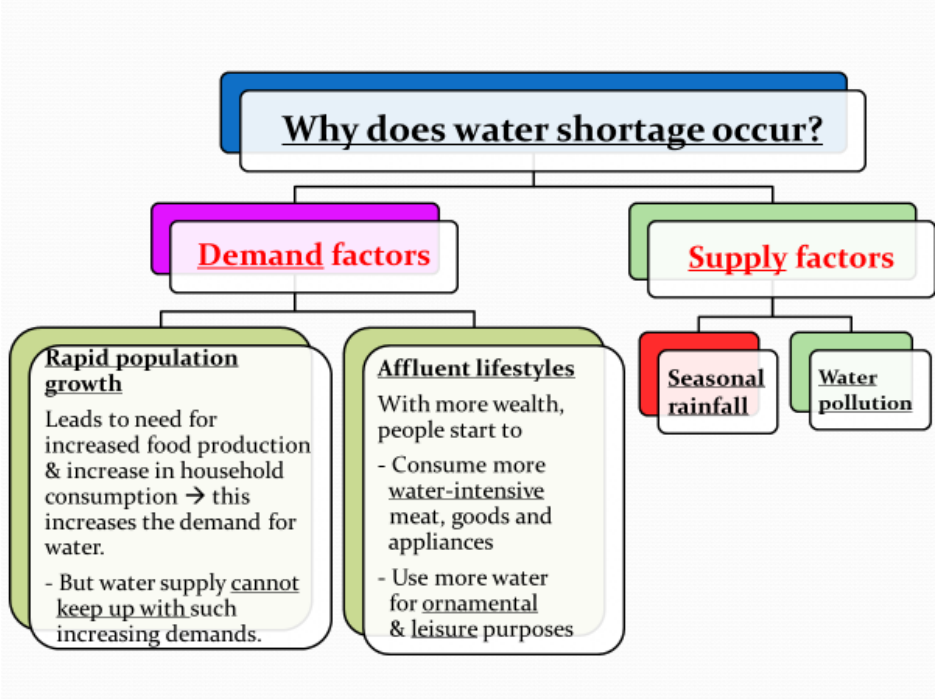
- **(Extra) Supply Factor 5: Poor Infrastructure (not in Slides)**
  - Poor infrastructure might result in water leaks during transportation, decreasing the available supply of water, which may result in an inability to meet the demand.

Demand Factors (Water usage > Supply of water)

- **Demand Factor 1: Population growth/Overpopulation (usually in less developed countries which are the ones suffering the greatest water shortage)**
  - More people equate to a larger consumption of water overall. However, the supply of water might not be able to keep up with the rate of population growth, and therefore the demand for water might exceed the supply of available freshwater suitable for consumption.
  - Greater Melbourne: 2014/15 the city's population grew by a staggering 91,600 to a total of 4,530,000 people. it takes more than 475 litres of water/person/day to grow food for the city's residents. To feed its residents, Melbourne will require at least an extra 21 GL per year every year for the foreseeable future.
- **Demand Factor 2: Increasing affluence**
  - More people in developed countries leading affluent lifestyles able to afford more goods, produced with water, consuming more goods which require more water for production. People also tend to use more water (eg. to keep ornamental fishes and swimming pools).
  - **USA vs Vietnam:** USA has a high income per capita of $47, 310 compared to Vietnam, $3070. This results in USA consuming 2842 m^3 of water compared to Vietnam, 1058m^3

What is sustainable water resource management?

- Planning and distributing water resource in a way that they will not be depleted.
- Ensuring that there will be minimal damage to the environment in the process of using or recycling water.
- The strategies usually fall under 1 of 3 categories:
  - Increase supply of available freshwater
  - Decrease demand of available freshwater
  - Maintain supply of freshwater (This one is a bit risky as its emphasis is more on maintaining water quality which keeps the source clean, ultimately **preventing a decrease of supply of available clean freshwater.**)



Brief overview on the causes of Water Shortage

Impacts of Water Shortage

- **Impact #1: Reduced Agricultural Yields (Economic)**
  - Agriculture is the biggest user of water ☮uses 70% of the global fresh water supply
  - Water shortage disrupts production of crops or livestock ☮result in lower productivity / yields / less harvests
  - Irrigation areas, farmers' water allocation has been cut back because of water shortage ☮reduced farm output ☮☮farmers have less to sell ☮lower income

- Market shortage of certain crops ☮scarcity in food supply ☮may lead to
  - (i) higher costs of food items in some places
  - (ii) increased need for imports

- **Economic impact =** country spends more on importing food items, farmers earn less, may lose their jobs etc
  - In Taiwan, agriculture worth 70% of total industry, however only self-sufficient for food at 32% due to water shortage
- **Social impact =** farmers do not earn enough due to reduced yields, unable to pay debts, unable to support family, trapped in poverty cycle

- **Impact #2: Increased difficulty in collecting water for people (Social)**
  - Some parts of the world where people don't have access to clean water (esp. Developing Countries)
  - In some parts of the world, people walk long distances (eg, up to 8 hours to collect water (eg: in rural Ethiopia), especially women
  - Children may not go to school as a result

- Walk is long, tiring and water collected may be dirty
- Drinking unclean water can result in water borne diseases such as cholera.

- **Impact #3: Increased cost of industrial production (Economic)**
  - Water shortage can lead to cutting of power production ☢ can result in increased price of power ☢increase cost of production of goods and services in other industries
  - Various industries / businesses incur losses and suffer from reduced earnings
  - In India, water shortage reduces the Index of Industrial Production (IIP) growth by around 40-50%

- **Impact #4 Conflict over water supply (Political, Social, Economic)**

  - **Regional Scale:** In trans-border rivers (e.g. Mekong), water shortage resulted in conflict among affected countries (eg, Lao People's Democratic Republic's proposed to build the Xayaburi dam but was objected strongly from neighbouring countries). Would affect fish industry, as Mekong is richest source of fish, worth an estimated $2 billion per annum.
  - **Local Scale:** conflicts among farmers sharing one water source

Fieldwork and Sampling

Difference between sampling methods

- Systematic
    - Easier to conduct
    - Useful when investigating changes
- Random
    - Fairer as everything has an equal chance of being sampled
    - **MORE ACCURATELY REPRESENT POPULATION**
        - Can vary spatially or temporally

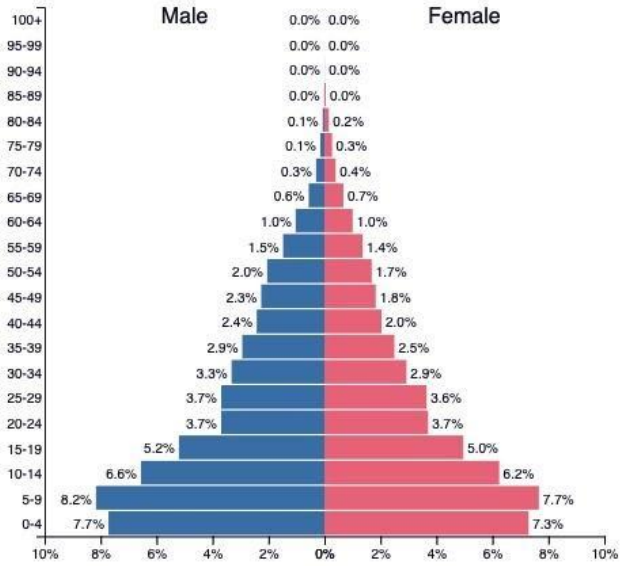
Apparatus used in measuring Water Quality

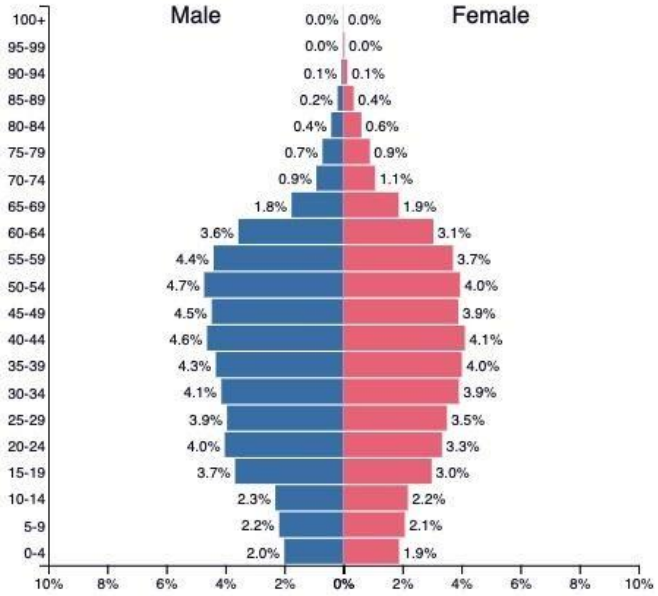
Dissolved Oxygen (DO)	Dissolved Oxygen tablets, DO Graph by colour
pH Level	• Litmus paper and compared to pH graph colour OR • pH Thermometer
Temperature	Digital Thermometer
Turbidity in JTU	Container with Secchi disk

Chart containing appropriate levels of indicators will be given during Examinations, don't need to memorise.

Geography: Population Studies (NOTES)

Population pyramids





Broad base	Narrow base
Narrow middle	Broad middle
Skinny top	Skinny top

Demographic Transition Model

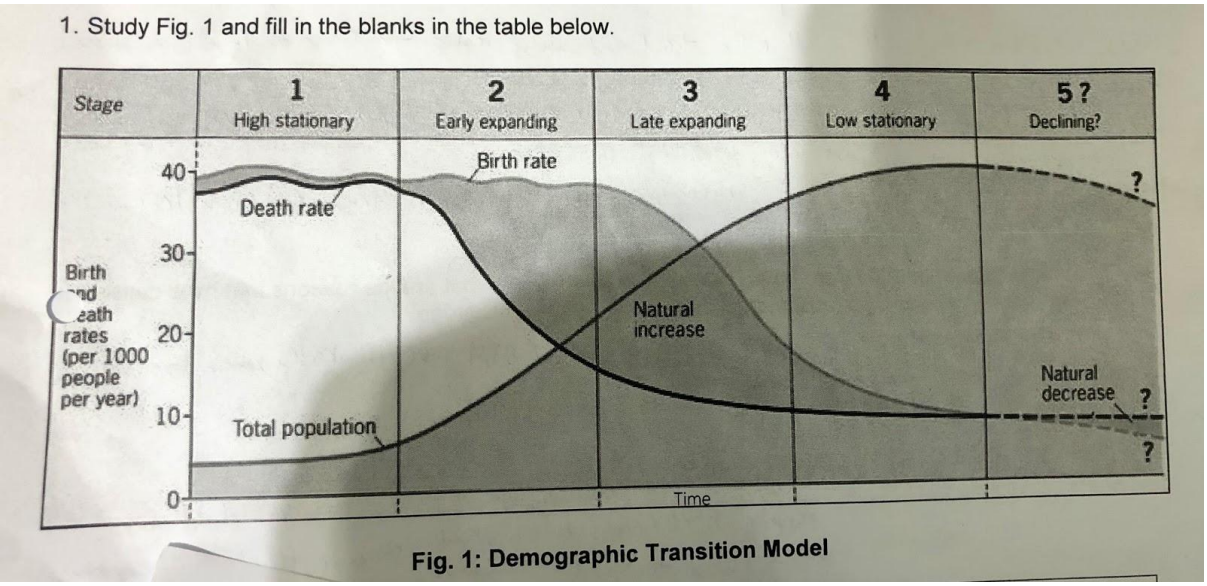


Fig. 1: Demographic Transition Model

Stage 1	High	High	Stable
Stage 2	High	Falling sharply	Rapid increase
Stage 3	Falling	Falling gradually	Gradual increase
Stage 4	Low	Low	Falls gradually before stabilising
Stage 5	Falling	-	Natural decrease

Factor(s) affecting Death Rate (DRQ Standard)

Increasing number of people dying off in the older ages: Better Medical Facilities

- **Developed countries**
- Better access to Medical facilities
    - Longer life expectancy
        - Greater population living into old age
            - More of the population is elderly and reaching the end of their lives
                - Higher Death Rate

In Singapore, due to better access to better chronic disease management, men can expect to live up to 78.8 years and women, 83.3 years. (2010). This is compared to around 60-70 years old in the 1970s.

Lower Death Rate: Newer developed places

- **More recently developed countries**
    - Younger population profile

        - Leading to higher economic growth, improved healthcare services, improved nutrition, and improved access to clean water and sanitization.
            - Lower death Rate

Factor(s) affecting Birth Rate (DRQ Standard)

Higher Birth Rate: Pre-industrialization, cultural norms

- **Desire for child to carry on family name (culture)**
    - Families keep on having babies till a son is born

- **Replacement children (to replace those that have died)**
    - Poverty – diets lack variety and people are undernourished and too weak to fight infections. -> people have more children to ensure that more of them survive to adulthood
    - In Nigeria due to high infant mortality rate (1 in 5 children die before reaching the age of 5), many families give birth to many children, resulting in a high of 5 people per family, compared to 3.16 people per family in Singapore.

- **More Labour for family business**
    - Family needs child to provide extra worker to boost family income
    - E.g. In Indonesia, 43.3% of working children are child labourers. Majority of children work in their family farms.

- **Longer childbearing years**
    - Girls marry and start giving birth at younger age, longer childbearing years to produce more children
    - In rural Niger, girls get married young, usually as teenagers, and have their first child at 18. The country's population exploded from 3.5 million people in 1960 to nearly 20 million today.

Lower-Birth Rate: Cost of raising a child

- **Expensive to raise a child**
    - Cost of raising a child discourages families from raising too many children
        - In Singapore, it costs at least $670,000 to raise a child
    - Higher level of economic development; Fewer people rely on farming, more move to urban areas to work in the industries and the need for large families decline (Personal needs)
    - Women are more educated, stay in education longer; Women get married and start having children later, shorter childbearing years and usually have fewer children (career-minded women)

        - In Singapore couples usually get married at 25 compared to Nigeria, at 18 years old. Therefore, shorter childbearing years to menopause compared to Nigeria.
    - Educated women also know more about birth control and so can limit their family size more effectively. (Education for women)
        - In 1980s the Singapore government set up family planning centres, encouraged 2 children per family and promoted contraceptives, reducing the number of children.

To increase birth rate in Singapore, the government…

ENHANCED BABY BONUS

- Cash Gift for every child born: 1st & 2nd child -$8000 3rd child onwards -$10000
- Child Development Account: Co-savings scheme for children
- Parents can deposit money into a special savings account for their children – government to match the contribution dollar-for-dollar (up to a capped amount)

GOVT-PAID LEAVES

- Maternity Leave Working mothers are entitled to 16 weeks of paid maternity leave (partially paid by employer).
- Paternity Leave Fathers are entitled to 2 weeks of paid paternity leave.
- Allows parents to be assured that they can better take care of their children

TAX REDUCTIONS

- Includes tax rebates and relief
- Reduces the financial burden on families having to take care of children

a. Parenthood Tax Rebate

- Parents are eligible to claim tax rebates for each child born:

–1st child: $5 000
–2nd child: $10 000
–3rd child onwards: $20 000

Reduces financial burden on families so they have the ability to give birth to more children

Types of DRQ questions (formatted for Population Pyramids but applicable to any Geography topic)

- **Describe:** overall population [concentration of young dependents, economically supporting population, elderly dependents (Generals), specifics, *abnormalities (if applicable)]*
- **Explain:** PEEL (The usual stuff)
- **Suggest** *reasons*
- **State** *why*
- **Compare –** Similarities vs differences, *comparison terms*

© Copyright

Certain segments of these notes have been sourced from:

- https://docs.google.com/document/d/1JelHmcxjahCQ9SdZJ-_Ga0_tEOX8E6hR6R9CD0GFvj4/
- https://docs.google.com/document/d/1BljCSoXGPqnSvkOoeL27JUd8tWJSqybvqoOTPWyx-2A/edit

- Some Information has also been retrieved from external sources, such as the Internet/Worksheets/textbook/IVY