Grampian Joint Health Protection Coordination Group

Population Health Protection Needs Assessment

04 January 2024

Contents

1 Introduction and background

> ***Public health*** *is the science and art of preventing disease, prolonging life and promoting health through the organised efforts of society*
>
> – D Acheson, 1988[1]

> *[**Health protection** is] … the protection of individuals, groups and populations through expert advice and effective collaboration to identify, prevent and mitigate the impacts of infectious disease, and environmental, chemical and radiological threats*
>
> – Ghebrehewet, Stewart & Rufus, 2016 (p.3)[2]

Section 7 of the Public Health etc (Scotland) Act 2008 places a statutory duty on NHS Grampian to publish a biennial Joint Health Protection Plan.[3] The next plan is due to cover the years 2024/25 through 2025/26. This health protection needs assessment was collated to inform the development of that plan.

2 Aim and objectives

Aim

To allow current health protection arrangements to be considered in light of local demography and epidemiology and future threats, so that recommendations can be made in relation to priorities for action.

Objectives

1. To define health protection
2. To describe current health protection arrangements
3. To review current and projected demography and hazards to public health
4. To identify gaps between the defined function and current arrangements
5. To consider how projections might impact upon health protection
6. To provide recommendations on how to meet the gaps and future impacts

[1] Committee of Inquiry into the Future Development of the Public Health Function (1988) HMSO: London
[2] Ghebrehewet et al (2016) What is health protection? In Ghebrehewet S, Stewart AG, Baxter D et al (Eds) *Health Protection: Principles and Practice* Oxford University Press: Oxford pp.3-8
[3] https://www.legislation.gov.uk/asp/2008/5/contents

3 Method

The needs assessment involves a review of the literature, epidemiological analysis and stakeholder input.

Objectives 1 to 3

- Defining health protection

Published and grey literature was found by searching the websites of the World Health Organization (WHO), Public Health Scotland (PHS), UK Health Security Agency (UKHSA), Scottish Government, Scottish Health Protection Network (SHPN), Scottish Health Protection Information Resource (SHPIR), and by searching for “health protection definition” with “health protection” and “public health”, websites including the Lancet and the BMJ, and Scottish Government guidance.

- Epidemiological analysis

Published information was obtained from the websites of National Records for Scotland and Public Health Scotland, supplemented by local epidemiological data.

- Stakeholder input

Interviews were undertaken with NHS Grampian health protection team, local authority protective services and NHS Grampian infection and prevention control team.

Objectives 4 to 6

The findings from objectives 1 to 3 were analysed, gaps identified and recommendations made.

Structure of report

The report is structured around the following headings:

- Chapter 1: introduction and background
- Chapter 2: aims and objectives
- Chapter 3: method
- Chapter 4: definition and current health protection arrangements
- Chapter 5: demographics
- Chapter 6: current and projected hazards to health
- Chapter 7: corporate (stakeholder) needs assessment
- Chapter 8: review and recommendations
- Chapter 9: conclusion

4 Definition and current health protection arrangements

4.1 Definitions of health protection

Section one of the Public Health etc (Scotland) Act 2008 defines the protection of public health as involving the prevention, control, and response to: infectious diseases; contamination involving biological, chemical or radioactive substances; and "other such hazards" which constitute a danger to human health.

The WHO does not provide a definition of health protection but it is mentioned as being part of their aim to support member states in strengthening their public health capacity.[4] PHS, SHPIR and SHPN do not provide definitions of health protection, but they do provide a comprehensive list of issues that fall under the remit (appendices 1 and 2). UKHSA describes the function of health protection teams as preventing and reducing the impact of "infectious diseases, chemical and radiation hazards and major emergencies".[5] NHS Education for Scotland has a definition consistent with this.[6] National guidance on the Management of Public Health Incidents defines 'hazards to health' as being biological, chemical or physical exposures through a variety of routes.[7]

HAZARDS

Infectious diseases are those caused by micro-organisms including bacteria, viruses, protozoa or fungi. Communicable diseases are infectious diseases which can be spread directly or indirectly between people. Zoonotic diseases are infectious diseases which can be spread from animals to humans (e.g., campylobacteriosis, salmonellosis, rabies). Parasitic diseases are those caused by human parasites (e.g. cryptosporidiosis, giardiasis). Non-communicable infectious diseases include those caused by micro-organisms which can't be passed between people (e.g. Legionnaire's disease). Some infectious agents have the potential to be deployed as biological weapons.

Chemicals, poisons and toxins can exist as solids, liquids or gases. They can be natural or manmade. Potentially hazardous chemicals are commonly found in industry, healthcare, workplaces and household products. Chemicals, poisons and toxins can also be developed and deployed as weapons. Hazardous chemicals and materials encompass a wide range of substances including Carbon monoxide (CO), Arsenic, Ammonia,

[4] https://www.who.int/about/what-we-do/thirteenth-general-programme-of-work-2019---2023
[5] https://www.gov.uk/guidance/contacts-phe-health-protection-teams
[6] https://www.nes.scot.nhs.uk/our-work/health-protection/#:~:text=Health%20protection%20is%20a%20term,the%20transmission%20of%20communicable%20diseases
[7] This guidance narrows the scope of health protection to involuntary exposures to infectious, chemical or physical agents. There are a far wider set of threats to human health which do not fall under the scope of health protection. These include examples such as interpersonal violence, child neglect or abuse, poverty, malnutrition, intoxication, damp or overcrowded living conditions, isolation and loneliness, sedentariness, tobacco smoking, and more. These important determinants of health are of direct relevance to public health efforts to improve health, to promote health, and to ensure equitable access to health and care services.

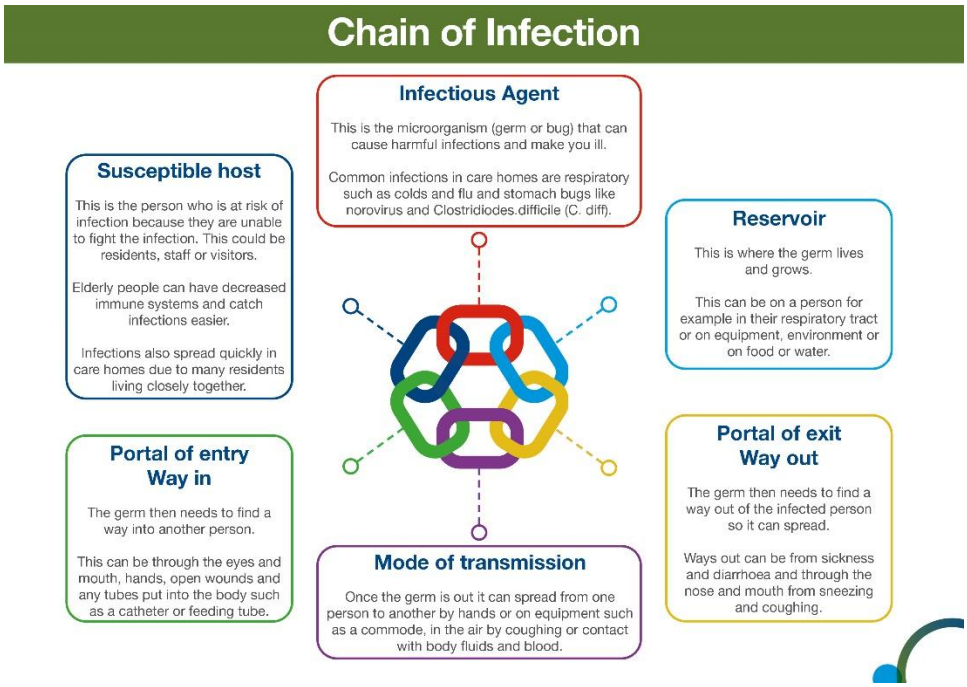
Formaldehyde, Fentanyl, Ethylene oxide (EtO), Lead, Kerosene, Mercury, Mustard gas, Sulphuric acid, Hydrochloric acid and Toluene.

Radiation is the emission of energy or particles from a source that travel through space or other mediums, and spans ultraviolet, visible and infrared light, microwaves, radio waves, X-rays and gamma rays. Radiation can occur naturally (e.g. radon gas) or be manmade. Radioactive materials are routinely used in industry and healthcare. Radioactive materials can be used as weapons. Radioactive substances include Caesium, Cobalt, Iodine, Plutonium, Strontium, Thorium and Uranium. Physical hazards can also include extreme weather events (e.g. floods), natural disasters (e.g. fires), natural particulates and human pollution.

PATHWAYS

Infected persons can transmit infectious diseases to others. **Animals**, whether domestic, agricultural or petting zoo, can be a source of, or vector for, infectious agents. **Food** can be microbiologically or chemically contaminated during production, storage, preparation or serving. **Water** can be a vector for some infectious agents; water systems can become microbiologically contaminated due to stagnation and treatment failures; potable water supplies can be microbiologically or chemically contaminated due to treatment failures or ingress to distribution systems; raw water in the sea, rivers or lochs can be contaminated by naturally occurring microbiological processes or chemical spills. **Air** can be a vector for some infectious agents and can be polluted indoors and outdoors with particulates, chemicals or radioactivity (e.g. radon gas). **Land** can become contaminated by infectious agents or chemicals.

The process of transmission of infection is commonly referred to as the 'chain of infection'. There are six links in the chain i.e., infectious agent, reservoir, portal of exit, mode of transmission, portal of entry, and susceptible host. Breaking a link of the chain can stop the transmission of infection



Source: National Services Scotland. National Infection Prevention and Control Manual Care Home Infection Prevention and Control Manual (CH IPCM)[8]

Exposures to hazards can occur in numerous **settings**, including the home, workplaces, nurseries, schools, universities, prisons, factories, hospitality settings, leisure settings, healthcare settings, social care settings, tattoo parlours, gyms, harbours and airports, farms, urban and countryside settings.

RESPONSE

Surveillance is a process for producing information that will trigger, inform or be used to evaluate defined public health action. Such actions include measures to prevent, to mitigate and/or to control hazards, routes, settings or exposures.

Prevention can involve elimination of a hazard, or barriers to contact with a hazard. Where hazards cannot be eliminated or a barrier erected, mitigations lessen the risks of harm in those exposed (e.g. vaccination). Ongoing hazards can require sustained and deliberate control measures to prevent or lessen production, dissemination or exposure.

Preparedness requires ongoing commitment to a 24/7/365 system comprising trained personnel; continually updated processes, procedures and resources; supported continuing professional development; and training exercises and simulations.

[8] https://www.nipcm.scot.nhs.uk/care-home-infection-prevention-and-control-manual-ch-ipcm/#a2820

INCIDENTS

Public health incidents can involve actual or potential population exposure to a hazard and are managed in proportion to the presenting complexity and threat. Some incidents require public health to convene an independent multiagency group to coordinate the investigation, risk assessment and management of the situation, including public communications. Public health incidents might involve a heightened risk of population exposure to a hazard, or a single case of serious illness with major public health implications (e.g. viral haemorrhagic fever), two or more linked cases suggestive of an outbreak, or any emergency situation that results in, or has the potential to result in, serious harm to the health of the public.

4.2 Health protection overview

The International Health Regulations (IHR) are coordinated globally by the World Health Organization. Implementing these nationally and locally requires arrangements to protect the health of populations from the risks of harm from biological, chemical and physical hazards through the coordinated efforts of a number of agencies and organisations. Health protection necessarily requires the involvement of a wide range agencies and organisations. Furthermore, the health protection function is supported by the wider health system that it is located in.[9] This includes equitable investment into the social and economic determinants of health (given these can be associated with exposure to hazards and to the risk of harms arising from exposure) as well as equitable population access to comprehensive primary and secondary healthcare services.

The **UK Health Security Agency** is responsible for protecting every member of every community from the impact of infectious diseases, chemical, biological, radiological and nuclear incidents and other health threats.[10] The **Animal and Plant Health Agency** is the UK agency for animal health and zoonoses.[11]

Public Health Scotland is the national public health agency and is comprised of four directorates, one of which – Clinical & Protecting Health – comprises three functions (infections service; clinical, health intelligence and research; and environment and emergency response). **Scottish Environment Protection Agency** is the national agency safeguarding Scotland's air, water and land.[12] **Food Standards Scotland** is the national agency safeguarding Scotland's food.[13] **Scottish Water** provides the public (including potable) water supply in Scotland.[14] There are notification systems and working relationships in place between the national agencies, health boards, and local authorities.

[9] https://www.who.int/news/item/19-10-2021-who-s-7-policy-recommendations-on-building-resilient-health-systems
[10] https://www.gov.uk/government/organisations/uk-health-security-agency
[11] https://www.gov.uk/government/organisations/animal-and-plant-health-agency
[12] https://www.sepa.org.uk/media/157264/sepa-framework-document.pdf
[13] https://www.foodstandards.gov.scot/
[14] https://www.legislation.gov.uk/sdsi/2014/9780111024782

NHS Grampian Health Protection Team (HPT) receives statutory notifications of infectious organisms and infectious diseases from medical practitioners, **NHS Grampian medical microbiology diagnostic laboratories** and national medical microbiology reference laboratories, and from other HPTs. The HPT works in close partnership with Local Authority protective services with regards to environmental hazards to public health. The HPT and NHS Grampian Infection Prevention and Control Team have a close working relationship. The HPT operates as part of a national obligate **Scottish Health Protection Network** that ensures provision of a coherent health protection response across Scotland.[15]

NHS Grampian **Public Health Directorate** also hosts the Grampian **Sexual Health and Blood Borne Virus Managed Clinical Network**, and provides public health input to **Alcohol and Drug Partnerships**, and population **vaccination** and **screening programmes**.

Aberdeen City Council, **Aberdeenshire Council** and **Moray Council** protective services have statutory remits including animal and pest control, contaminated land, environmental health, food safety, housing quality, noise control, refuse collection and private water supplies. Council protective services comprise environmental health officers, technical officers, and managerial and administrative staff.

4.3 Local health protection arrangements

NHS Grampian HPT comprises consultants in public health / medicine (currently <2.0 WTE), health protection nurse specialists (3.6 WTE), one advanced health protection nurse (0.6 WTE), one TB nurse specialist and two TB nurses (joint clinical and health protection roles; 3 WTE) and managerial and administrative staff, and two health protection officers (2.0 WTE). There are currently eleven Health Board Competent Persons in Grampian.[16] NHS Grampian provides a 24/7/365 health protection response. A minimum two tier out-of-hours rota is maintained 365 days per year. The first tier is provided by HPNS, Specialty Registrars and a Specialty Doctor. The second tier is based on a substantive workforce of eight CPH/M. There are close working relationships with NHS Grampian medical microbiologists and virologists, medical scientists, infection prevention and control doctors, infection prevention and control nurses, and infectious disease consultants.

Aberdeen City Council employs a Protective Services Team, which is split into Environmental Health (Environmental Protection and Commercial Team) and Trading Standards Teams. The former includes Environmental Health Officers, Authorised Officers, Scientific Officer, Pest Control and Dog Warden Service; the latter includes Trading Standards Officers and Authorised Officers. Aberdeen City Council provides a 24/7 service with an out-of-hours rota in operation 365 days per year. The out of hours service is for emergency incidents that require an immediate response.

[15] https://www.hps.scot.nhs.uk/about-us
[16] The Public Health etc. (Scotland) