

# DP IB Geography: SL



Your notes

## Future Health & Food Security & Sustainability

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## Possible Solutions to Food Insecurity

# Possible Solutions to Food Insecurity

## Food Insecurity

- **Food insecurity** is the lack of access to nutritious and affordable food
- There is enough food for everyone on the planet, however, consumption is uneven
- Many people, particularly in lower-income countries, suffer from **food deficits** and food insecurity
- Roughly 783 million people are suffering from severe hunger
- In more developed countries, there is often a **food surplus** and large amounts of **food waste**

## Possible Solutions to Food Insecurity

### Economic and agricultural solutions

- Those working in government could provide more **investment** in agriculture
  - Investments boost the agricultural economy, modernise agricultural systems, and support those in poverty
  - This reduces food insecurity
- **Microfinance loans** support farmers in investing in technologies or other methods to boost their productivity
- Ensure that land is used to **grow food crops** for humans, instead of cash crops for biofuels or animal fodder
- Moving away from subsistence farming, and adopting **commercial agriculture** to improve incomes and boost production

### Political solutions

- Countries or organisations send **food aid** to those in need during war or after a natural disaster
  - Natural disasters and warfare can result in food shortages or even **famine**
  - **Alleviates** governments so they can focus on infrastructure repairs or other vital tasks
- **Free Trade:**
  - Reductions in trade limitations make it easier for food exports and imports
  - Free trade removes **import tariffs** which lowers food cost



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- Allows **agricultural technologies** and **knowledge** to flow more easily, leading to increased productivity
- Improves the **variety** of foods that countries may have access to
- Boosts economic growth
- **Examples** of Free Trade agreements:
  - North Atlantic Free Trade Area (NAFTA)
  - Canada-European Union Comprehensive Economic and Trade Agreement (CETA)
  - UK-Australia Free Trade Agreement/UK-New Zealand Free Trade Agreement
- **Fair Trade:**
  - Reduces the risk of farmers being affected by changing prices, providing them with **stable incomes**
  - Provides farmers with fair pay
  - Allows farmers to grow food for export and **self-sufficiency**
  - Provides **food loans** or **fertilisers** during low productive seasons
  - Support of agricultural mechanisation e.g. farming equipment
- **Land Reform:**
  - **Land tenure** and **tenure insecurity** have a huge impact on food insecurity
  - Farmers are more likely to invest in land that is theirs
  - Provides farmers with more access to financial support
  - Better ownership of land can ensure crops are grown not just for exports or cash crops
  - Giving women more land ownership rights can improve productivity
- **Ending warfare**
  - Conflict can cause food insecurity e.g:
    - Crop damage
    - Weaponisation of food
    - Aid blockades
  - Many conflicts have resulted in or contributed to **famine**
  - Promoting **peace** and **ending conflict** is vital for ending food insecurity

- Creating or improving **government policies** that focus on reducing food insecurity and boosting production
  - The UK adopted the Agriculture Act and Fisheries Act to support producers in their transition to sustainability, to ensure food security for the future



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## Technological solutions

- **The Green Revolution:**
  - Using **Irrigation systems** during dry seasons and in arid climates
  - Using **high-yielding seeds** to increase yield
  - Using **pesticides** and **fertilisers** to reduce pests and increase yield
- **The New Green Revolution:**
  - Crops which can withstand **droughts** or high **salinity**
  - Boosting soil production through **crop rotation**
  - **Integrated pest management**
- **Mechanisation** of agriculture
  - Using more machinery like tractors or heavy tools
  - Improving **storage** and **transport** infrastructure
- Moving to contemporary food production
  - Biotechnology e.g. **Genetically Modified Crops** or In Vitro Meat
  - **Vertical Farming** e.g. **hydroponics** and **aeroponics** to grow more food
- **Sustainable agriculture** – to protect the environment, boost food production, support farmers and prepare for climate change
  - **Polyculture** to boost soil fertility or **crop rotation**
  - Solar-powered irrigation
  - Organic produce
  - Integrated pest management
- **Appropriate technology** to boost local production (typically in LICs)
  - Small-scale irrigation pumps and pipes made of plastic
  - **Solar agriculture** uses small greenhouses to grow food even during the winter season

## Social and cultural solutions

- **Educating women** and giving them more rights to improve productivity
- **Reducing food waste:**
  - Encouraging **food donations** to food banks or other charities
  - **Educating** people properly about 'best before' and 'use by' dates
    - Many foods are safe to eat well beyond these dates
  - **Education** about food waste, pre-planning and not cooking in excess
  - Improvements to **transport** and **storage infrastructure** to reduce spoilage waste
  - **Initiatives** and **programmes** to reduce food waste:
    - Food Waste Reduction Alliance Project - working on reducing food waste, donating food and recycling waste/keeping it from landfill
    - Many supermarkets sell 'Wonky Veg' or take part in 'Too Good To Go' offers
    - Some restaurants have a ban on getting rid of food waste e.g. in Austin, Texas



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## Contemporary Approaches to Food Production



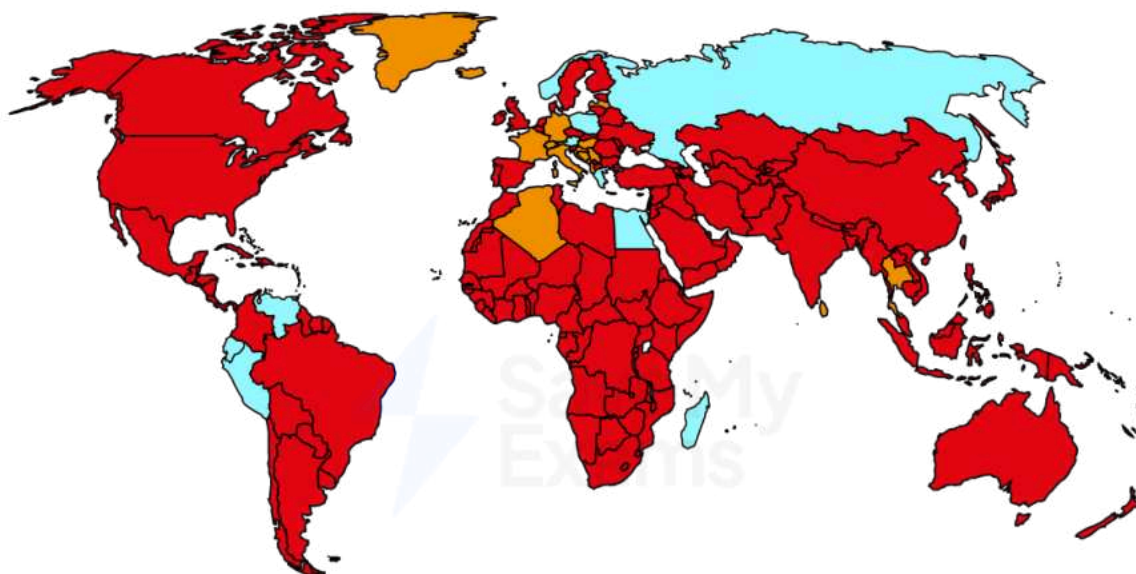
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# Genetically Modified Organisms (GMO)

- **Genetically Modified Organisms** are modifications of genetic material
  - Genetic modification involves adjusting DNA to create new variations of plants and animals
  - New **DNA** is inserted into other organisms or shared between organisms to improve productivity, flavour or nutritional value
  - Through **biotechnology**, we can now alter the structure of organisms
- Normal methods for food production may be unsuccessful or cause certain issues
  - For example, pests and diseases may impact successful crop growth
  - Genetic modification can increase pest and disease resistance
- **GM methods include:**
  - Increasing the nutrition density of a crop
  - Disease resistance
  - Pest resistance
  - Growth hormones
  - Increasing shelf life and reducing spoilage time
  - Taste improvement
- **Examples** of GM foods include:
  - Pink Pineapple
  - Tomatoes
  - Salmon
  - Cotton
  - Summer squash
- It is a **heavily debated** food production method
- Many countries across the world ban or have restrictions on GMO products



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KEY:	
<span style="color: red;">■</span>	NO RESTRICTIONS
<span style="color: orange;">■</span>	SOME RESTRICTIONS
<span style="color: cyan;">■</span>	RESTRICTED OR BANNED

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**Countries with GMO restrictions in 2016**

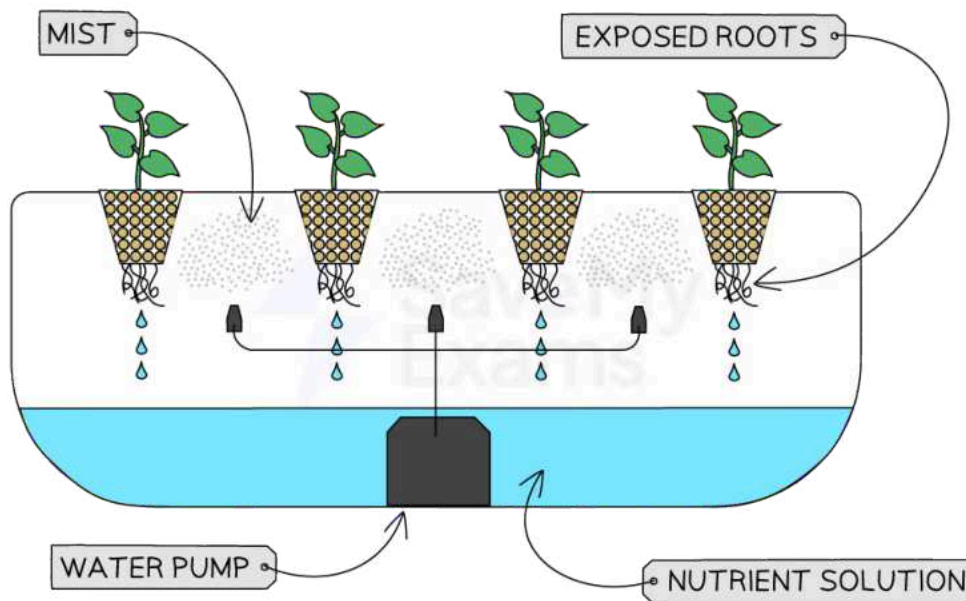
## Vertical Farming

- **Vertical farming** is the growth of crops vertically (upwards), in layers
- Usually occurs in large buildings, greenhouses or shipping containers to reduce land use
- Produces **more food** for the land available
- Examples include:
  - **Hydroponics** - growing plants without soil, using mineral nutrient-rich water instead
  - **Aquaponics** - using **aquaculture** with hydroponics. Waste from marine animals nourishes the water used for crop growth
  - **Aeroponics** - crops hang in the air, with their roots exposed. A nutrient-rich condensed mist waters the plants



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- Vertical farming is seen in countries across the world, from Germany and the Netherlands to Japan and Singapore
- Examples of vertically farmed foods include:
  - Lettuce, kale, broccoli, garlic
  - Strawberries
  - Tree seedlings
  - Plants used for medicine
  - Fish



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**An Aeroponic system**

## In Vitro Meat

- In Vitro Meat** is synthetic meat
- It is produced by **removing cells** from live animals and placing them into a culture liquid full of nutrients, where they will grow to produce tissue
- Natural (or synthetic) materials, e.g. gelatine, are then used to help shape the tissue into the recognisable 'meat'
- It is highly **restricted** or **banned** in some countries



- Only the United States and Singapore currently sell In Vitro Meat

## Advantages of contemporary approaches



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Contemporary approach	Advantages
<p><b>Genetically Modified Organisms</b></p>	<p>Helps to increase the nutrition provided by crops through nutrient fortification</p> <ul style="list-style-type: none"> <li>▪ Rice with high vitamin A density</li> <li>▪ This is useful for LICs with higher levels of undernutrition and nutrition-related diseases</li> </ul> <p>Crops may be drought-resistant</p> <ul style="list-style-type: none"> <li>▪ This supports food growth in countries with arid climates and low water provision</li> </ul> <p>May produce more productive crops and higher yields</p> <ul style="list-style-type: none"> <li>▪ This will lower food prices and support food security</li> </ul> <p>Food lasts longer and won't spoil quickly</p> <p>Pest resistance limits the use of harmful pesticides</p> <p>Can improve flavour and the look of food, e.g. apples which don't brown</p>
<p><b>Vertical farming</b></p>	<p>Doesn't require soil, which is ideal for places with poor soils</p> <p>Can be grown in all sorts of places, from highly urbanised cities to the underground</p> <p>Much more sustainable, using</p> <ul style="list-style-type: none"> <li>▪ Less land</li> <li>▪ Fewer pesticides and fertilisers (and therefore less pollution)</li> <li>▪ Less water</li> <li>▪ Recycled water</li> <li>▪ Less polluting machinery</li> <li>▪ Less transport (reducing <b>food miles</b>)</li> </ul> <p>Saves land for other resources</p>



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	<p>Supporting food security and climate change, as there is less risk of crop damage from flooding or droughts. It is more reliable</p> <p>Aeroponics reduces the amount of labour needed to grow produce</p>
<b>In Vitro Meat</b>	<p>More sustainable - conventional meat production has negative effects on the environment e.g. high water use, land use, greenhouse gas emissions</p> <p>Better for animal welfare than conventional farming (animals don't die)</p> <p>Is productive, with large outputs</p> <p>Better for our health with fortification of nutrients e.g. Omega-3 fatty acids</p> <p>Reduces the need for things like growth hormones</p> <p>Reduces the risk of animals contracting diseases and limits the risk of food poisoning pathogens</p>

## Disadvantages of contemporary approaches

Contemporary approach	Disadvantages
<b>Genetically Modified Organisms</b>	<p>People are still worried about the safety of GMO foods for consumption e.g. allergic reactions or cancer</p> <p>May cause superweeds, which are resistant to certain herbicides</p> <ul style="list-style-type: none"> <li>▪ This increases the use of harmful herbicides</li> </ul> <p>Different restrictions across the world add to people's suspicion</p> <p>Biotechnology giants control production.</p> <ul style="list-style-type: none"> <li>▪ <b>Patents</b> limit what farmers have access to and could ultimately affect food security</li> </ul> <p>May cause biodiversity loss and cross-contamination of GMO genes into other natural organisms</p>
<b>Vertical farming</b>	<p>Needs regular monitoring and knowledge to operate successfully</p> <p>Low labour inputs may result in fewer jobs and the loss of traditional farming jobs</p> <p>Heavily technology dependent</p>



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	<ul style="list-style-type: none"><li>▪ If there is a fault in the system, crop loss will be catastrophic</li></ul> <p>Land in urban areas is expensive, resulting in higher costs</p> <p>The systems use a lot of energy</p>
<b>In Vitro Meat</b>	<p>Many question the ethics of production</p> <p>Can be costly, with technologies and trained staff</p> <ul style="list-style-type: none"><li>▪ This results in higher prices for the consumer</li><li>▪ Low-income countries may not be able to adopt this method</li></ul> <p>Has a different taste from normal meat</p> <p>Uncertainty around the safety of In Vitro Meat e.g. cancer possibilities</p> <p>The culture liquid is sometimes made from animal blood, therefore it isn't necessarily cruelty-free</p> <p>Not really a useful alternative for vegetarians and vegans</p> <p>Could put conventional farmers out of business</p> <p>Increasing people's access to meat may result in people eating more, bringing disease with it</p>



### Examiner Tips and Tricks

Make sure you know the advantages and disadvantages of each contemporary approach to food production. You may be asked to compare the three or with traditional farming techniques!

## Prevention & Treatment of Disease



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# Prevention & Treatment of Disease

## Prevention and treatment

- Healthcare systems differ across the world
  - Some countries focus on **prevention**, whilst others focus on **treatment**
- Preventative Healthcare** involves preventing the disease from manifesting or spreading
  - General avoidance of disease contraction and spread
  - Quick detection of diseases to improve recovery
  - Anticipating disease to stop further development
  - Examples include yearly flu jabs or cancer screenings
- The **advantages** of preventative healthcare include:
  - It helps to spot or diagnose some diseases early e.g. cervical cancer screening
    - This can lead to recovery as diseases haven't progressed
  - It can be cheap and easy to distribute e.g. education and health campaigns
  - It stops the spread of disease before it becomes dangerous
- Curative Healthcare** involves the treatment of a disease post-infection
  - Very effective with the correct resources e.g. hospitals and medical staff
  - Examples include antibiotics or chemotherapy
  - Curative healthcare is more common globally
- The **advantages** of curative healthcare include:
  - Entirely getting rid of a disease or illness instead of just reducing the severity
  - Supports recovery from a disease
- Primary healthcare** combines both prevention and treatment strategies

## Social Marginalization Issues

- Social marginalisation** is the **exclusion** of certain groups in society



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- Marginalised people may not be able to access or afford healthcare
  - This is particularly a problem where healthcare isn't free
- Immigrants may not be able to register themselves with healthcare providers easily
- **Poorer people** are typically more at risk of **Diseases of Poverty**
  - Many **Diseases of Poverty** are preventable diseases e.g. measles or polio
  - Disease prevention is an ideal strategy e.g. vaccinations for measles and polio
- If **education** rates are lower, disease prevention may not be as effective
  - Curative strategies would therefore be a better option

## Government Priorities

- Governments may prioritise curative healthcare
- This may negatively impact 'people who need preventative treatment'
  - Governments could improve by ensuring their focus and priority is on the provision of preventative healthcare for people who need it most
- During **endemics** or **pandemics**, governments must minimise disease spread and develop preventative or curative treatments
- In many cases, the **cost** of health strategies can influence government choices
  - Some treatment options are significantly more expensive than preventative measures
- Governments may analyse how **risky** a disease may be
  - If the effects of the disease are not concerning, cheaper prevention methods may be adopted
  - E.g. there are all sorts of flu strains that come around each year
  - The UK offers regular preventative flu jabs for free or at a low price

## Means of Infection

- The means of infection can affect whether preventative or curative strategies are chosen
- **Communicable diseases** are **contagious** diseases, therefore prevention is vital
  - With curative treatment, millions of people will contract the disease and be at risk of serious health issues or even death, before a cure is found
- **Non-communicable diseases** may also benefit from preventative measures e.g. improving diets can reduce the risk of heart disease or high blood pressure

- However, in much of the developing world, curative strategies already exist for many non-communicable diseases
- If a **new/unknown disease** appeared, curative measures would be the only real option
- If a disease spreads very **quickly**, then it would be too late for preventative measures
- Some diseases in **high quantities** would need **primary healthcare** e.g. malaria
- Prevention of disease could **waste money** e.g. screenings without disease discovery
  - Money could be funnelled into better curative medicine for people already suffering

## Scientific Intervention

- Without **scientific intervention**, many prevention and treatment options wouldn't be available
- **Science** has contributed to the creation of:
  - Preventative measures like vaccines for smallpox and hepatitis
  - Curative measures like radiation therapy for cancer
- Scientific intervention and advice are vital for deciding which healthcare approach to adopt
  - Scientific intervention may **guide government policies** on global approaches e.g. to pandemics
  - Scientific bodies associated with charities and other non-governmental organisations may put **pressure** on governments to follow a particular strategy
- Countries with more **investment** in scientific and healthcare sectors will be able to provide more curative and preventative treatment



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## Managing Pandemics

# What is a Pandemic?

## Pandemics

- A pandemic occurs when a disease affects one country, multiple countries or the whole world
- The **World Health Organisation** will state whether a pandemic has begun
- Famous pandemics include:
  - The Black Death in the 14th century
  - Spanish Influenza in 1918
  - Swine Flu in 2009
  - Covid-19 in 2020

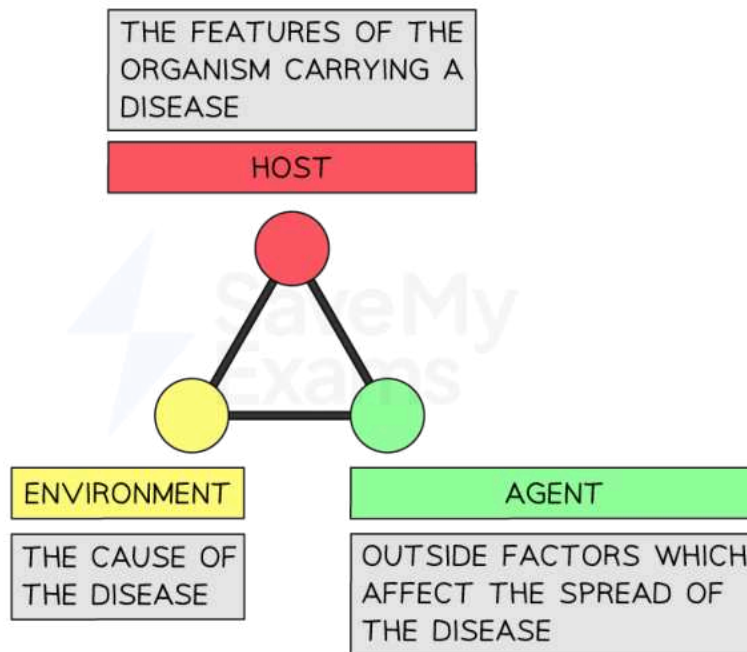
# Epidemiology of Disease

- **The Epidemiology of Disease** is the understanding of:
  - **When** a disease started
  - **Where** it has started
  - **How** it started
  - **Factors** contributing to the spread
- It also supports work to **prevent** and **treat** diseases
- It is a vital study that underpins the management of pandemics
- The famous physician **John Snow**, named the '**Father of Epidemiology**', was one of the first to use **epidemiological thinking** to assess disease outbreak
  - In London in 1854, a severe outbreak of cholera hit the city
  - Most physicians at the time assumed it to be an airborne disease
  - Using epidemiology, John Snow worked out how the disease began
  - The disease originated from a **water pump**
- We can think about disease spread using the **Epidemiological Triangle**



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- There are 3 factors to consider:
  - Host** - characteristics of a person e.g. age, race, occupation, social status etc
  - Agent** - the cause (biological, chemical, physical or nutritional)
  - Environment** - what could impact the agent (temperature, food or water, pollution, housing status)



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*The Epidemiological Triangle*

## Prior Local & Global Awareness

- Local and global awareness** of pandemics is important in pandemic management
- If a disease is already well known to local and global communities, people are more aware of the issues
  - This means that the disease is easier to manage and reduces the impacts
  - Novel diseases** are harder to manage as people are not aware of the risks and prevention strategies
- A good example is COVID-19:
  - The UK government adopted a fierce hand-washing strategy



- Covid-19 is an airborne disease, therefore evidence now suggests that the focus should have been on controlling this
- Masks and lockdowns were brought in later, resulting in huge infection levels and death toll
- Prior local and global awareness can help us **prepare** for future diseases
  - Knowledge about diseases is vital:
    - Where diseases **originate**
    - How diseases **spread**
    - How to minimise **impacts**



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## International Action

- International action involves **international governments** and **organisations** working together to combat a pandemic
- International action is a **powerful tactic** in reducing disease spread and impact:
  - Global vaccination rollouts
  - Consistent testing, tracing and treatment
  - Announcements of Public Health Emergency
  - International border closures
  - Relief efforts e.g. doctors, aid workers etc
  - International funding and collaboration for pandemic containment

## Role of the Media

- The **media** can play both a **vital** and **destructive** role in pandemic management
- Mainstream media, the news and social media can impact the portrayal of a pandemic
  - When the media informs the public about a pandemic, they may do so from a specific angle
  - This may result in empathetic reactions from the public, resulting in more awareness and knowledge about the issue
- When based on science, it is a good source of information for the general public
- Informs the public about rules e.g. lockdowns or vaccine availability
- Poor media coverage can result in **stigmas** towards the disease e.g. HIV was initially labelled as a 'gay disease'

- **Western media** may only begin to report on a disease outbreak in places like Africa when Westerners come home with the disease
- Media portrayal of pandemics can result in **scaremongering**



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## Case Study: Pandemic



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# Case Study: COVID-19

## Covid-19 Pandemic

### Causes

- Covid-19 is a **novel coronavirus**, caused by SARS\_CoV-2
  - **Novel** viruses are new diseases
  - Other examples of coronavirus in the past include:
    - SARS coronavirus (Severe Acute Respiratory Syndrome)
    - MERS coronavirus (Middle East Respiratory Syndrome)
- Covid-19 originated in **Wuhan, China** in 2019
  - It was traced back to a market in the city and the animals sold there
  - This supports a **zoonotic** outbreak theory
  - Others theorise it may have come from the Wuhan Institute of Virology
- The **World Health Organisation** named Covid-19 a global pandemic in March 2020



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## Impacts

- It is still an **ongoing pandemic**
- Over **700,000,000 cases** have been recorded
- Nearly **7 million** people have died
- As it was a **novel coronavirus**, there was very little prior local and global awareness about it
- **Symptoms** include:
  - Fever
  - Dry cough
  - Shortness of breath
  - Exhaustion
  - Cold symptoms

- Loss of smell or taste
- Whilst many have recovered, lots of people suffer from **Long Covid**:
  - Brain fog
  - Insomnia
  - Exhaustion or chronic fatigue
  - Can also affect heart function, stomach issues, muscle pains
- School closures across the world, resulting in missed **education**
- Businesses closed and many people became **unemployed**
- Hospitality and retail closed
- **Borders** closed, hitting the **travel** and **tourist** industries
- More deaths occurred in areas of **poverty**, exacerbating **inequalities**
- **Extreme poverty** rates rose
- It affected the **global economy**, leaving many countries in **recession**
- Large gatherings and important events were banned or cancelled e.g. marathons, the 2020 Olympics and festivals

## Management

- Many strategies were adopted across the world to combat the pandemic
- Management solutions differed between different countries
- **Lockdowns** were enforced, and people could not leave their homes
  - Wuhan enforced a lockdown in January 2020
  - The UK was criticised for enforcing a lockdown too late
  - Some countries were incredibly strict with their lockdowns, with very little freedom for the public
    - China adopted a **Zero-Covid Policy**, which resulted in protests and a severe hit to the public's mental health
- Initial **border closures**, followed by mandatory **quarantining** for travellers
  - Some countries kept their borders firmly shut, for example, New Zealand closed their borders for 2 years
  - Once vaccines arrived, travel rules eased, as long as you had evidence of vaccination or recent infection



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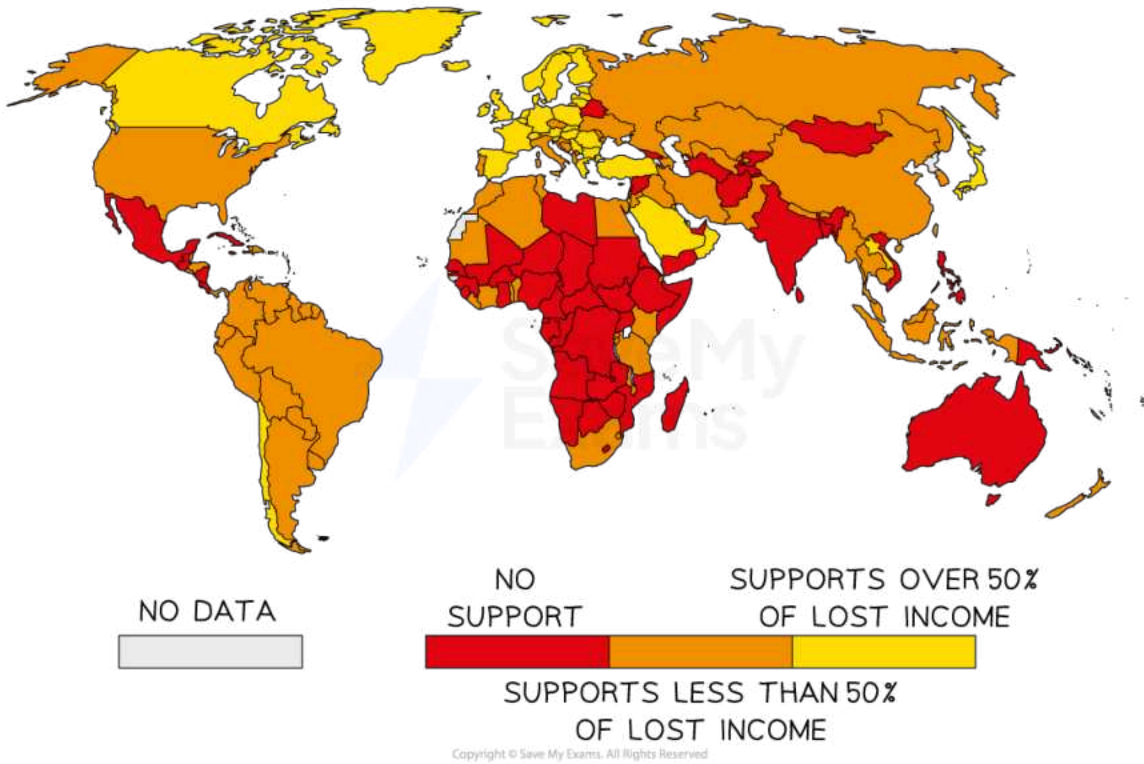


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- **International action** was a vital part of the pandemic management:
  - The global vaccine rollout was an important moment in 2021
  - The most vulnerable had high priority e.g. the elderly, people in healthcare and people with illnesses
  - The World Health Organisation aimed to vaccinate 70% of the world's population by 2022
  - In many countries, vaccination was an official requirement for certain people
- **Contact tracing** and **testing** were a vital part of tracking the spread
  - Many countries had apps that would notify you of being in the presence of a positive case
  - Encouragement of regular testing
  - Encouragement to keep distance from people outside their household
- After the lifting of major lockdowns, other **restrictions** remained in place
  - Some countries enforced nighttime **curfews**
  - Some countries adopted rules for hospitality and other events
    - Germany had a '2G' rule, where people were only allowed to take part in certain activities if they were 'geimpft' (vaccinated) and 'genesen' (recovered)
  - Encouragement or mandates for **masking** in public spaces in many countries
- The **media** played a vital role:
  - TV, social media and other media outlets spread information and educated people about the pandemic
  - However, **misinformation** and 'fake news' became a problem
  - The media labelled Covid-19 as 'Wuhan Virus' or 'China Virus', which increased **xenophobia** and **racism**-fuelled violence
- There was **economic support** for people in many countries where people faced unemployment
  - Many governments offered more than half of people's salaries
  - International debt relief e.g. paying off loans and stopping evictions



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### Examiner Tips and Tricks

Make sure you link back this case study to how we manage pandemics, including prior awareness, international action and the role of the media.