

# SL IB Geography



Your notes

## 9.4 Future Health & Food Security & Sustainability

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## 9.4.1 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
  - 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



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- 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

## 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 [popover id="w772lam4L-pdIAPv" label="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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## 9.4.2 Contemporary Approaches to Food Production

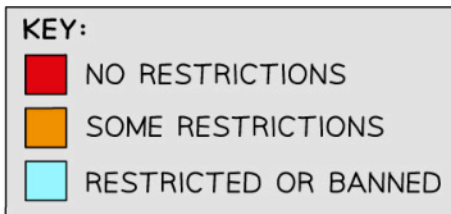
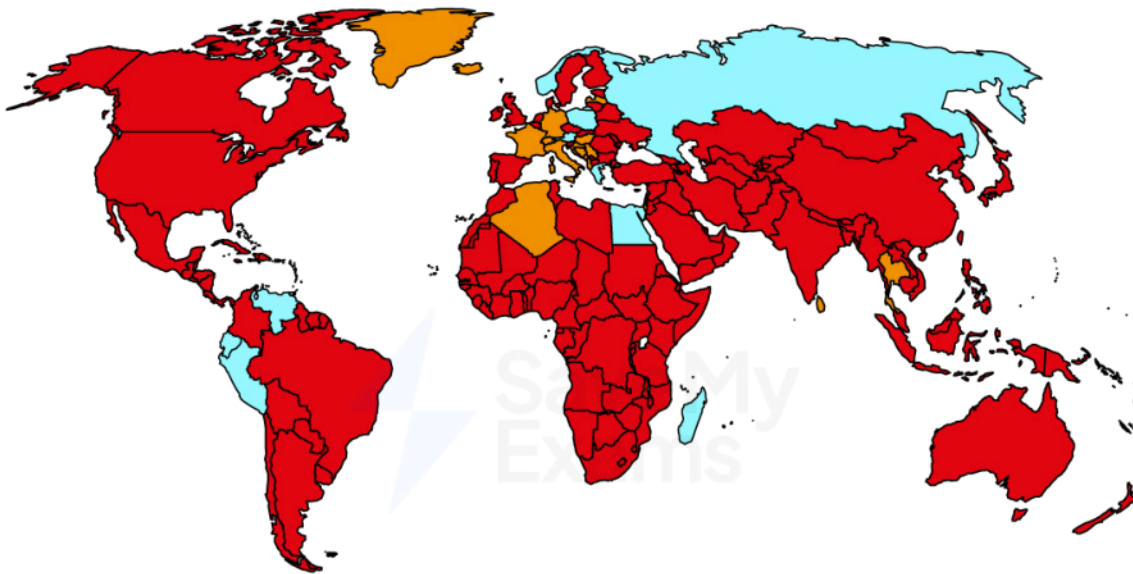
### Genetically Modified Organisms (GMO)

#### 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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**Countries with GMO restrictions in 2016**

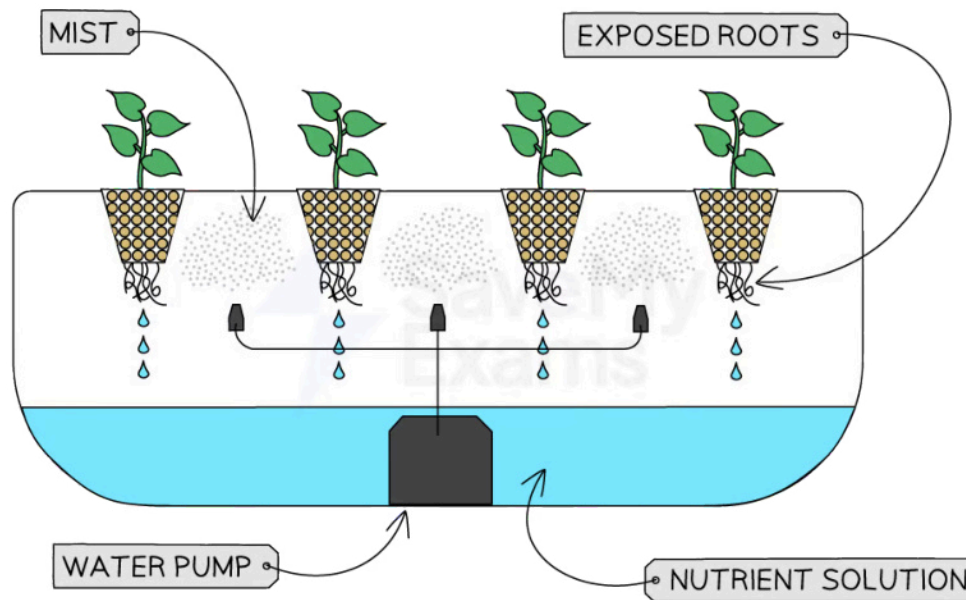


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## Vertical Farming

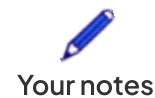
### Vertical Farming

- **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
- 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

- **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

Contemporary approach	Advantages
<b>Genetically Modified Organisms</b>	<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>
<b>Vertical farming</b>	<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> <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>
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### **Examiner Tip**

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!



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## 9.4.3 Prevention & Treatment of Disease

### 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 issues

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



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## Government Priorities

### 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

### 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

### 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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## 9.4.4 Managing Pandemics



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### 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

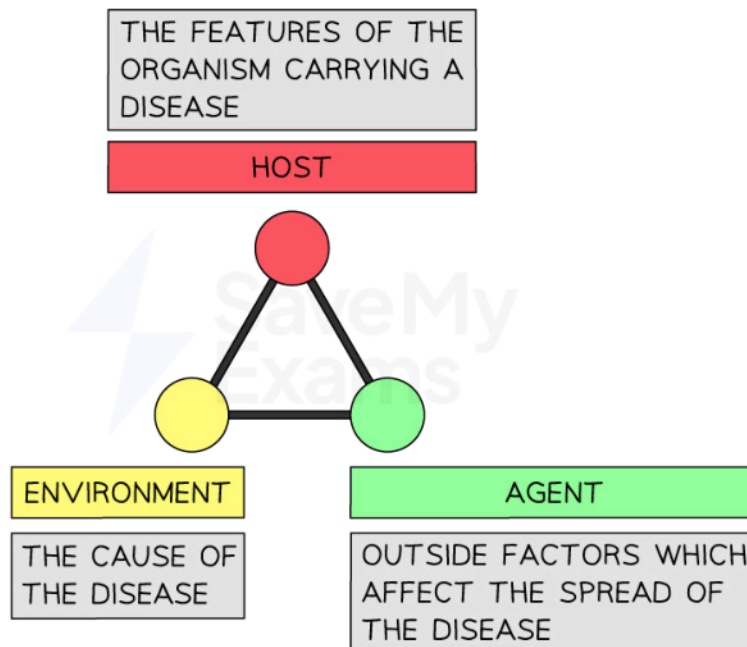
# Epidemiology of Disease

## Epidemiology of Disease



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- **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**
  - 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**



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## Prior Local & Global Awareness

### 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**

## International Action

### 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

### 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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## 9.4.5 Case Study: Pandemic

### 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



##### Impacts



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- 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

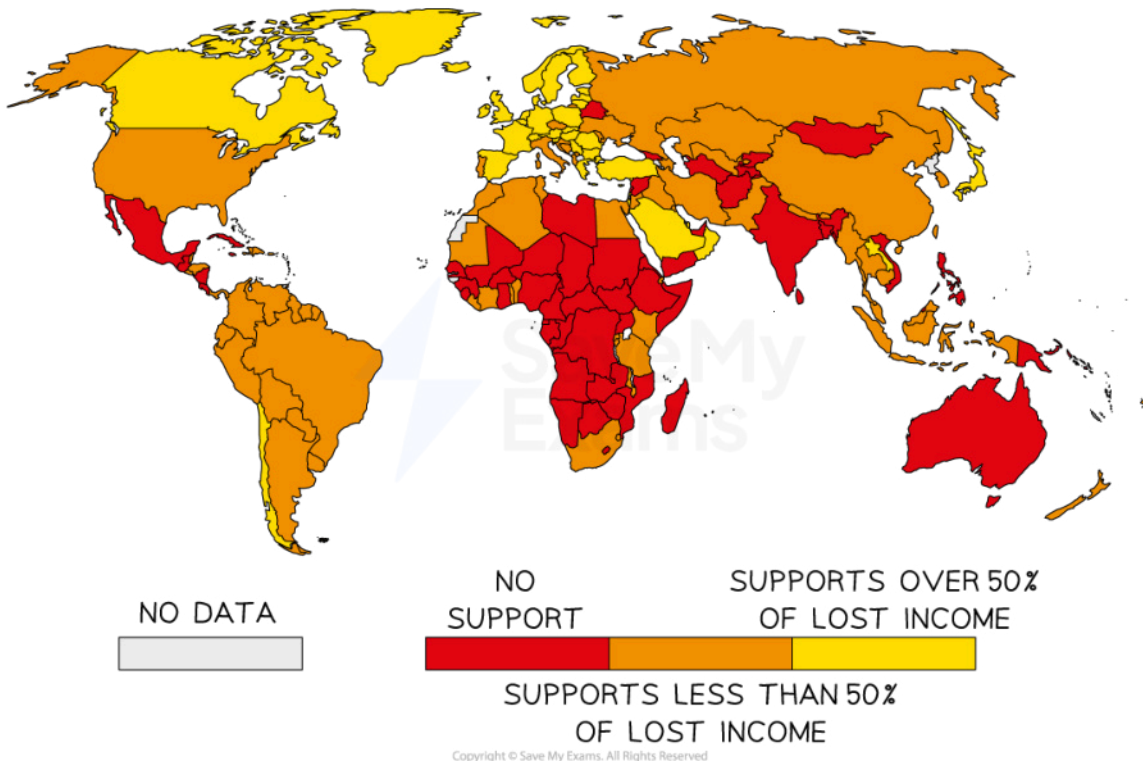
## Management

- 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
- **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



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- 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



 **Examiner Tip**

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



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