SL IB Geography

Your notes

9.2 Food Systems & the Spread of Disease

Contents

9.2.1 Systems Approach


Your notes

Comparison of Energy Efficiency & Water Footprints in Food Production

- **The systems approach** looks at all components, relationships and feedback effects within a process
- The approach is useful for showing whether the impacts in one area of the system have consequences on another
- Food production is a **system**:
  - **Inputs** - things that enter the system
    - **Human** inputs like labour, money, and technology
    - **Physical** inputs like land, soil, seeds and water
  - **Transfers/processes/stores** - the operations that occur during food production, turning inputs into outputs
    - Weeding, ploughing, sowing, milking, rearing, shearing etc.
    - Decision-making by states and farmers
    - Changes and patterns in land use
  - **Outputs** - the products (the end of the system)
    - **Positive** outputs - crops, milk, eggs, animal fodder, profits/wealth
    - **Negative** outputs - waste, air/water/land pollution, soil erosion
- The system may also have feedback effects:
  - **Positive feedback** - imbalanced **equilibrium** with stagnation, decline or complete loss of the system
  - Natural disasters may also impact positive feedback
  - **Negative feedback** - return to **equilibrium** with increased reinvestment and innovation

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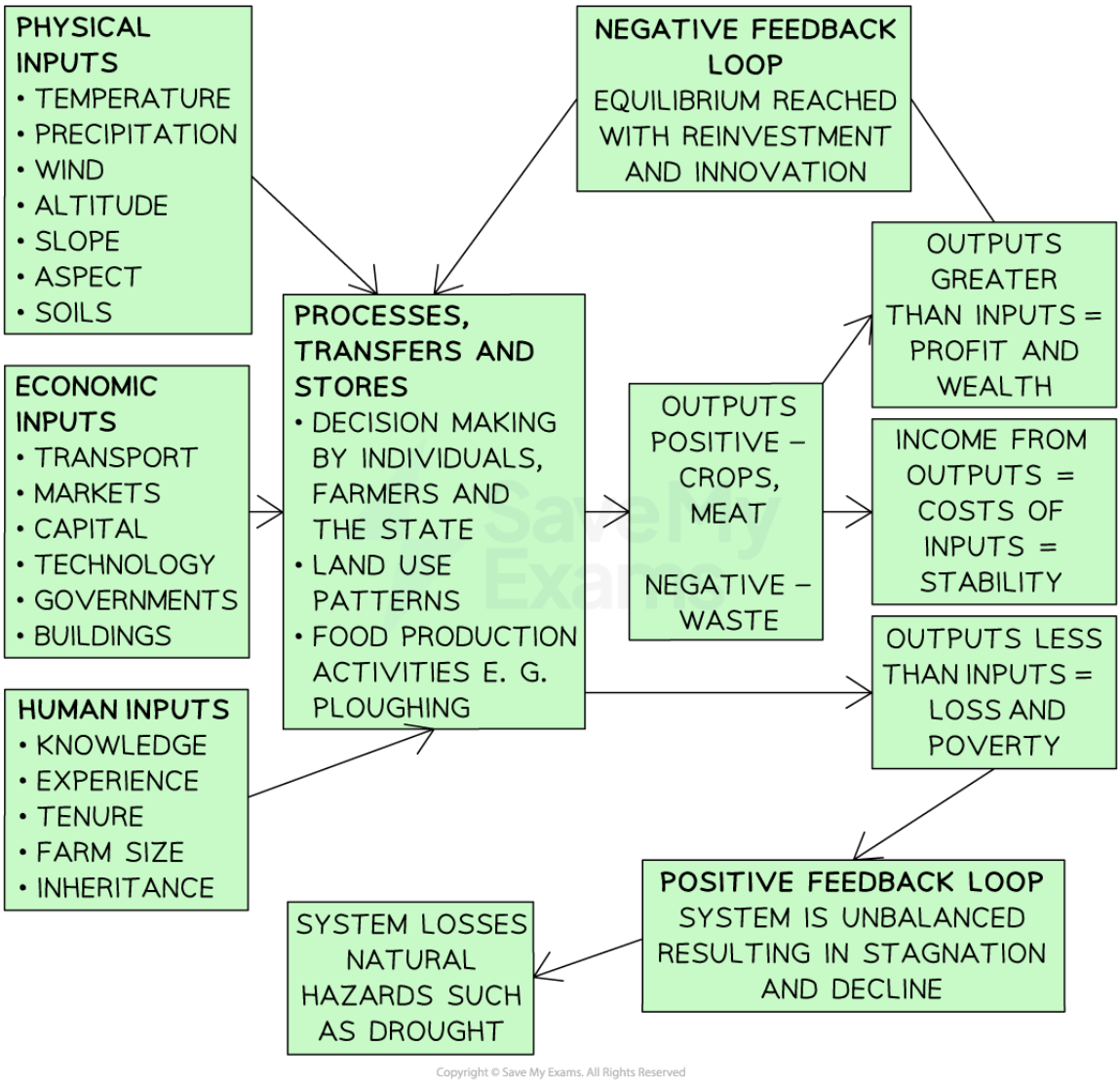

The systems approach to food production

- Food systems can be intensive or extensive
  - **Intensive** systems:
    - **Capital intensive** - high capital and low labour inputs
    - **Labour intensive** - low capital and high labour inputs
    - **Profit** oriented
    - The land is relatively small
    - Output is high
  - **Extensive** systems:
    - Small labour and capital inputs
    - Rely on natural characteristics e.g. rainfall and soil quality

- The land is larger
- Fewer agricultural technologies
- Output is low
- **Subsistence** oriented

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Advantages of the systems approach

- The systems approach can compare energy efficiency and the water footprint within food production systems
- There are many different types of farms/food production systems
- Each food production system will have different energy efficiency and water footprints

Types of food production systems

Type of farming	Characteristics
Arable	Crop growth, like barley or wheat
Pastoral	Rearing animals/livestock e.g. ranching
Mixed	Growing crops and rearing animals simultaneously
Commercial	Profit-oriented - produce is sold on markets e.g. coffee or cotton
Subsistence	Growing crops/rearing livestock purely for the farmer and family
Sedentary	Use of the same land each year e.g. maize or sugarcane
Nomadic	Herding of livestock to find new grazing pastures (moving from one place to another)

Energy efficiency

- Modern food systems require man-made technologies and resources to function
  - These may need large **energy inputs** to operate
- The **Energy Efficiency Ratio** measures the energy efficiency of a system
- It is calculated by:
  - **Total outputs ÷ total inputs**
- Inputs can be:
  - **Direct** e.g. fuel, labour, machinery, planting
  - **Indirect** e.g. irrigation, electricity, fertilisers and pesticides

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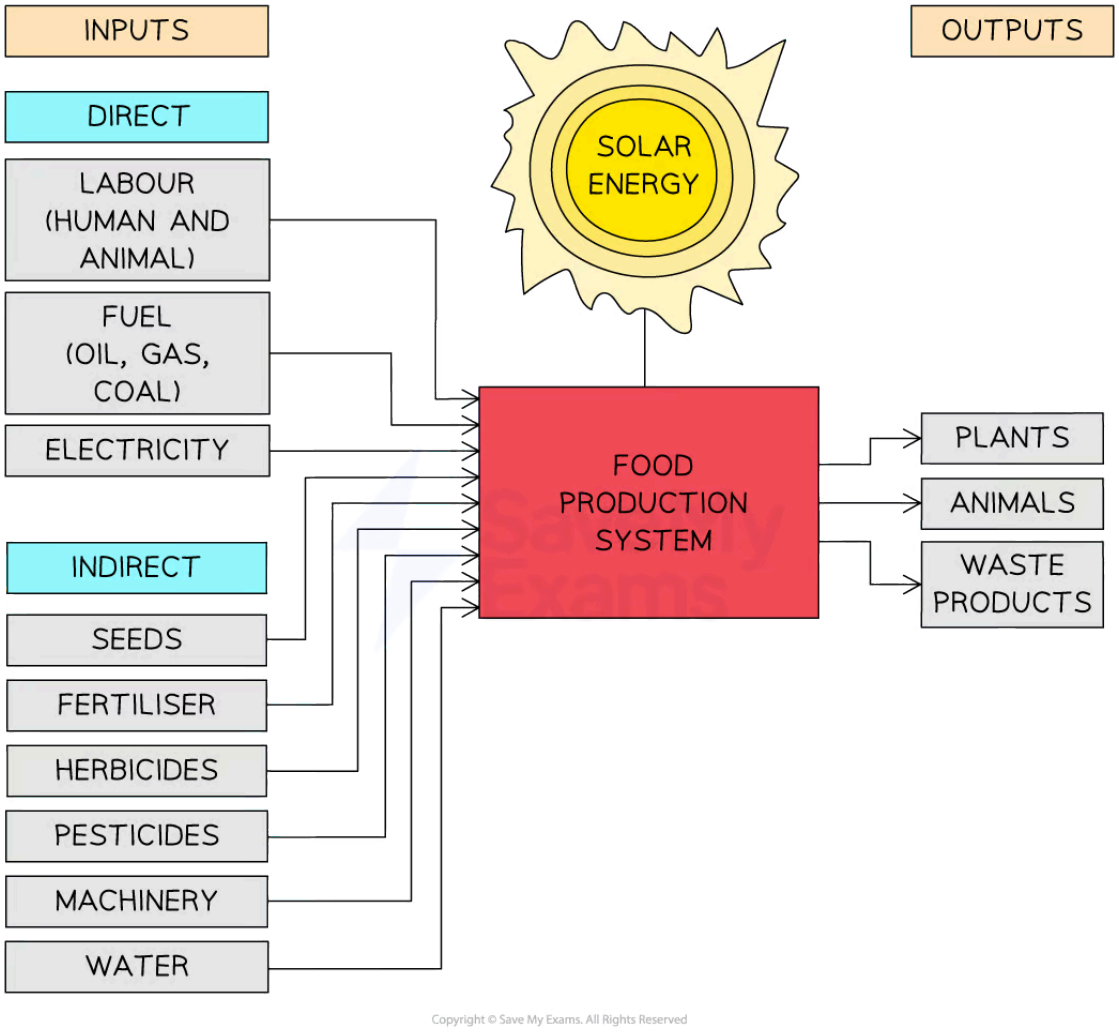

Energy inputs and outputs in a food production system

- Energy efficiency can be affected by:
  - **Climate**
    - **Warmer** climates are more efficient. Crops will need fewer energy resources (they can use the sun)
    - **Wetter** climates are more efficient as they need less **irrigation**
  - **Soil type**
    - Some soils are not fertile and require more fertilisers
  - **Crop type**
    - Certain crop types need more energy
  - **Topography**
    - Flatter topographies use less energy as there is lower water/nutrient runoff
  - **Farming type**

- Certain farming types may be less energy-efficient than others
- **Use of technology**
  - Greenhouses use more energy than cultivating open land
- The energy efficiency ratio is useful for showing the efficiency of different food production systems
- However, it ignores energy use in other areas of production e.g. packaging, processing, distribution and consumer preparation before consumption


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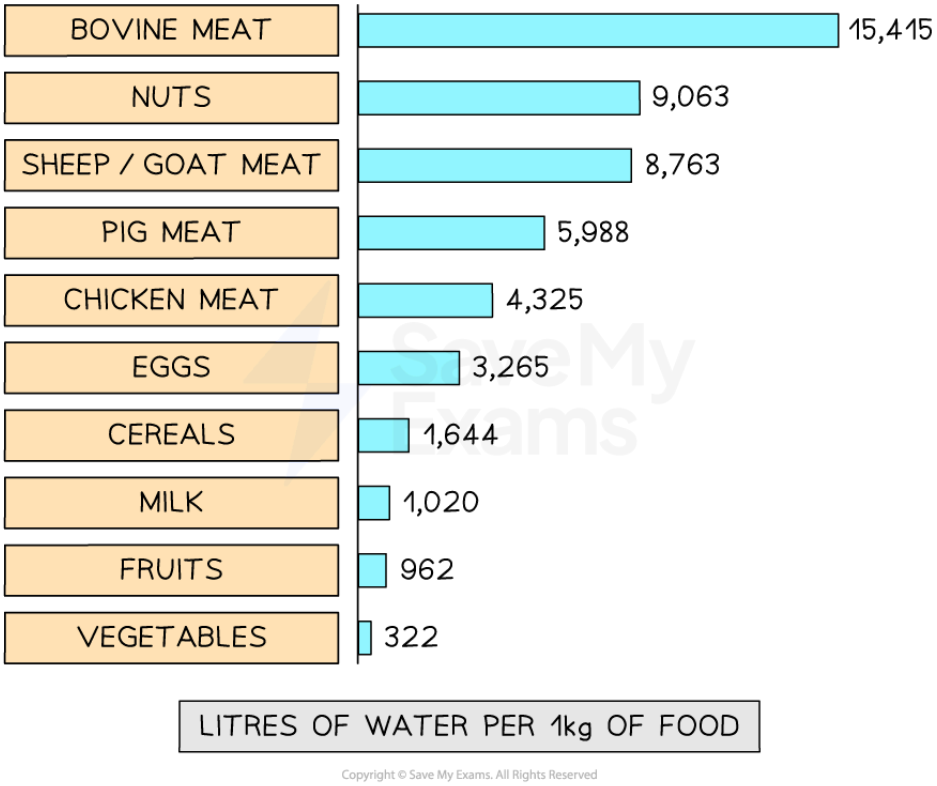
Water footprint

- All food systems require embedded water to operate
- Agriculture uses roughly 85% of global water consumption
- The water footprint can be calculated by **summing up** all the water used in the system
- It includes the **consumption** and **pollution** of freshwater (inputs and outputs)
- Water is separated into 3 categories:
  - **Green** - water from rainfall that is evaporated, transpired or stored in the soil or used by crops
  - **Blue** - water from surface/groundwater sources that evaporates, is used for a product or is returned to another source e.g. for irrigation
  - **Grey** - sources of water pollution into freshwater through pipes or from indirect leaching/runoff
- Factors affecting the water footprint include:
  - **Climate**
    - Wetter climates require less irrigation
  - **Topography**
    - Fewer pollutants from runoff on flatter land
  - **Type of food production system**
    - Meat production requires more water than vegetable growth
    - Pastoral farming has a higher water footprint than arable farming
    - Certain crops may need more fertiliser or pesticides (this may cause more pollution)
- The water footprint is useful for showing the sustainability of different food production methods
- It can be used to assess and produce more sustainable methods of water use



Litres of water needed to produce food products

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Sustainability of Food Production


Your notes

- Food production is negatively affecting our environment
  - **Agrochemicals** cause pollution of land and water
  - Farming contributes to **greenhouse gas emissions**, e.g. methane
  - **Deforestation** and **wetland clearing** damages ecosystems and habitats
- **Sustainable agriculture** is a method of food production, which will sustain current and future generations, without damaging the environment
- It maintains agricultural productivity, reduces environmental damage and maintains resources for the future
- **The systems approach** is useful for showing the relative sustainability of food production in different areas and each part of the system
- Many 'sustainable' solutions focus on parts of systems, instead of the system as a whole
  - **Agricultural policies** are in place to support farmers in adopting environmentally friendly techniques
  - These mainly focus on protecting biodiversity, whilst ignoring issues like pollution, soil degradation and lower yields
  - This means the **whole system** isn't taken into account
- Using a systems approach means that sustainable solutions can benefit all parts of the system
  - This means considering the economy and the environment in inputs, processes and outputs

Exam Tip

Think about other sustainable agricultural solutions and consider the systems approach. Do those solutions benefit all parts of the system, or just one?

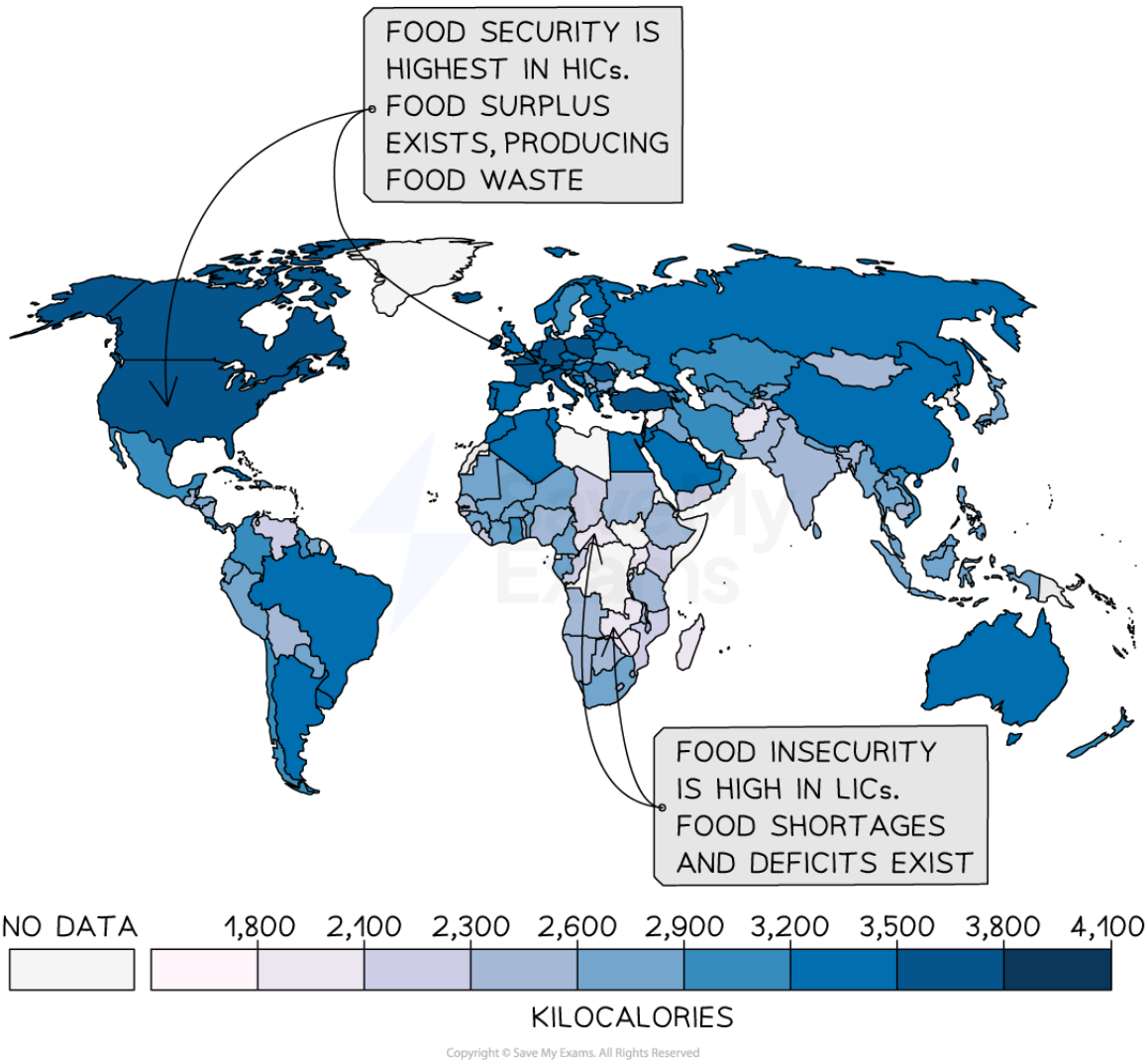
9.2.2 Variations in Food Consumption


Your notes

Variations in Food Consumption

- **Food production** and **food consumption** are increasing globally
- Global **food production** is efficient
- There is currently enough food to feed all the people on the planet
- **Food production** has increased due to:
  - **Land availability** e.g. from deforestation, wetland clearing and brownfield site conversion
  - Increased **productivity**, due to:
    - **Mechanisation** of farming
    - **Genetically modified high-yielding** crops
    - **Agrochemicals**
    - **Irrigation** systems
  - Increased **wealth** - increases the demand for higher-cost foods like seasonal foods or meat
  - **Education** - more knowledge about food choices
  - **Globalisation –** food is globally distributed via plane, ship, road and rail through international trade routes
- However, **food consumption** is **unequal**
  - Increased food production does not mean there is increased consumption everywhere
  - Food consumption varies regionally and internationally
  - **HICs** consume more calories than **LICs**
  - Some areas are food **secure** whilst others are food **insecure**
  - In some cases, **food security** can result in food **surplus** and food waste
  - **Food insecurity** results in food **deficits**
- **Human** and **physical** factors affect food consumption around the world

Your notes



Daily supply of calories per person in 2018

Human factors

Development

- **Development** is rising across the world
- As countries become more developed and the middle class grows, food consumption increases
  - People can afford more food or more **expensive/calorie-rich** foods like meat
    - **China's** meat consumption increased
    - In 1980 it was 12kg per person, by 2023 it was over 62kg per person
    - This increase has occurred as the country has developed and incomes have risen
  - With **globalisation**, people demand more non-seasonal or non-local foods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    - As more people learn about food miles and environmental change, consumption of seasonal foods may change
- **Population growth** is booming in LICs, which creates **pressure** on food demand
    - Food shortages may occur if **population growth** outweighs **agricultural productivity**
- People in poverty-stricken areas in LICs may find themselves unable to afford food
    - This can mean they cannot go to work to earn money due to hunger or ill health
    - This becomes a vicious **cycle**
- Lack of **infrastructure** in LICs can reduce the amount of food transported to an area
- Farmers in LICs may not be able to afford **fertilisers** or other **agricultural technologies** to increase their crop yields

Politics

- Food consumption may increase with **food aid** from international governments or charities
- In some areas, **conflict** can hinder food consumption
    - People may flee a war-torn area, leading to a lack of food access
    - Warfare can damage crops and kill livestock
    - Food may be **weaponised**, and food supplies taken away
    - Food prices globally may rise, meaning food becomes unaffordable (not just in LICs, but in HICs too)
- Political **corruption** or **instability** in countries limits **food aid** from reaching those who need it most e.g. in the Democratic Republic of the Congo
    - These issues may impact people's accessibility to food
        - This results in a **Food Entitlement Deficit (FED)**

Trade

- Although globalisation has increased food movement, trade inequalities still exist
- LICs **export** more food than they keep, leaving behind food insecurities
    - LICs rely on **export earnings**
    - These countries have less money to **import** food
    - This results in an imbalance in food production, exports and imports in LICs
    - HICs can afford to import more foods, resulting in a large discrepancy between LICs and HICs
- The global **Fair Trade movement** protects farmers in LICs by providing them with a reliable income to afford food

Type of food

- Diet can impact the levels of **calorie consumption**
    - More **developed countries** have a **higher calorie consumption**, as diets are richer in fats and sugars
    - **Less developed** countries consume **less calories**, as diets focus on lower fat and higher fibre diets
- The stages of the **Nutrition Transition** directly affect food consumption and the related effects

Physical factors

Climate, water and soil

- **Climate** impacts the ability to grow crops, resulting in food shortages
  - **Droughts** can cause **infertile soils** and desertification
  - **Flooding** can damage crops and livestock
- **Water stress** or **water insecurity** can cause crop yields to be very low
  - This is caused by:
    - Low rainfall
    - Pollution caused by flooding
    - High population density
  - Poorer countries may not be able to afford technologies like **irrigation systems**, to reduce drought-associated problems
- Poor **soil quality** increases erosion and reduces crop yields
  - Some soils are nutrient-rich and can hold water, ideal for crop growth
  - Farmers in poverty may not be able to afford **fertilisers** or other tools which increase crop yields


Your notes

Climate change

- Climate change is rapidly exacerbating food insecurity and food shortages
  - Climate change increases flooding, droughts and storms which reduces crop yields, kills livestock and affects the global food trade
  - This results in a **Food Availability Deficit (FAD)**
- Increased **carbon dioxide** in the atmosphere can reduce the **nutritional density** of crops
- Climate change also impacts our oceans and the world's fisheries, with rising ocean temperatures and **ocean acidification**
- **Rising sea levels** pose a threat to coastal agricultural land

Pests and disease

- Pests and diseases can damage crops, reducing crop yields
- This is exacerbated in warmer countries, or where there is not enough money for pesticides
- **Climate change** also increases pests and diseases

Exam Tip

Remember to think about why food production may be higher or lower. The amount of food production has a direct effect on food consumption around the world.

9.2.3 Diffusion

Your notes

What is Diffusion?

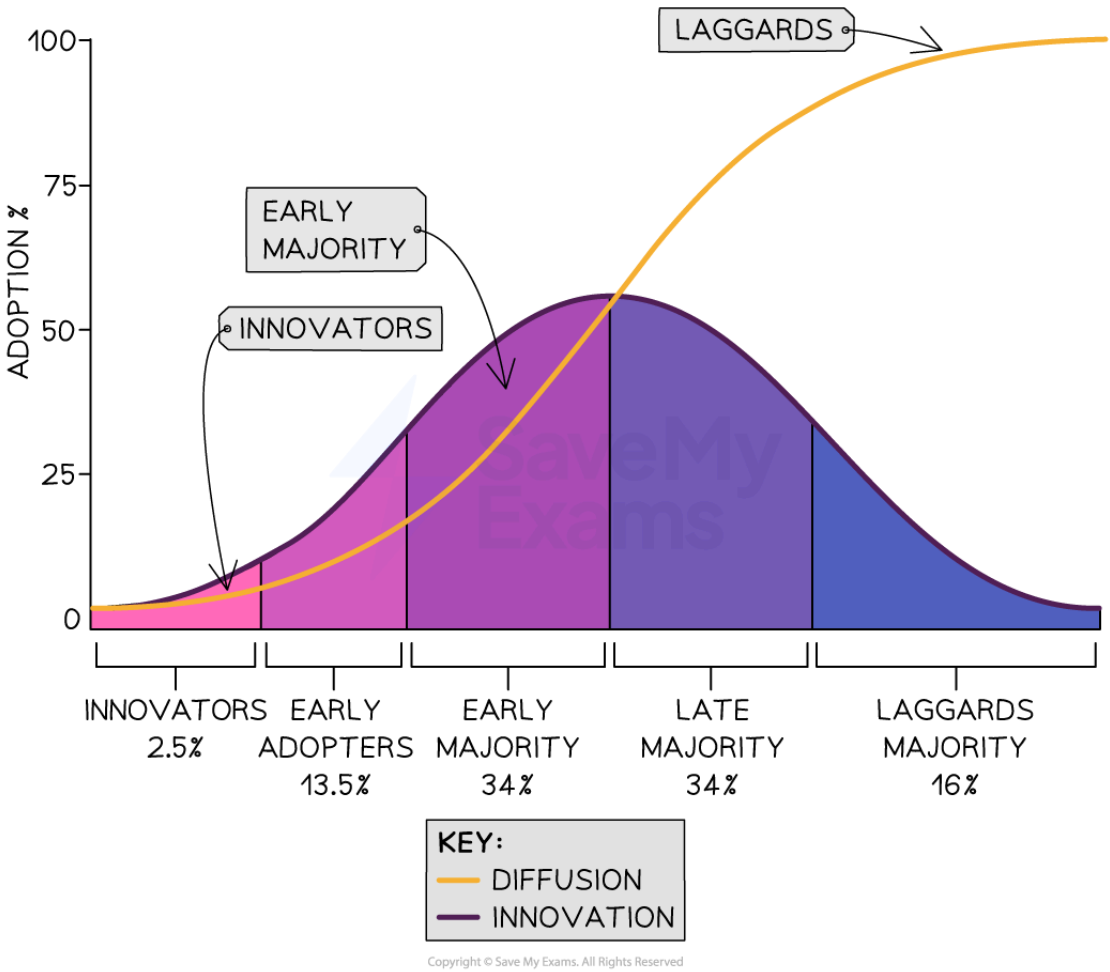
Diffusion

- **Diffusion** is the spread of something from place to place
- This can include ideas, practices, technology and disease
- **Distance decay** means that higher diffusion rates occur closest to the point of origin. Lower rates occur further away

Diffusion of innovation

- **Diffusion** has different elements:
  - **Innovation** - the first stage, where individuals or groups create a new idea/concept/object
  - **Time** - diffusion typically increases over time, as more people adopt the innovation
  - **Social/Communication**
    - Diffusion needs groups of people and stakeholders
    - It requires communication (face-to-face, writing or media), to transfer information and ideas
- In 1962, Everett Rogers coined the **Diffusion of Innovation Theory**
- There are **5 stages**, showing different stakeholder groups
  1. **Innovators** - the first people to use an innovation (without testing)
  2. **Early Adopters** - innovation is improving, so more people begin to use it
  3. **Early Majority** - The product is well known, used by a large proportion of people
  4. **Late Majority** - cautious stakeholders, waiting for cheaper prices or improvements
  5. **Laggards** - very reluctant, but eventually adopt the innovation
- This information produces a **Bell Curve**
- Combined with the Bell Curve information, the **S Curve** can show the adoption of innovation over time

Your notes



Bell Curve and S curve of the diffusion of innovation theory

Diffusion of Agricultural Innovations

Diffuson of Agricultural Innovations

Your notes

- **Agricultural innovation** is the implementation of new ideas, processes, or products to increase **productivity** and **efficiency** and **reduce risks** within a system
- It can involve new solutions to issues and improved methods of problem-solving
- Some examples of agricultural innovations include:
  - **Genetically Modified Crops**
  - Dam construction
  - **Precision agriculture**
  - **Vertical farming**
  - **Farm automation**
- **Diffusion** of agricultural innovations is the **spread** of these new processes, ideas and products between farming groups
- There are **3 main types** of **agricultural innovation diffusion**:
  - **Adoption/acquisition**
    - Becoming aware of/interested in an innovation
    - Creating or following a new agricultural innovation
  - **Expansion**
    - **Innovation** gets stronger at the origin, whilst also spreading to new places
  - **Relocation**
    - **Innovation** moves away from the origin, reducing or eventually vanishing
    - Maybe a result of migration
    - Caused by transport networks (**network diffusion**)
- Diffusion of agricultural innovations is vital for the **development of agriculture**:
  - To improve **food security**
  - To increase and maintain **resource sustainability**
  - To increase **economic development**

Role of geographic factors in the rate of agricultural innovation diffusion

Geographic factor	Barrier	Effects on the rate of diffusion
Physical	Land suitability	Agricultural land/farms may not be suitable for certain innovations e.g. soil type
	Remoteness	Lack of transport routes could hinder the diffusion of agricultural innovations
Economic	Labour	Adopting innovation can increase labour and costs and takes a long time Worries about lower yields put farmers off

		A lack of demonstrated examples can prohibit farmers from adopting innovative techniques
	Development	Agricultural innovations can be expensive. Poorer farmers may not be able to afford to adopt new technologies Lower education rates can influence innovation adoption
	Demand	Demand for certain innovations can be lower e.g. organic food prices are higher, so demand is lower
Political	Credibility	Uncertainty towards technologies and the reliability of policies/policymakers can affect diffusion rates
	Tradition vs innovation	Tradition acts as a barrier - some prefer traditional methods and don't want to develop further
	Policy-making	In some cases, there aren't enough policies to support farmers in adopting innovations e.g. financial support Differing opinions from groups of people over what is the best innovation method


Your notes

Diffusion of Diseases


Your notes

- The concept of diffusion also applies to **disease**
- **Disease diffusion** is the spread of disease around the world
- Diseases will begin at a **source point** and spread outwards
- With **distance decay**, higher incidences of disease will occur closer to the origin
- **Globalisation** has made disease diffusion a lot easier (transportation systems)
- There are **5 types** of disease diffusion:
  - **Expansion**
    - The spreading of disease from place to place
    - Disease spread is **intense** in the **origin**
    - It becomes **less severe** in regions **further away**
    - A good example is the H1N1 flu, originating in Mexico
  - **Relocation**
    - Spreading of disease, leaving **fewer cases** at the **origin**
    - Good examples include **disease carriers** like HIV
    - A person may bring diseases into an area. In 2010, Nepalese aid workers entered Haiti after the earthquake, resulting in a large cholera outbreak
  - **Network**
    - Diseases spread through **transport networks** and **social networks**
    - **Globalisation** increases transport routes around the world
    - COVID-19 spread rapidly through **transport routes** (late lockdowns and border closures)
    - HIV spread through **social networks** (sexually transmitted)
  - **Contagious**
    - Spread through **direct contact**
    - **Distance decay** is prominent here. Those closest to the source of the disease will be more likely to contract it than those further away
  - **Hierarchal**
    - Disease transmission through an **order** of different places or people e.g.
      - Urban areas to rural areas
      - Higher to lower-income groups

Role of Geographic Factors in the Rate of Diffusion

Your notes

Role of geographic factors in the rate of disease diffusion

Factor	Barrier	Effects on the rate of diffusion
Physical	**Distance decay**	Infection is lower further away from the origin
	Remoteness	Rural areas have less migration, therefore diffusion rates are lower Mountainous regions are not accessible, so diffusion is lower
	Climate	Extreme climates also reduce migration and therefore diffusion rates Warmer climates can make it easier for disease carriers e.g. mosquitos or tics Climate change and natural disasters can also impact disease spread e.g. increased flooding and pollution of water sources
Economic	**Development**	People may live in closer proximity in lower-income areas (**densely packed housing**), increasing the rate of disease diffusion Urban areas may have a higher diffusion rate than rural areas due to population size In areas with unsafe water, poor hygiene, poor sanitation, and lower education rates, disease diffusion will be higher Rate of globalisation. Some areas are not fully globalised, so diffusion rates will be lower e.g. North Korea, Eritrea, Turkmenistan
Political	**Borders**	Border control can reduce disease diffusion. The best example is North Korea during COVID-19
	Migration	US migration policies prohibit migrants who have infectious diseases. They must undergo medical screening
	Disease management	How governments control outbreaks can impact diffusion e.g. lockdowns across the world limited the spread of COVID-19 Specific management strategies like face masks, social distancing, banning public events, quarantines, vaccine rollouts, and contraception, also affect diffusion rates International regulations and public health information act as a barrier to disease diffusion

9.2.4 Factors Contributing to Diffusion

Your notes

Geographic Factors Contributing to Diffusion

Geographic Factors Contributing to Diffusion

- **Diffusion of disease** is its spread from place to place
- The disease **incidence rate** is the number of new disease cases over a specific period, in relation to the overall population of an area
- Geographic factors are **physical** and **human** characteristics that affect incidence and diffusion rates
  - **Vector-borne disease** transmits to humans from another vector e.g. animals like mosquitos or tics
    - These include diseases such as dengue fever, malaria and Lyme disease
  - **Water-borne diseases** result from poor sanitation, hygiene and the consumption of unsafe water
    - They include cholera, typhoid, diarrhoea and dysentery

Physical

- **Warmer climates**, like tropical latitudes, make it easier for vector-borne diseases to spread
  - Mosquitos thrive in warm and humid environments
  - Climate change is likely to worsen this, as vectors may spread to areas such as southern Europe
- **Heavy rainfall** can cause flooding, leaving behind large areas of **stagnant water**
  - Vectors thrive in these stagnant water bodies e.g. mosquitos
  - For example, water may stand near **populated areas** or in **irrigation channels**
- **Natural disasters** could increase dirty water
  - **Flood** or **tsunami** waters may contain sewage
  - **Earthquakes** or **hurricanes** can damage sewage systems, allowing sewage to enter drinking water sources
- Rich **biodiversity** causes **dilution** of vector-borne diseases
  - With human-induced climate change, biodiversity will **decrease**
  - This will increase disease spread

Economic/political

- **Less developed countries** have poor sanitation and hygiene, which increases the risk of water-borne diseases
- Education rates are also lower, with little knowledge about hygiene and disease spread
- Less developed countries also have poorer quality **healthcare**, e.g vaccines
- **War and conflict** can result in higher disease incidence:
  - Destruction of healthcare infrastructure, like hospitals
  - Damage to sewage pipelines, resulting in contaminated water
  - Debris contamination in stagnant water
- **Industry development** may also cause diffusion:
  - **Logging** within tropical rainforests increases temperatures in the area
    - Heavy rainfall causes flooding of the cleared/deforested land or increases
  - Water collects in mining pits, irrigation channels and rice paddy fields, where vectors breed more efficiently

- Agriculture (e.g. livestock) can provide food for vectors, increasing their population

Social and cultural

- **Migrants** or settlers may move to an area that already has high immunity and contract vector-borne diseases
- **Urbanisation** causes increased unregulated development in areas where vectors thrive or where other non-human disease hosts exist
- **Globalisation** has meant that new **non-indigenous vectors** can move around the world

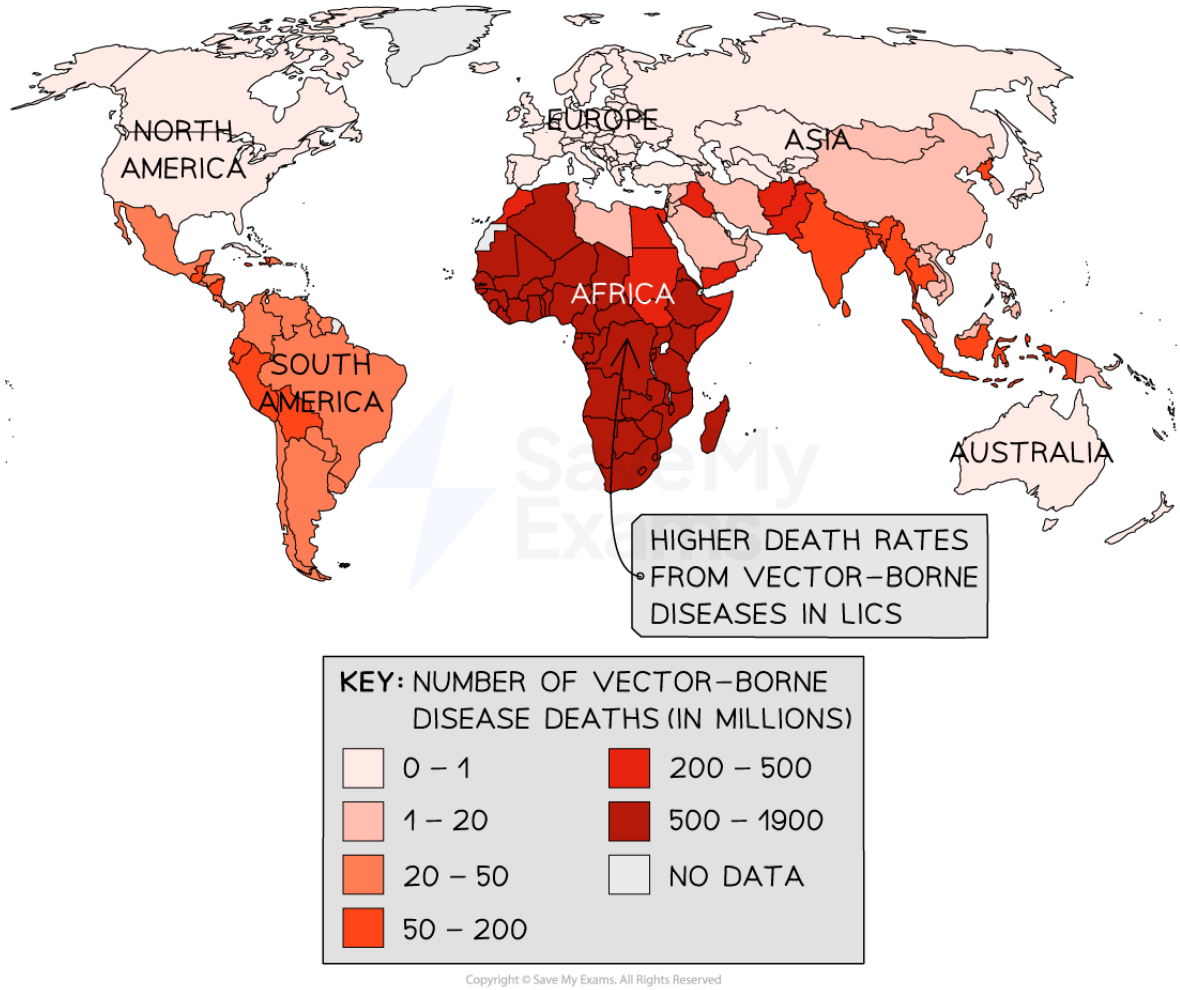

Your notes

Impacts of Vector-borne & Water-borne Diseases

Your notes

Demographic

- Water-borne diseases heavily impact **children**, causing higher mortality rates in younger people
- Vector-borne diseases like malaria heavily impact **children** and **pregnant women**
  - Malaria impacts Maternal Mortality rates
- **Immunocompromised** people have a higher risk of contracting malaria e.g. HIV
- Diseases impact **travellers,** as they haven't been exposed to the disease and have no immunity e.g. malaria
- **Lower-income groups**/those in poverty are more at risk of vector and water-borne diseases
  - Many developing countries lie in warmer/tropical regions, where vector-borne diseases thrive
  - Poor sanitation and unsafe water increases the risk of water-borne diseases
- Both vector-borne and water-borne diseases can impact **death rates** in a country



Deaths from vector-borne diseases

Socio-economic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- In lower-income countries, people **travel** far to collect **safe water,** usually by foot
  - It may take a long time to get to the water source
  - This can mean they do not go to work, which can negatively affect the economy
  - They may suffer physically as a result of strenuous activity
- **Disease prevention programmes** can be costly
  - This can include bug nets or repellants and medical fees
  - This can cause problems for lower-income countries, which already struggle with economic development
- Children may not be able to attend school due to sickness, reducing **education rates**
- The **tourism industry** may take a hit. Foreign travellers may be wary about entering a country e.g. the Caribbean and Latin America experienced large losses in the tourism industry after the Zika virus hit in 2015

9.2.5 Case Study: Water-borne & Vector-borne Diseases

Your notes

Case Study: Malaria (Vector-borne) (in Ethiopia)

Malaria

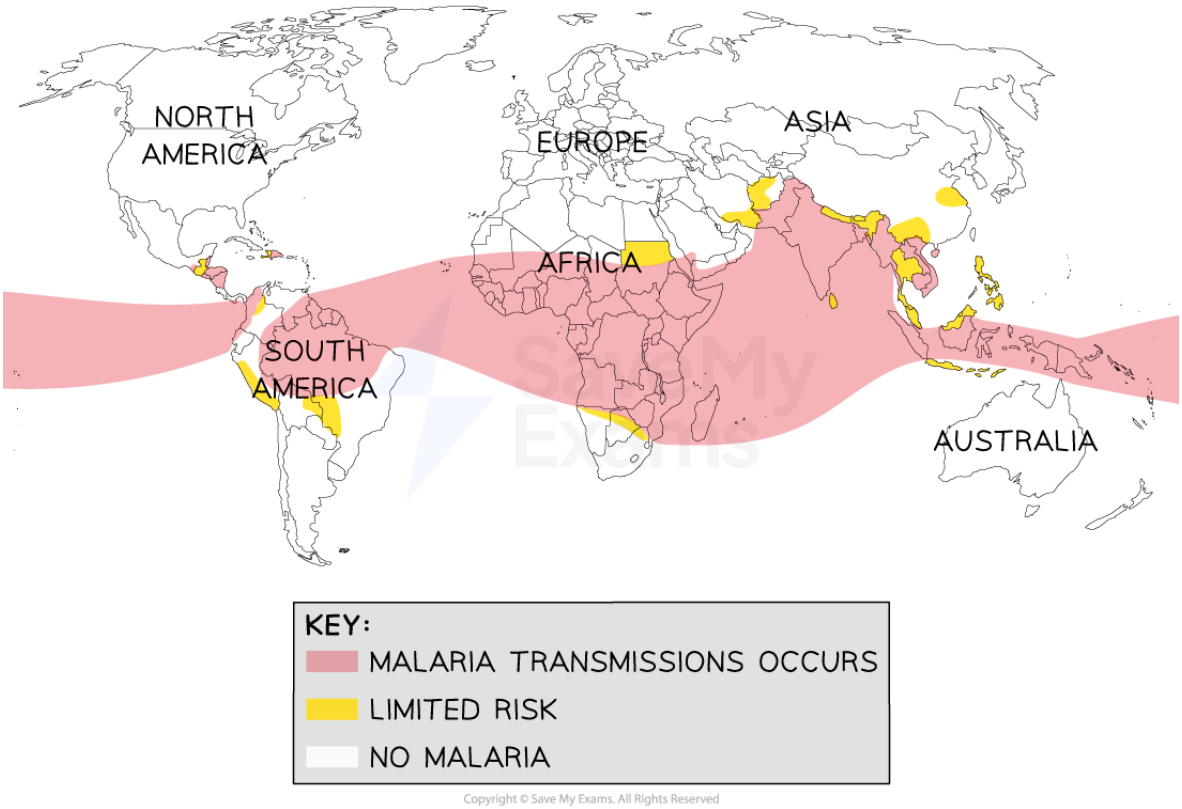
- Malaria is a **vector-borne** disease (parasite) carried by **mosquitos**
- Initially, there are no symptoms
  - After a few weeks, or even up to a year, flu-like symptoms appear
  - Fever, shaking chills, nausea, headaches, exhaustion, diarrhoea
  - It can be **fatal**
- Roughly **240 million people** contract malaria annually
- There are many different contributing factors to high incidences of malaria
- However, **poverty** is the most prominent issue
  - Malaria has been **eradicated** from much of the developed world
  - Developed countries mainly worry about disease contraction during **travel** or as a result of the **global spread** of the disease
  - Malaria is mostly concentrated in Sub-Saharan Africa (the lowest levels of development)
  - Malaria may spread around the world as **global temperatures rise**

Causes of Malaria

- **Anopheles mosquitos** can carry the disease, and infect humans by biting
- Malaria is more common in **tropical** and **subtropical regions** e.g. **the Malaria Belt**
  - The **climate** is **warmer** and more **humid**. It is the ideal environment for mosquitos to thrive and reproduce
  - **Deforestation** in rainforests also increases temperatures
- Mosquitos thrive in areas with **stagnant water**
  - Heavy rainfall and flooding can cause standing water
  - Water collects in mining pits, irrigation channels and rice paddy fields, where mosquitos breed more efficiently
- **Vulnerability**:
  - **Children** under the age of 5
  - **Pregnant** women
  - **Immunocompromised** people e.g. HIV
- **Immunity** to malaria may develop over time
  - If immunity wanes, cases of malaria will rise
  - **Travellers** or **migrants** may come from areas with no malaria, so they do not have immunity
  - Mosquitoes are becoming **immune** to drugs
- **Urbanisation** may increase malaria
  - If unregulated development occurs near water bodies, people will come into direct contact with mosquito breeding grounds
- **Low income and poverty**:
  - Lower-income countries have very poor **healthcare** or reduced access to treatment and vaccines
  - Poor **sanitation** and water sources can result in more standing and stagnant water

- **Immune systems** are weaker as a result of other diseases like malnutrition
- **Education rates** are lower, resulting in less awareness about the disease and prevention methods
- Jobs are usually **labour-heavy**, exposing people to mosquitos outdoors

Your notes



The Malaria Belt

Impacts of Malaria in Ethiopia

- In 2019, Ethiopia recorded **2.9 million cases** of malaria
- Roughly 70% of Ethiopia is at risk of malaria contraction
- As of 2020, malaria cost Ethiopia around $200 million per year (about 10% of total outgoings on healthcare)
- **Education** rates will go down as a result of children being off sick from school
- People can't go to work due to sickness
  - Directly affects the economy
  - Affects the agricultural sector and food production
  - People struggle to afford food
- Direct effects on the **well-being** of the population e.g. anxiety, grief
- Malaria impacts Death Rates, Infant Mortality Rates and Maternal Mortality Rates
- **Pressure on healthcare systems**:
  - More people require treatment and medication
  - Increased staff shortages

- Money goes into healthcare instead of economic or education development
  - This results in economic **stagnation** or **decline**
- Medicines and other preventative measures, like nets or repellants against malaria, are costly
- Lack of education and technology results in a shortage of information or knowledge about malaria **epidemics**
- Some areas in Ethiopia experience a lower incidence of malaria due to **arid climates** and **higher elevations** (physical **barriers** to diffusion)
- Impacts of malaria may also be **seasonal**, particularly after the rainy season


Your notes

Solutions to Malaria in Ethiopia

- **Insecticides** (e.g. Dichlorodiphenyltrichloroethane or DDT) have been useful in Ethiopia
  - Insecticides result in water pollution and can enter the food chain
- In 2003, malaria cases rapidly increased in Ethiopia
  - UNICEF led the international response, with **financial aid** coming from the UK, the US and the World Health Organisation
  - It funded drugs, supplies and other responses like training and investigations
  - However, the funding was not enough to fully eradicate malaria and has since gone down after the economic crash of 2008
  - Malaria is also becoming immune to some of the drugs
  - Malaria won't be eradicated from Ethiopia without dealing with development issues and poverty
- The **U.S President's Malaria Initiative** began in 2005
  - Helping to provide treatment for malaria
  - Working to reduce deaths, stop cases and eradicate the diseases altogether
- Other general solutions include:
  - Travellers can take **anti-malaria drugs** to stop the infection
  - Providing mosquito **nets** in high-incidence areas
  - **Education** for people about malaria **epidemics**
  - Stopping mosquitos at the source:
    - **Covering** standing water
    - **Removing** irrigation channels no longer in use
    - **Adding** marine life to bodies of water to consume mosquito larvae
    - **Mosquito Breathing Traps**

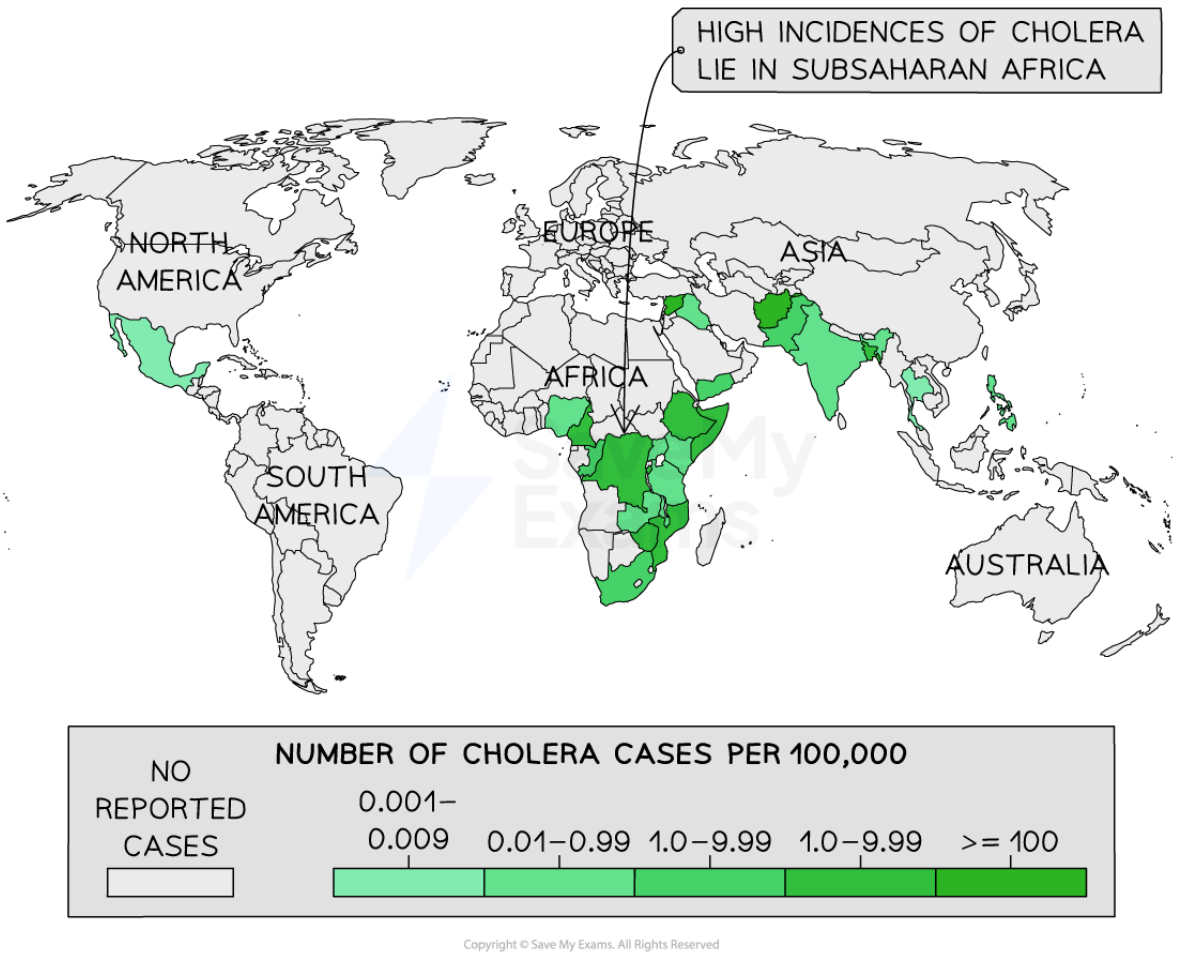
Case Study: Cholera (Water-borne) (in Haiti)

Cholera


Your notes

- Cholera is a **water-borne disease**
- Cholera has existed for **hundreds of years**
  - In the 19th century, cholera outbreaks were common
  - **7 major cholera pandemics** have occurred over the last 200 years
  - The most recent is said to have started in the 1960s and is still **ongoing**
  - Much of the world's cholera decreased in the 1990s, however, regions of Africa and Asia still experience high incidences of cholera
- **Symptoms** of cholera include:
  - Watery diarrhoea (rice-water stools)
  - Vomiting
  - Thirst
  - Leg cramping
- Symptoms develop quickly, from anywhere between 12 hours and 5 days (or not at all)
- Cholera bacteria stays in the stools after illness, which can cause further contamination

Your notes



Global cholera cases in 2023

Causes of Cholera

- Cholera is mainly caused by **dirty/unsafe water**, poor **sanitation**, poor **hygiene** practices and low **food safety**
  - **Vibrio cholerae bacteria** contaminate water sources and enter the food chain
  - The bacteria is usually found in **fecal matter**
  - Unsafe water and poor sanitation typically occur in **less-developed countries**
  - If **sanitation systems** are not adequate, cholera can spread
- **Natural disasters** can increase cholera:
  - **Flood** or **tsunami** waters may contain sewage and enter drinking water sources
  - **Earthquakes** or **hurricanes** can damage sanitation systems, resulting in sewage leaks and contamination
- **War and conflict** can damage sanitation infrastructure
- **Migrants** may bring cholera into a country
- **Vulnerability**:

- **Travellers** who are not wary of food and water safety
- **Healthcare** or **aid** workers
- Certain **blood types** e.g. O blood type
- Lower levels of **stomach acid** e.g. older people
- **Children** under the age of 5
- **Malnourishment**


Your notes

Impacts of Cholera in Haiti

- In 2010, a severe **earthquake** hit Haiti
- The **United Nations aid response** caused a deadly cholera outbreak
  - **Nepal** was experiencing a cholera outbreak
  - **UN peacekeepers** from Nepal brought cholera to Haiti
  - Waste from the peacekeeping camp was discharged into the river used by local Haitians
  - There was poor sanitation and no water treatment
  - Haiti also had **low immunity**, so the outbreak hit hard
- Between 2010 and 2019, Haiti recorded roughly 820,000 cholera cases, with just under 10,000 deaths
- The **earthquake** exacerbated the outbreak:
  - Poor health and sanitation infrastructure meant disease spread was quick
  - **Overcrowding** in makeshift camps
  - Diahrroea and vomit waste were not contained, causing cholera to spread
- Certain areas were hit hardest e.g. **rural** areas/**high poverty** levels:
  - The Bocozel community in the Artibonite Valley was severely hit
  - They relied on the river for drinking, washing and agriculture
  - There was poor hygiene and limited healthcare access
- **Economic losses** from lack of productivity (sickness and death)
- **Education rates** can go down as children miss school or entire schools close
- People must travel far to find safe water, meaning they cannot go to work or school
- Cholera was **eradicated** from Haiti in February 2022
  - In October 2022, new cases were discovered
  - Haiti is currently experiencing a **humanitarian crisis**
    - Fuel blockades, violence and unrest, lack of food and clean water and a cholera outbreak
  - With hospitals closing, not enough medical staff, lack of fuel, food and water, the cholera outbreak could worsen
- Internationally, cholera is a **threat to the world**
  - However, it mainly impacts the developing world

Solutions to Cholera in Haiti

- **Rapid Response** in Haiti in 2013:
  - After a case is reported, a team visits the family and works through a questionnaire on hygiene, sanitation and water sources
  - This locates the source of the outbreak quickly
  - Teams disinfect houses and show locals how to stay safe
  - Provision of chlorine for a month and antibiotics for all family members
  - The team creates a sanitary zone

- The team returns later to assess the situation
- In 2017, Haiti had 88 rapid-response teams

- 2013 **National Plan for the Elimination of Cholera with UNICEF** and the government of Haiti
  - Funding from the European Commission Department for Civil Protection and Humanitarian Aid (ECHO)
- Other general solutions include;
  - **Improvements** to healthcare systems that can cope better with outbreaks
  - Improvements to the access to water, sanitation and hygiene systems **(WASH)**
  - Drinking **sealed water**
  - **Boiling water** before use or using **chlorine treatments**
  - **Cooking** food well, particularly seafood
  - Consistent **handwashing**
  - **Disposing** of waste at a distance from water sources or communities
  - **Track** and **surveil** outbreaks
  - Community **support** and **education** e.g. health practices
  - Cholera **vaccine**


Your notes