

3 Factors Affecting Natural Population Growth

1. Improved Living Standards

Explanation (increase): Improved living standards means that there is a higher level of healthcare and sanitation, such as clean water. A higher level of sanitation means that there are more people living in more hygienic conditions, and their homes are supplied with clean piped water and rubbish disposal facilities and sewers. Therefore, they are less susceptible to infectious diseases and dying prematurely, which reduces the number of people who fall sick. A higher level of healthcare means people have access to advanced medical facilities and healthcare services, patients will be able to receive better medical care in time. This causes the death rate to decrease, especially in infant mortality rate, and an increase in the life expectancy, which leads to a natural increase in population.

1. **Example (increase):** Singapore, a developed country that has advanced health care and a high level of sanitation has a low death rate of 5.2 deaths per 1000 people.

Explanation (decrease): Improved living standards refer to a developed economy, which means that many births are required for manpower. Moreover, improved living standards also refer to a developed society, where there is better family planning, which reduces the fertility rate and birth rate, thus decreasing the population growth. Also, improved living standards increase the cost of living in the more developed urban areas, which causes families to have fewer children as it is too expensive to raise them. In addition, women are more educated and they will rather pursue their careers, so they do not want to spend time at home taking care of children. As a result, some of them might decide to marry later. This decreases their child-bearing years and they will have fewer children.

Example (decrease): Singapore is a developed country that has a Family Planning and Population Board to control the population growth through family planning, and most women in the country are educated. It has a low birth rate of 1.14 births per woman in 2019.

2. Government Policies

Explanation: The government can launch policies to increase or slow down the birth rate, depending on the country's situation. The

government can give rewards, salary bonuses etc. to people who **abide by the policy**, while those who **violated them** were given **punishments** and **salary deductions**. The government may also **ban/encourage** the use of **contraceptives to increase/decrease birth rates**.

Example (increase): In 1987, the Singapore government launched the “Have three or more - if you can afford it” policy to reverse the decreasing birth rate caused by the previous “Stop at 2” policy. Paid **maternity leave** and **Baby bonuses** were given to help citizens support their children financially, encouraging them to have more children. The 1st and 2nd children get an \$8000 baby bonus, while the 3rd child gets a \$10000 baby bonus.

Example (decrease): In 1979, the Chinese government started the “One Child Policy” to slow down the **population boom** after World War II. Rewards and salary bonuses were given to people who **abided by the policy**, while **finances and annual tax** for those who **violated the policy**. This caused a **drop in the birth rate** from 6.4 in 1965 to 1.6 in 2000.

3. Cultural Attitudes

Explanation (Increase): In different cultures and religions, it is often encouraged to have an extended family. Moreover, **twins and triplets** are considered **blessings** to the family, which will **encourage couples** to keep **trying** until they have **twins**.

Example (Increase): The Muslims treasure their **extended family** very much, due to the **communal family spirit**, thus they are encouraged to have more children.

Explanation (Increase): Some religions **may ban the use of contraceptives** due to **various reasons**, like **going against “nature’s law”**. As a result, these **religious families** may have **more children** as they are **unable to prevent pregnancies**.

Example (Increase): Christians **ban the use of contraceptives** as it is said to be **going against “nature’s law”**. As a result, Christian families have **more children** as they are **unable to prevent pregnancies**.

Explanation (Increase): Some countries or religions have a preference for males due to them being able to carry on the family lineage. As a

result, these families will have more children in hopes of giving birth to a boy.

Example (Increase): Asians tend to have a preference for males because they carry on the family name. The birth rate in China before the one-child policy was exceptionally high, at 6.4 per woman in 1965.

4. Increased Accessibility and Availability of Contraceptives (Hinders Population Growth)

Explanation: The increased accessibility of contraceptives allow more people to use contraceptives, which will reduce the number of unwanted pregnancies and thus the number of accidental births. This causes a lower fertility rate and birth rate, which hinders population growth.

Example: During the 1960s in China, the government started giving out free contraceptives as part of the One-Child Policy. This reduced the number of unwanted pregnancies and births in China, hence reducing the fertility rate from 6.4 children per woman in 1965 to 1.6 children per woman in 2000.

5. Better Education (Hinders Population Growth)

Explanation: Many educated couples believe that education is the key to their child's success. However the high education fees pressure these couples to have fewer children, so they can afford the education fees for every child. This results in lower fertility and birth rate, which hinders population growth.

Example: In 1990, the education costs in Hong Kong was one of the highest in the world. This caused the population pyramid to change from a large-base pyramid to a beehive shape. The fertility rate in Hong Kong also dropped from 3.46 per woman in 1970 to 1.27 children per woman in 1990.

Explanation: More educated women tend to have children later and have fewer children. They tend to spend more time working to earn money to support their family.

