

Name:

Applied Human Biology

Y12-Y13 SIL

Unit 3: A1 Understand health issues and associated initiatives and research



Support Resources:

- <https://qualifications.pearson.com/content/dam/pdf/BTEC-Nationals/applied-human-biology/2018/specification-and-sample-assessments/9781446958599-btecnat-l3-extcert-apphumbio-spec-ppv2-070618upd.pdf>
- <https://qualifications.pearson.com/content/dam/pdf/BTEC-Nationals/Applied-Human-Biology/2018/Support-resources/Student%20resource%20-%20Unit%203%20Human%20Biology%20and%20Health%20Issues.pdf>

Getting to know Unit 3

Unit 3 Specification Overview

A1 Understand health issues and associated initiatives and research

Learners will select and apply knowledge of fundamental human biology, such as cells and tissues, human body systems and functions, immune response and genetics from Unit 1: Principles of Applied Human Biology and microorganisms and infectious diseases from Unit 2: Practical Microbiology and Infectious Diseases. They will then develop an understanding of health issues, associated initiatives and research, and potential areas for further research and development:

Covered in this booklet:

- Infections:
 - reducing the transmission of infectious diseases
 - controlling the spread of antibiotic resistance in bacteria
 - antibiotic- and antimicrobial-resistant infections
 - role of vaccination programmes in controlling disease.
- Health and lifestyle initiatives related to:
 - cardiovascular diseases
 - respiratory diseases
 - ageing population
 - obesity
 - smoking, alcohol and substance misuse
 - sexually transmitted infections (STIs).

Expect to learn about these in class in September:

- Genetic initiatives:
 - genetic screening
 - genetic diseases
 - pre-implantation genetic diagnosis.
- Medical prevention and treatments:
 - cancer screening
 - medical imaging
 - stem-cell therapy, epigenetic modification and reprogramming
 - developing new drugs
 - hormone therapies.

- **Assessment**

- You will be assessed through a 3-hour supervised task (EXAM) worth 60 marks, which is set and marked by Pearson.

Key terms used in Unit 3: Write the correct term next to each definition

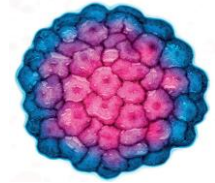
Term	Definition
	The capacity or power to have an effect on the development, actions, behaviours or opinions in healthcare
	Issue or problem, related to health, that has been identified, which is open ended and has multiple potential solutions
	Data in numerical form, which can be categorised and used to construct graphs, or tables of raw data, such as data drawn from the results of experiments
	Inclination or prejudice in a way considered to be unfair
	Related to the best use of limited, or scarce, resources (financial)
	May be used on its own to describe the subject that the article is describing e.g. obesity
	Acknowledgement of sources of information used within an article
	Consider in detail, the different aspects of an issue, situation, problem or argument and how they interrelate.
	Effects or consequences of an action or decision that may happen although not explicitly stated
	Published research reports and data, likely to be based on analysis of primary research
	The extent to which an experiment, test or measuring procedure yields the same results on repeated trials
	Ethically related aspects that may have affected how research was carried out
	Research compiled directly from the original source, which may not have been compiled before
	Refers to how the research described in the article was carried out, for example through quantitative methods such as analysis of numerical data or qualitative- based observations
	Specific terminology directly relating to the subject matter presented in the article
	An issue that influences and is opposed by a considerable number of individuals in society
	Strategy/plan identified in the article and related to the impact it has in the health issue
	A specific group at which an article is aimed
	The means of mass communication through reporting medium
	Use your knowledge to propose a likely solution to a problem
	Descriptive data, such a data drawn from open-ended questions
	Requires identification of a point and linked justification / exemplification of that point. The answer must contain some linked reasoning in questionnaire

Section 1: Infectious Diseases

Many diseases are caused by infecting agents or microorganisms, such as viruses, bacteria, protoctists, fungi or larger parasites such as worms and insects (lice and fleas). Infecting agents live in or on the body, and if they cause disease, they are described as pathogens.

Viruses occur in all types of ecosystem and can affect all living organisms.

Give some examples of infectious diseases caused by viruses:



Some viruses cause cancer, such as cervical cancer which is caused by the human papilloma virus (HPV).

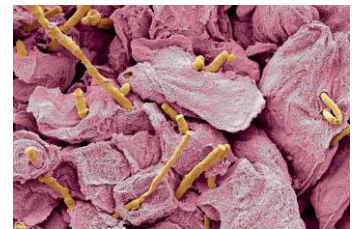
Bacteria are single celled prokaryotic organisms. Many inhabit the intestines of animals, including human intestines. Many types of bacteria are essential to us, however some types of bacteria are pathogenic.



Give some examples of infectious diseases caused by bacteria:

Fungi are eukaryotic organisms. While some fungi support ecosystems by breaking down dead matter to recycle nutrients, some fungi act as parasites and infect other organisms. Yeast is one such type of fungi that can infect humans,

Give some example of infectious diseases caused by yeast:



Protoctista are species that do not fit into the other categories of microorganisms. All members of this species kingdom are eukaryotic and include:

- protozoa – infecting agents that cause malaria, sleeping sickness and amoebic dysentery
- slime mould and water moulds.

Infectious diseases are also called communicable diseases as they can spread from person to person, or from animals to people, and, in some cases, people to animals. However, all microorganisms require certain conditions for their cell numbers to grow by replicating. **What are the five conditions?**

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Complete the table below to show some examples of communicable diseases and their method of transmission (how they enter a host)

Method of transmission	Infectious disease
Direct or social contact –fomites are objects or substances that can carry infecting agents and transfer them from one person to another. Examples include shaking hands, physical touching, and sharing of items such as towels, bedding and money.	
Airborne – the infecting disease is carried in droplets and released via breathing, coughing and sneezing; the droplets are breathed in by another person.	
	Typhoid, salmonella, campylobacter, hepatitis A, Ebola and cholera
	HIV, AIDS, syphilis, hepatitis B and the human papilloma virus (HPV) (which causes cancer of the cervix)
Insects and tick bites.	

For many of the identified infectious diseases across the world, how they are spread and how they are cured using medicines such as antibiotics is known, and ultimately how they are prevented using vaccinations and other health-related policies and procedures. However, there are important public health issues in the prevention and control of infection, that influence the level of infectious disease in a community and can lead to outbreaks of a previously unknown, or previously contained, infectious disease.

Describe some public health issues that can impact the prevention and control of infection:

Epidemiology

What is epidemiology?

What type of data do epidemiologists gather and how is this used?

Complete the following key definitions, with an example for each

Key term	Definition	Example of disease (s)
Endemic		
Epidemic		
Pandemic		

In Britain, local health authorities must report any outbreak of a disease in the area they are responsible for. This data is generated from GP reports, private health agencies and health-related charities. This data is then passed on to the Department of Health and Social Care (DoHSC) to review over a period of time. If they detect a serious outbreak of a disease, this is reported to the World Health Organisation (WHO) who track the data further and decide if medical assistance or resources are needed to prevent a serious epidemic.

Reducing the transmission of infectious disease

Infectious diseases still cause millions of deaths around the world every year – from malaria and schistosomiasis in tropical areas, to influenza and norovirus outbreaks in the more temperate regions of the world. They affect all age groups, from new-born babies to the elderly and cannot always be stopped from spreading from one person to another.

Where possible, health professionals take preventative measures against infections that are common in particular age groups, or those that occur on a seasonal basis. For example, people vulnerable to infectious disease, such as the elderly, or those with underlying health conditions such as diabetes or respiratory issues, are offered a flu vaccination on a yearly basis. Babies and infants are immunised against communicable diseases such as measles, mumps and rubella to prevent them spreading.

Antibiotics and vaccination programmes are only a small part of how governments and healthcare workers help to reduce the burden of infectious disease on individuals and on society. The following case studies look at some different ways of reducing the transmission of a particularly deadly infectious disease.

Controlling the spread of antibiotic resistance

Bacteria can quickly develop resistance to antibiotics. In fact, bacteria have been developing antibiotic resistance for millions of years as a defence mechanism against naturally occurring antimicrobials, and against antibiotics secreted by other bacteria.



Why has antibiotic resistance increased over the last century?

The WHO has previously stated that “antibiotic resistance is one of the biggest threats to global health, food security, and development today”.

One way of getting around antibiotic resistance is, of course, to develop new antibiotics. Why is this far more difficult than it sounds?

New antibiotics cannot currently be developed quickly enough to deal with the problem of antibiotic resistance, and so doctors and scientists have been forced to look for other methods of reducing resistance. One of the most important of these is through what is known as “antibiotic stewardship”.
Explain how this works.

As modern medicine discovered more antibiotics through the second half of the 20th century, some older antibiotics were replaced with more modern ones. Another approach to reducing antibiotic resistance has been to “rotate” the prescription of antibiotics. **Explain how this works.**

There are some other possibilities being examined by scientists as ways of combating antibiotic resistance.

Bacteriophages –

Bacteriocins –

Immunotherapies –

Vaccination programmes and disease prevention

Vaccination is another way to help reduce the overuse of antibiotics. **What is a vaccination?**

Vaccination involves active immunity where the immune system is activated to make its own antibodies.

- **Active immunity is;**

- **Passive immunity is:**

- **Why does active immunity last a long time, but passive immunity is fairly short lived?**

- In order for vaccination programmes to be successful and to protect the greatest number of individuals possible, large proportions of the population must be vaccinated. **Explain why:**

Children in countries with established vaccination schedules rarely suffer from potentially serious diseases such as polio, measles, meningococcal meningitis.

In the UK there is a vaccination schedule that:

- offers all children vaccination against specific diseases at appropriate ages, such as whooping cough, mumps, measles and rubella

- offers vaccinations through the NHS against influenza and pneumonia to all people over 50, who have certain health conditions, are pregnant, frontline health and social care workers, or who care for or live with someone at significant risk of contracting influenza. However, because influenza has a high mutation rate, each year the vaccine is adjusted to the three types predicted to most likely infect people in that specific period.

In addition to planned schedules, people travelling abroad can request and pay for certain vaccinations, and people with specific health conditions can ask for vaccines against hepatitis B, TB and chickenpox.

Different infectious diseases have different levels at which herd immunity is said to have been achieved. This is based not only on how effective the vaccine is at immunising each individual, but also how infectious the disease is.

Research the minimum percentage of the population that must be vaccinated to guarantee herd immunity for measles:

Research the minimum percentage of the population that must be vaccinated to guarantee herd immunity for polio:

Why is the minimum percentage higher for measles than for polio?

Complete the table below to consider the advantages and disadvantages of vaccination

Reasons for / advantages of vaccinations	Reasons against / disadvantages of vaccinations

Section 2: Health and lifestyle initiatives

Cardiovascular disease (CVD)

Cardiovascular disease (CVD) includes all the diseases of the heart and circulation such as:

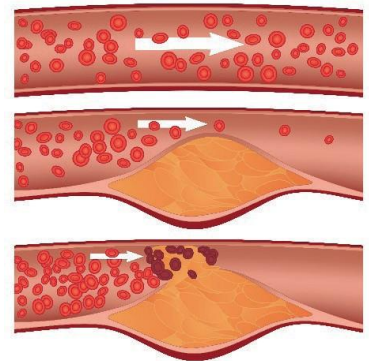
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Diseases of the cardiovascular system are some of the biggest killers globally, causing an estimated 31% of deaths worldwide – most of which are from heart attacks and strokes. It is estimated that over 1 billion people around the world suffer with hypertension, which puts them at a greater risk of having heart attacks and strokes.

Describe some of the consequences of hypertension.

As an individual ages, they have an increased risk of CVD due to narrowing of the arteries and other blood vessels as a result of fats being deposited in the walls of the blood vessels. This process of the arteries being 'clogged up' is called atherosclerosis.

Describe some of the consequences of atherosclerosis



Modern medicine, combined with public health approaches, has to implement a wide range of approaches to reduce the effects of cardiovascular disease on an individual and on society.

Primary prevention

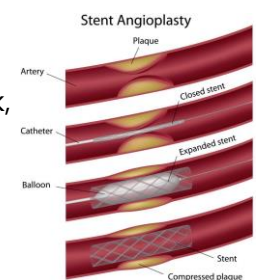
Primary prevention involves trying to prevent medical emergencies such as heart attacks and strokes before they occur. This involves looking at populations who might be at risk of these conditions, such as people with high blood pressure, high cholesterol, or other pre-existing medical conditions. Primary prevention often involves both lifestyle changes and medical intervention, although this depends on why an individual is at risk of cardiovascular disease.

Describe the methods involved in primary prevention of CVD:

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Intervention

However effective primary prevention may be, some people are still going to be unfortunate enough to suffer from a cardiovascular event – whether that is a heart attack, a stroke, or sudden damage to a blood vessel from a blood clot. If this happens then immediate treatment is needed. Without rapid intervention these conditions can be fatal or lead to lasting disabilities. Interventions in cardiovascular disease may involve:



- **thrombolysis –**
- **angioplasty –**
- **Bypass surgery –**

Secondary prevention

Where primary intervention involves prevention, and interventional management involves treatment, secondary prevention focuses on trying to reduce the likelihood of a health problem recurring.

In cardiovascular disease, this involves looking at people who have already suffered from a heart attack, stroke or other cardiovascular condition, and trying to reduce the risk of this happening again. Like primary prevention, this often takes multiple approaches.

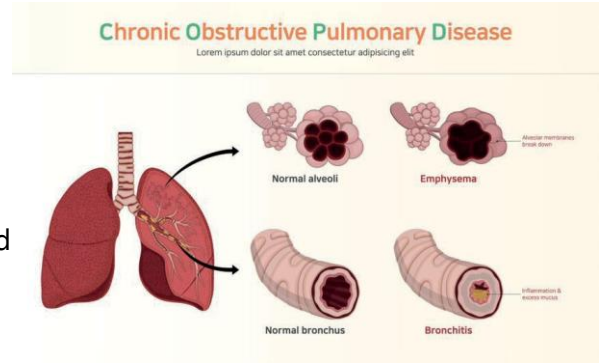
Describe the health and general lifestyle measures involved in secondary prevention of CVD:

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Respiratory diseases

Whilst not causing as many deaths worldwide as cardiovascular disease, respiratory diseases still affect many millions of people every year.

The most common respiratory diseases are asthma, COPD and lung cancer, although there are many others in addition to these.



Complete the table below on the treatments for the most common respiratory diseases

Lifestyle measures			
Medications			
Respiratory disease	Asthma	COPD	Lung cancer

An ageing population

Thanks to modern medicine and other significant social changes, the population of the world is gradually getting older. The WHO estimates that by 2050 the proportion of the world's population over the age of 60 will have doubled to 22% – almost 2 billion people.

With the average life expectancy in the UK at more than 80 years of age, as the population ages, new challenges arise for individuals and society. As a result of living longer, people are now affected by a wider range of diseases, particularly those that are slow to develop.

State some diseases that are more prevalent in older age:

Additionally, as people age, they tend to depend more on others for care and support as their independence and quality of life declines. **What impact might this have on their families and the health and social care services?**

It takes years to develop new health and social care services that meet the demands of the population and this often requires years ahead of the new services being needed so that sufficient time is given to develop new drugs and build new hospitals, for example. Gathering data regularly on the population to monitor the incidence of different diseases and disorders is the only way for the government and health and social care providers to predict the needs of society in the future.

One of the ways in which society can try to reduce the impact of an ageing population is by encouraging people to look after their bodies throughout their life, to reduce the number of people suffering from multiple comorbidities in older age. Health services need to understand the health needs of the older population and understand what separates those who remain active and maintain good health, from those who are physically less active and may experience more health problems.

Consider the different ways that local authorities, charities and other health and social care groups promote health and wellbeing by providing resources:

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Obesity

Define a healthy diet:

What is malnutrition?

What is obesity?

The WHO reports that globally there are more people who are obese than underweight in most regions, and that obesity is linked to more deaths globally than being underweight.

Obesity is currently a significant concern to health services globally. The prevalence of being overweight and obesity among children and adolescents aged 5-19 has risen dramatically from 4% in 1975, to just over 18% in 2016 globally. For adults, the figure is estimated that around 13% (650 million) of the global population is obese, and 39% (1.9 billion) is overweight.

State some examples of serious health problems that obesity can cause:

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Explain why tackling obesity is difficult for healthcare professionals and governments:

Discuss the advantages and disadvantages of the different strategies used to tackle obesity in the table below:

Strategy	Advantages	Disadvantages
Public Health Campaigns		
Medication		
Gastric band operation		

Smoking, alcohol and substance misuse

Tobacco and alcohol are both legal drugs in the UK but are responsible for causing significant amounts of harm. They are both physically and psychologically addictive, are strongly related to higher rates of cancer, liver and lung disease – but are still seen as socially acceptable drugs.

Smoking

It was only after the Second World War that scientists began to make the link between smoking and disease, and longer still before governments worldwide started to take action to reduce smoking- related harm and deaths. The ONS report the number of people in the UK who smoke has fallen continually – in 2015, only 17.2% of adults smoked, compared to 46% in 1974.

Smoking is a risk factor for many diseases throughout the body – **name some of these diseases below:**

Explain why smoking-related diseases and deaths is challenging.

In the UK, how have healthcare workers and governments tried to stop people smoking or never start in the first place?

Alcohol

It is possible to drink alcohol at a "harmless" level, which is not associated with any particularly increased risk of disease. Over sustained periods of time, **name some health issues caused by alcohol misuse:**

Describe how alcohol misuse can also lead to social problems:

In the UK, how have different organisations tried to reduce alcohol misuse?

Substance misuse

Explain what is meant by substance misuse

Describe some of the potential consequences of substance misuse (consider behavioural, physical, social and economic issues)

Complete the table of health risks commonly associated with illegal substances

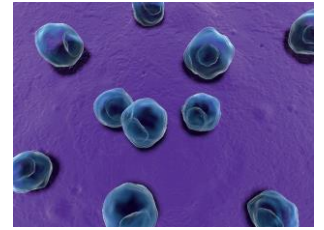
Misused drug	Method of use	Possible health risks
Cannabis		
LSD		
Heroin		
Ecstasy		
Cocaine		
Amphetamine		

Describe some of the long-term damage of addiction and overreliance on drugs

How does the UK government deal with tackling the problem of illicit drug use?

Sexually transmitted infections (STIs)

Sexually transmitted infections may be caused by a huge variety of pathogens – viral, bacterial and fungal. They cause many different symptoms – from itchiness or soreness in the genital region, right through to suppression of the immune system, and even death. Many sexually transmitted infections are treatable with modern medicine – but not all of them can be eliminated entirely.



Research some common STI's in the UK in the table below:

	Cause (pathogen)	Symptoms	Treatment	Potential issues of treatments	Long-term effects of the disease
Chlamydia					
Gonorrhoea					
Herpes					
HIV					

If an STI cannot be treated, then preventing people from contracting the infection in the first place becomes tremendously important. **Research strategies that have been used by different UK organisations to reduce the spread of STI's.**

In addition to disease prevention campaigns, vaccination campaigns can be an effective way of treating some STIs. In the UK there is now a national vaccination campaign for Human Papilloma Virus (HPV)

Who is this campaign targeted at and why?

Explain the importance of this vaccination programme in the UK.