Example: Japan, which has a 100% primary school enrollment, has a low birth rate of 1.3 children per woman.

6. Evaluation

Government policies are the most significant factor in influencing natural population increase as they can be implemented anytime. Regardless of country and culture

Overpopulation

Overpopulation refers to when a large number of people in an area relative to the number of resources available, such that there are not enough resources to accommodate the population. (usually developing countries)

Causes of Overpopulation

1. High birth rates

Explanation: Many uneducated people do not know how to use contraceptives, which will cause many unwanted pregnancies, and they are not educated about family planning. Some countries or religions also do not allow the use of contraceptives. In other countries, children are a valued source of labour. This increases the birth rate, thus increasing the population.

Example: Eritrea has a low primary school enrolment of 35.7%, and has a high birth rate of 1.6 children per woman.

Example: China before the one-child policy was a poor country, and agriculture was one of the only sources of income for most poor families. Children were considered valuable sources of labour so more children determined more economic benefit and thus resulting in high birth rates.

2. Immigration

Explanation: Immigration occurs when foreigners migrate to a country through unfavourable conditions in their homelands like war and diseases called push factors and favourable conditions in the target country like constant warfare and job opportunities called pull factors. These people settle down in another country and add to the population there, regardless of whether they have a family there or are alone.

Example: The United States of America's population increased from 152 million people in 1950 to 270 million people in 2002, a 78% increase in population, due to the huge number of immigrants who were attracted by America's large population.

Example: In Singapore, 60% of the people are local citizens while 40% are

foreigners, because of Singapore's liberal attitude towards immigration in 1990.
(Now causes social issues like their housing problems)

3. Need for Manpower

Explanation: In countries that have huge amounts of labour work, such as farming and agriculture, the people will tend to have more children so that the children can help out on farms and increase manpower.

Example: In China, people from lower economic classes had more children so that their children can help them earn a living.

4. Technological Advancements in Fertility Treatment

Explanation: Technological advancements have enabled infertile couples to undergo fertility treatment processes to conceive their baby.

Example: 40 to 45 % of women under 35 years old in the United States in 2014 underwent vitro fertility treatment, causing them to be pregnant, hence increasing the fertility rate and birth rate.

Impacts of Overpopulation

1. High Unemployment Rates

Explanation: Overpopulation leads to more competition for jobs, which results in more people being unemployed. This will cause unemployed people to resort to crime in order to survive.

Example: Afghanistan has one of the highest unemployment rates of 35.1%, causing Afghanistan people to suffer from poverty and lack of housing due to unemployment.

2. Insufficient Resources

Exclamation: The large population means that there are insufficient resources like food and clean water to accommodate the population. This will cause more people to die of thirst and disease, increasing the death rate.

Example: China has to feed 22% of the global population with only 10% of the global arable land which led to many people starving and feeling sick.

Strategies for Overpopulation

1. Reducing the High Birth Rate

Explanation: Overpopulated countries can educate their people on family planning through family planning programs and the benefits of birth control.

Example: In India, many family planning clinics have been set up to educate people about family planning.

Limitation: Some families might not listen to the advice provided by family planning clinics and continue having more children which will increase the birth rate.

2. Reducing Unemployment

Explanation: Overpopulated countries can try to expand the economy and seek other companies and investors to set up business in the country, which will offer more job opportunities, thereby reducing unemployment rates. Training schools can also be set up to equip people with the necessary skills to get a job.

Example: Singapore has a Workforce Development Agency, which helps to equip unemployed Singaporeans with the skills to get a job.

Limitation: Some companies might not be willing to invest in less developed countries' economies due to bad reputations such as low security.

Underpopulation

Underpopulation occurs when there are not enough people to maximise the use of resources in the county.

Causes of Underpopulation

1. Absence of pro-natal policies

Explanation: The lack of pro-natal policies, such as helping to reduce the costs of having a child, will discourage people from having children, decreasing the fertility and birth rate.

Example: In Italy, there are no pro-natal policies such as subsidies for housing to curb the skyrocketing rent and housing prices, thus many people cannot afford to raise a child.

2. Education

Explanation: A higher level of education means that children are taught about family and birth control at a young age, which discourages them from having many children, thus reducing fertility and birth rate, decreasing the population.

Example: Italians receive compulsory education from 6 to 16 years old and are taught about family planning and birth control methods.

3. Changing attitudes towards women joining the workforce

Explanation: Women joining the workforce is now seen as more conventional, encouraging more women to get a job. This means that women have to juggle work time and do not have time to have a child.

Example: In Italy, many women prioritize jobs over children, so they will spend more time on their jobs than having a child, which decreases the birth rate.

Impacts of Underpopulation

1. Lack of Manpower

Explanation: Underpopulation means that there are not enough people to take up the jobs needed for the country to run, reducing the country's productivity.

Example: Japan's low birth rate has caused it to be lacking in manpower in various sectors such as construction and elderly care, which reduces Japan's productivity.

2. Closure of Schools

Explanation: Underpopulation will cause fewer students in each school, which does not maximise the efficiency of the schools, so the government will close some schools to reduce the cost of raising children.

Example: Thwaites announced in September 2015 that it was going to close approximately 18 schools that had a low number of students.

Strategies for Underpopulation

1. Increasing Technology Opportunities

Explanation: Investing in the technology sector allows the economy to become more digitally developed, thus increasing the number of job opportunities for the locals and foreigners, attracting more people to settle down in the country.

Example: The Digital Serbian Initiative invests in local startups and encourages foreign companies to move into Serbia, with the aim of creating a digitally competitive economy in Serbia.

Limitation: This strategy may be expensive to implement especially in poorer countries that do not have adequate technology or infrastructure.

2. Investing in Local Development

Explanation: Making use of the active cultural scenes while developing the infrastructure can help make small towns and rural areas of a country more attractive to live in.

Example: During the second half of the 20th century, many immigrants moved and settled down in Singapore due to its cultural diversity and advanced infrastructure such as HDB flats, which provided housing for many people.

Limitation: This strategy requires political stability where the government is not corrupted, so that money can be used for local development instead of for the government's personal use.

Ageing Population

Causes of Aging Population

1. High Living Costs

Explanation: Most of the time, the monetary incentives provided by the government are not enough to cover the costs of having a child. This causes fewer people to have children and reduces the birth rate, therefore there are fewer people in the working class to support the elderly, increasing the country's dependency ratio.

Example: In Singapore, the Baby Bonus policy gives people \$8000 for their 1st and 2nd baby born. However, it is not enough to cover the high costs of housing and education for the children, thus Singapore has a birth rate of 1.14 in 2018.

Impacts on Aging Population

1. Increase in Dependency Ratio

Explanation: Due to the low birth rate, there will be a larger proportion of the ageing population in the workforce population. Retired people in countries with an ageing population will not have to pay tax as they are not working anymore, so the working population will have to pay more tax.

Example: Japan has a low birth rate of 7.397 children per 1000 people in 2019 and has a high dependency ratio of 68.28% in 2019.

2. Lack of Manpower

Explanation: An ageing population requires more resources to support, as they can get injured easily. Thus a larger workforce is required to support the ageing population. However, the birth rates in such countries are low, hence there are not enough people joining the workforce to support the elderly, causing a lack of manpower.

Example: In Singapore 1997, about 10 people were supporting 1 elderly aged 65 and above, but in Singapore 2030, it is estimated that there will be 3 people supporting 1 elderly aged 65 and above, as the elderly population will make up 18% of the total population in Singapore in 2020.

Strategies for Aging Population

1. Increase Retirement Age

Explanation: This increases the number of economically active people, especially the older people so that they are less elderly dependent on the younger working force to support them.

Example: In 2020, China has announced that it has plans to increase its retirement age to 60 for men and 55 for women, to cope with the ageing population in China.

Limitation: Older people who work in physically taxing jobs may overwork themselves and possibly injure themselves, resulting in more elderly dying from their injuries, thus increasing the death rate.

2. Promote Immigration through Incentives

Explanation: Incentives such as scholarships can encourage foreign talents to work in the country, increasing the number of economically active people. This means that there are more people in the workforce to support the elderly, reducing the dependency ratio.

Example: In Singapore, about 31700 foreigners received their Permanent Resident status each year over the past 5 years, with 22100 new citizens every year in the past 5 years too.

Limitation: Immigration of foreign talents will cause more competition for jobs, which will result in locals being unable to get a job.

3. Pro-natal Policies

Explanation: Governments can **implement policies** to **encourage people** to have **more babies in Singapore**, such as subsidies for housing fees, lower taxes and priority for education.

Example: In 2001, the Singapore government rolled out the Baby Bonus that gives families \$8000 for the first two children and \$10000 for the 3rd and subsequent children to subsidise the cost of having children, encouraging more people to have children.

Limitations: There will be some couples who are not motivated by these incentives, which will reduce the number the children born

Population Graph

Triangular Pyramidal Shape

Populations that are young and growing, which are usually the developing countries

- **Broad base (high birth rate)**, with a **large percentage of the population** being in the younger age groups
- **Rapid narrowing towards the top** (high death rate)
- **Shorter height** (low life expectancy)

Beehive-shape / Rocket-shape

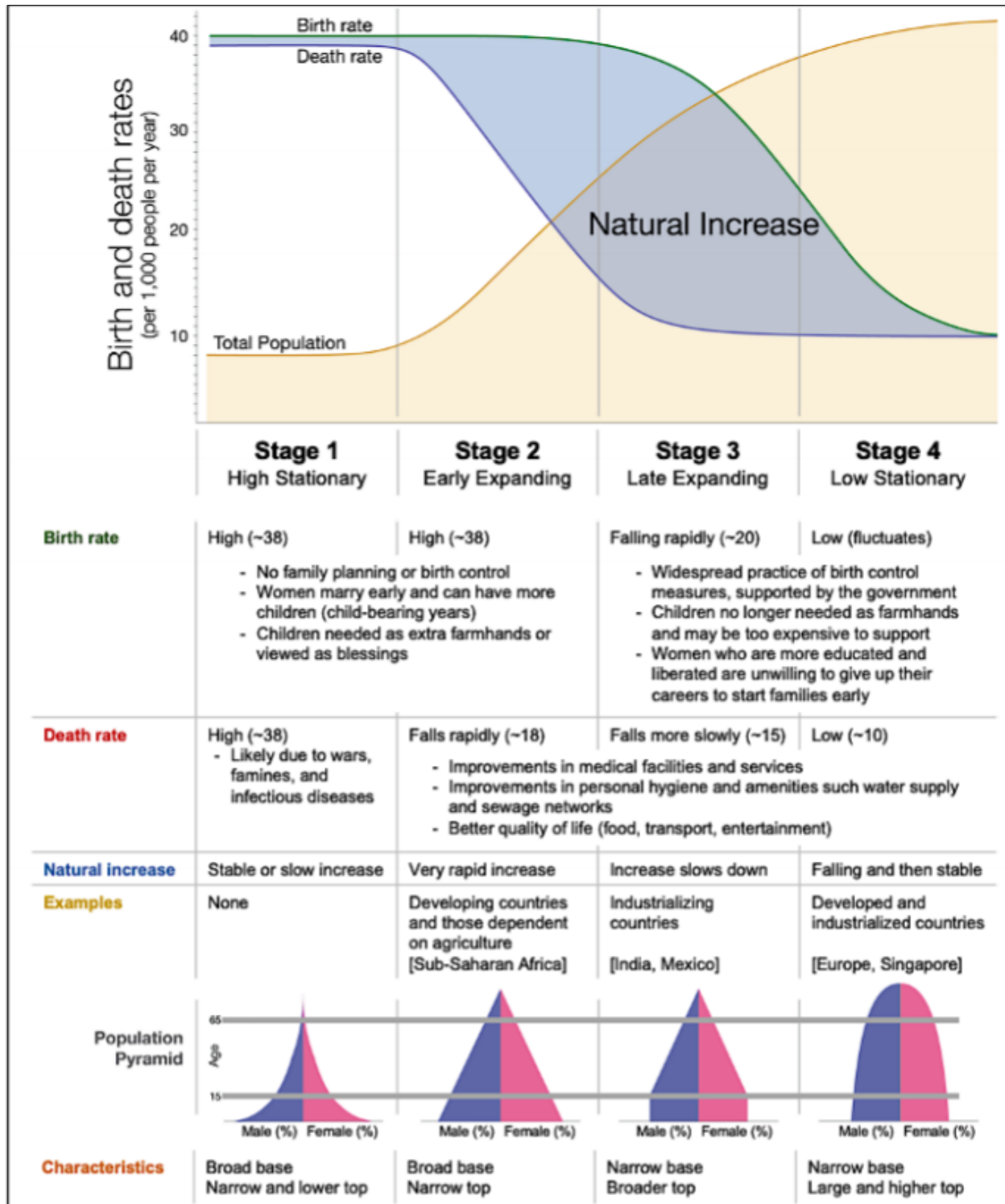
Populations that are **elderly and shrinking**, which are usually countries with **higher levels of development**

- **Narrower base**, with young dependents forming less than 30% of the total population
- **Wide or bulging middle section**, with most of the population economically-active
- **Gradual tapering towards the top** (low death rate and high life expectancy)

Rectangular shape

Populations that are not growing, which are usually the developed countries

- **Very narrow base** (very low birth rate)
- **Roughly equal percentages across age groups**
- **Tapering occurs** only near the top of the pyramid (very low death rate)



Housing Shortage

Causes of Housing Shortage

1. Rapid Population Growth

Explanation: Rapid population growth causes an increase in housing demand, which puts more pressure on the housing supply. When the housing supply is unable to meet the increasing housing demand, more people will not have a home to live in, resulting in them being homeless.

Example: In present day Nigeria, there is a housing shortage as the population is growing too fast. The housing supply board of Nigeria is unable to meet up with the increasing housing demand in Nigeria. This results in Nigeria having the highest number of homeless people globally of an estimate of 24.4 million homeless people in Nigeria, from a study done by ODA in the global development scheme 2023. There is a lack of housing for everyone, making many people in Nigeria homeless.

2. Rural-Urban Migration

Explanation: Migration refers to the movement of people from one area to another. Rural-urban migration refers to the movement of people from rural areas into cities to live and work. People move to cities in search of a better life. They are attracted by the wider range of economic activities compared to rural areas. However, there may be insufficient jobs to cater to the huge number of migrants. Migrants may also lack the skill required for jobs available in the cities. Hence, they have difficulty getting jobs and are not able to afford housing.

Example: Many people in rural areas of Brazil are attracted by work opportunities in Sao Paulo. However, those who are unable to get a job and buy a house have to live in slums.

Example: In 1950, a third of the world's population lived in urban areas. In 2007, there were more people living in cities than in rural areas for the first time in history. By 2030, the urban population is estimated to increase to 5 billion.

Example: According to data from the Office for National Statistics, in the United Kingdom, babies born to foreign-born mothers accounted for over a quarter of the total births in 2012-2013, while births in UK-born mothers remained the same. This shows the extent of the rural-urban migration.

3. High Birth Rates

Explanation: Some cities experience high rates of natural increase due to high birth rates and declining death rates. Cities have a large portion of people who are in their 30s and 20s (due to rural-urban migration) who are likely to

start families. This leads to the **above-average of fertility** which contributes to the **high increase in cities**.

Example: London's population increased rapidly by 100k from 2012 to 2013, with high birth and migration rates, and there were 86000 more births than deaths.

Example: 30% of people lived in cities in 1950, increasing to 54% in 2020, expected to increase to 70% in 2050.

4. Competing Land Use

Explanation: There are many **uses for land**, such as **residential, commercial, industrial and recreational uses**. This means that there is **less land for countries to build residential areas** on.

Example: Singapore has a lot of land needs and only assigns 17% of its land to housing its population, which might create housing shortages in future.

Example: Environmental-protection groups oppose the cutting of trees to make way for residential use.

5. Limited Land Supply

Explanation: Some countries have limited amounts of land that are suitable for building housing. This is dependent on the physical features of a country such as flatlands, which are suitable for building housing.

Example: Hong Kong is a small island surrounded by water. As it is also surrounded by countries like China and Taiwan, they are only able to reclaim a limited amount of land. Thus, it does not have enough land to build enough housing for its population.

Example: Singapore has 714 km-sq of land and Hong Kong has 1,104km-sq of land.

Impacts of Housing Shortage

1. Homelessness

Explanation: When there is a lack of houses or a high demand for houses, some people end up being homeless.

Example: There are up to 610,000 people homeless in the US every night.

2. Water Pollution

Explanation: Rivers **near the slums become polluted** due to **untreated sewage being disposed of in the water bodies**. Contaminants from the rivers may also seep into the ground through **infiltration** and affect other **water bodies like wells**.

Example: Guanabara Bay in Brazil experiences pollution due to disposal of untreated sewage into the bay from nearby slums and squatter settlements. The bay is now filled with floating rubbish and polluted waters.

3. Land Pollution

Explanation: In slums, there are no proper rubbish disposal systems, and hence rubbish is improperly disposed of, like being thrown into the drains. The drains get clogged, creating stagnant water bodies which are mosquito breeding grounds. The mosquitos will end up spreading diseases like malaria and dengue to the slum dwellers. The rubbish is also unsightly and produces a pungent smell.

Example: The Smokey Mountain in the Philippines has 30,000 people living in it, and the name of the slum is explained by the smoke emitted from burning the garbage

4. Lack of Safety

Explanation: Slums are made out of flimsy and flammable materials such as wood, which provides little protection for the slum dwellers. Houses may also be built on unsuitable land areas which may be low-lying or on steep slopes, making them vulnerable to natural disasters. This makes slum dwellers vulnerable to fires and natural disasters like landslides.

Example: In April 2010, 256 people were killed after a house collapsed down a hill slope in a favela in Brazil.

Example: A fire in a slum in Mumbai destroyed 150 houses and killed 6 people.

5. Lack of Security

Explanation: In slums, the houses were built illegally in the first place and can be demolished by the government anytime, leaving the slum dwellers living in fear of conviction.

Example: 40000 slum dwellers in a slum in Bangladesh protested because they were ordered to leave their slums which were about to be destroyed. The government only stopped the protests by temporarily stopping the eviction of residents.

Strategies for Housing Shortage

1. Slum Upgrading

Explanation: Slum upgrading refers to improving slums so that they are sturdier and have basic services like clean water and electricity. The residents have to be housed somewhere temporarily while the slums are being upgraded.

Example: For example, the slum upgrading in Nairobi, Kenya by UN-Habitat. It is a project that aims to provide residents with the rights to build on the existing land and improve housing and infrastructure. The residents were moved to public housing and the vacated slums were upgraded.

Limitation: Some residents may find it difficult to pay for the temporary housing units if not given financial assistance by the government.

2. Slum Upgrading (Self-help Schemes)

Explanation: This method is similar to Slum Upgrading, but instead they are done through self-help schemes, where the government and organizations provide supplies while the slum dwellers upgrade their slums by themselves. This reduces the construction cost as no workers are required to be hired. Training needs to be provided to equip residents with the skills to build their homes so the residents can build their houses at their own pace.

Example: The Rocinha Project in Brazil aims to upgrade slums in Rocinha. Most of the wooden houses have been replaced with sturdier concrete houses. 75 per cent of houses have electricity compared to 30 per cent in the past. Rooftop water tanks and piped water systems were added to provide clean water. Proper sanitation facilities such as toilets and a proper sewage system were also built.

Limitation: The rate of construction might also be slower as residents can only build the houses during their free time, like after their working times.

3. Public Housing

Explanation: Public housing refers to government efforts to provide housing that have basic services that cater to people with different needs such as the elderly and the disabled. Housing can also be subsidised by the government to make it affordable for the general population.

Example: In the 1960s, Singapore set up the Housing Development Board to clear the slums in the country and to build affordable public housing for the general Singapore population. After the Bukit Ho Swee Fire in 1961 that destroyed many homes, the government managed to relocate everyone successfully, winning over the public's trust. In 2013, more than 80% of Singaporeans live in HDB flats.

Limitation: However, it is challenging to monitor and evaluate all the public housing projects, especially in big countries.

HDB Housing

As of 2013, over 80% of the Singaporean population live in HDB flats.

HDB Towns often consist of the following:

Town Centre

Several Neighbourhood Centres
Amenities (Educational, Institutional and Recreational)

Affordability

Singapore has a Central Provident Fund that subsidised housing costs for Singaporeans. Singaporeans have to contribute a portion of their salary to the CPF every month, and their employers must also contribute to their employees' CPFs. The CPF money can be withdrawn for special cases, such as retirement and purchasing a house.

Racial Harmony

Singapore introduced the Ethnic Integration Policy in 1989. The policy set limits on the percentages of each race living in a flat. For example, Chinese people can only occupy 83% of every flat. Thus, if the Chinese quota is fulfilled but there are empty units for sale, Chinese cannot buy them. The policy is meant to encourage racial mixing and prevent a sole race from occupying the entire HDB. However, this makes flats sold to the Chinese more expensive as there is a greater demand for them.

Sense of Belonging

The meaning and value people attach to a place arise from people's interactions with the place. It could be the pleasant experiences or memories of the place or a unique physical feature of it that makes it stand out, allowing people to remember it better.

Example: Dragon Playground in Toa Payoh

Example: Spiralling staircase in Tiong Bahru

Causes of Traffic Congestions

1. Commuting Between Work and Residential Areas

Explanation: People work and live in different parts of the cities, resulting in the need to travel from one place to another to work or back home. This therefore contributes to large volumes of traffic during peak hours, as the people are trying to get to work or return back home.

Example: In 2013, the average number of cars entering the CBD in Singapore daily was 290,000. In many cities with high car ownership, you would see many cars entering and leaving the CBD resulting in traffic congestion.

2. Poor Provision of Public Transport

Explanation: Provision of transport services refers to the services provided to transport people and goods from one place to another. Poor provision of transport services means that a city has a small fleet of buses and trains and does not have enough of them to carry commuters. This often leads to overcrowded buses and trains, buses not arriving on time and train breakdowns. This discourages people from taking public transport and they would instead take private transport.

Example: In Mumbai, India, trains are always filled to many times their capacities and buses are filled with passengers and they are always caught in traffic. Hence, people opt to buy cars instead for a more pleasant commute.

3. Inadequate Transport Infrastructure

Explanation: When more people take private transportations, there may be too many vehicles to handle as they have a lack of carrying capacity. There may also be poorly connected transport networks that cause more congestion. There will be a lack of alternative routes, resulting in the build up of traffic during peak hours or in one-off events like accidents and road works.

Example: Expressways with few exits result in vehicles exiting from the same exit, congesting at the same exit.

4. Provision of Goods and Services

Explanation: Goods are required to be transported to city dwellers and people in rural areas. Vehicles are needed to transport the goods from place to place and buy the goods from shops and stores.

5. One-Off Events (Weather/Accidents etc.)

Explanation: Weather is one of the causes of traffic congestion. Bad weather includes heavy downpours, snow, hail, fog or haze. This causes reduced visibility and slippery roads. This then contributes to slow traffic speed and accident frequency and severity. High traffic and slow traffic speed, cause traffic jams and accidents and reduces the number of lanes available. Accidents, road works etc. may also block roads and direct traffic to the same road, causing traffic congestion as people from different roads to gather on the same road.

Example: For example, 30 cars collided on a bridge in Montana, United States in a major winter weather accident. It is the most severe winter accident and car pileup in nearly 20 years.

6. Large population

Explanation: High birth rates and low death rates contribute to a large population. In many cities, there is a large population of people in their 20s and 30s, ready to start a family. This contributes to high fertility rates and high natural increases. **Example:** According to the Office of National Statistics, London's population increased by 100.1k from 2012 to 2013, due to high birth rates and high migration rates. London also recorded 86,000 more births than deaths. Rural-urban migration also results in a large population. Rural-urban migration refers to the movement of people from rural areas in a country to the cities to live and work, due to better work opportunities. With a larger population, more people would be commuting to and from school, work or recreation, resulting in more people commuting and more traffic congestion.

Impacts of Traffic Congestion

1. Reduced Productivity

Explanation: When people are trapped in traffic congestion, they are stuck in their vehicles and wasting time instead of doing productivity like working, which can bring economic benefits. They spend a longer time in their cars rather than working. Traffic congestion also slows down the rates at which goods are being transported, reducing the economic growth of the country. All of this delay will cause the cost of production to increase and therefore might lead to higher inflation in the country.

Example: An average of 79 hours a month are wasted in traffic congestion in London.

2. Stress on Physical and Mental Health

Explanation: People caught in traffic often face stress and anxiety, negatively impacting their physical and mental health. Long travelling hours cause fatigue. This can lead to drivers losing their concentration or falling asleep which can cause accidents and even death. Traffic congestion also poses another serious health hazard. It is a source of exhaust fumes from idling vehicles caught in traffic. The exhausts contain carbon monoxide, carbon dioxide and particulate matter. These particulates are so small that they can penetrate deep into the lung tissue, causing inflammation. Long term exposure to these fumes has been linked to several health issues including lung infections and asthma.

3. Air Pollution

Explanation: When vehicles are trapped in traffic congestion, they will produce exhaust fumes. Vehicles that remain stationary during a congestion burn fuel to keep the engine and air conditioning working. More fuel is burned in start-stop traffic when the car accelerates and brakes.

Example: In the US, 50% of air pollution is caused by vehicles. The greenhouse gases produced by cars cause global warming as they are trapped in the ozone layer.

4. Noise Pollution

Explanation: Noise pollution occurs when there are excessive harmful noises that can affect human and animal life. Noise pollution affects human health and disrupts their activities at work, home or school. It can disturb sleep, cause cardiovascular and psychophysical effects, reduce productivity, provoke annoyance responses and changes in social behaviour. Hence, as a result, reduces the overall economic productivity of the country.

Example: Road traffic is the largest cause of noise pollution in the UK, disturbing more than 12 million people.

Example: For example, in Kolkata India, noise pollution is a prevalent issue because of the incessant honking from the drivers.

The solution to Traffic Congestion

Making Public Transport a Choice Mode

1. Bus lane scheme

Explanation: Bus lanes will allow buses to move quickly so buses will not be held up during traffic congestion. On top of that buses will arrive on schedule more often during peak hours. This will make travelling by bus more appealing.

Example: For instance, in Singapore, there are bus lanes in major parts of the city, such as Orchard Road and Bencoolen Road. These bus lanes are timed, which deactivate at certain times in the day, such as during midnight.

Limitation: The success of bus lane schemes depends on the compliance of drivers. Bus lanes will decrease the number of lanes normal cars can travel on. This will cause more traffic congestion.

2. Integrated Public Transport System

Explanation: An integrated public transport system connects various modes of transportation such that it functions as a whole. Building an integrated public

transport system is an important first step in encouraging people to use public transport.

Example: For example, all public transport modes in Tokyo can be paid for using a rechargeable contactless smart card.

Limitation: It is very difficult to plan and build such a system, and maintain it when adding rail lines and bus routes.

3. Increasing capacity and frequency of services

Explanation: Buses and trains should be upgraded to fit more commuters for more effective transportation. Implementation of better timings and schedules of the public transport arrival and departure should also be made.

Example: In Curitiba; Brazil, the bus rapid transit system has been successful in increasing the capacity of its bus systems. There are dedicated bus lanes for articulated buses, which are divided into 3 sections. Since these buses can carry more passengers, the BRT can transport nearly 2 million passengers a day.

Example: In Singapore, the Bus Services Enhancement programme in 2012 improved the frequency of bus arrivals and departures by working with the bus operators to cut down on commuter wait time.

Limitation: It is very costly to buy new buses and trains.

4. Expansion of Rail Networks

Explanation: Laying more train tracks and building more stations allow more places to be accessed by trains and make it a more attractive mode of transportation.

Example: Singapore's Land Transport Master Plan allows 8 in 10 homes to access MRT stations within a walking distance by 2030.

Managing Road Usage

1. Road Pricing

Explanation: Road pricing refers to the traffic management measure that charges drivers when they use roads. The number and location of gantries have to be determined. Drivers usually have to pay more during peak hours to discourage the use of certain roads.

Example: Stockholm, the capital of Sweden, imposed a road pricing scheme. The Stockholm Congestion Tax applies to vehicles entering and leaving the CBD. Cameras at control points capture trips made by each vehicle. A bill is sent to the vehicle owner to inform him or her of the amount to pay.

Example: ERP system in Singapore reduces traffic volumes on the roads as people have to pay to enter and it only operates during peak hours, diverting traffic elsewhere.

Limitation: Traffic diverted to other roads might lead to congestion elsewhere.

Pros (For Conclusion):

- Easy to implement and carry out (unlike rail networks and public transport systems)
- Does not need extensive planning (unlike bus lane schemes and public transport systems)
- Not costly as government can collect money from drivers going under ERP (unlike rail networks)

2. Increased Parking Fees

Explanation: This refers to increasing the cost of parking, especially, to and from the CBD, which will deter people from owning private vehicles. This will greatly increase the cost of owning a private vehicle and using it as car parks are used when travelling to a mall, to work and eateries. People will choose other modes of transportation such as public transport and carpooling, which refers to a group of people travelling together to work, school or other locations. It can reduce the number of cars on the road, solving traffic congestion.

Example: Singapore's CBD buildings tend to have parking rates that are 6 times that of normal parking rates during the day, while public parking areas are 2 times the normal parking rates to discourage parking in the CBD during the day.

Limitation: Some people would park at illegal places such as roads with double yellow lines, in front of people's houses. This may cause congestion and inconvenience to others who use the roads.

Pros (For Conclusion):

- Not expensive to implement (opposite of public transport system/rail networks, which is costly to build)
- Will not cause damage to the environment or inconvenience to residents (unlike railway networks, which will cut through residential areas)
- Convenient to implement (unlike building cycling tracks)

3. Enhanced Traffic Monitoring

Explanation: Enhanced Traffic Monitoring includes alerting drivers of traffic congestion on a road, allowing them to take a detour, detecting vehicles and pedestrians at major junctions, and informing them of green light timings. Traffic lights are coordinated so drivers can smoothly travel without stopping. Overall reduces traffic congestion, spreading vehicles to different roads.

Example: The Expressway Monitoring and Advisory Sudetenland (EMAS). When vehicles break down, live information will be made available to drivers on the roads about the situation.

Limitation: It only encourages drivers to drive elsewhere, and does not decrease the number of cars.

Pros (For Conclusion):

- Efficient as sensors are accurate (unlike bus scheme, which is dependent on the compliance of drivers)
- Does not affect residents when implemented (unlike building rail networks, which cuts through residential areas)
- Easy to implement in different places across a country (unlike public transport systems, which requires extensive planning)

Other Measures

1. Telecommuting

Explanation: Telecommuting is when workers work from home and avoid travelling to offices. This eliminates the need to commute to the office and back, thus there will be fewer vehicles on the road and less traffic congestion.

~~**Example:** When 3.9 million employees work from home at least half time, they reduce greenhouse gas emissions by the equivalent of taking more than 600,000 cars off the road for an entire year. Considering that 1 in 4 Americans are expected to work remotely in 2021 (approximately 39 million), that number jumps to 6,000,000 cars. With an estimated 13 to 27 million people working from home in the coming years, remote work could reduce commuting miles by 70 to 140 billion every year.~~

Limitation: The employee has less personal contact with managers and coworkers, hindering communication. It can be more difficult for managers to supervise someone working from home. The worker may also have more disruptions at home, resulting in reduced productivity.

2. Encourage Cycling

Explanation: Cycling is an environmentally friendly mode of transport. By encouraging cycling, more people will cycle instead of taking private transport, reducing traffic congestion or pollution. Cycling is a very flexible and mobile mode of transport. It is eco-friendly and sustainable.

Example: In Denmark, the government has built a large network of cycling lanes and numerous bicycle parking lots, making cycling very convenient. According to 2013 statistics by the city of Copenhagen, 52% of the people commute via cycling.

Limitation: It may be dangerous for cyclists as they are very near to motor vehicles. Some cities may not be suited for cyclists too because of their layout.

Structured Essay:

Give in 3 points to the essay,

For a four marks question, we give we 2 examples.

- 1) We make a point (**Strategy and reason**)
- 2) **Explain and elaborate (How and why)** : What does the given factor affect
- 3) Then we give 2 examples.

Population Pyramid: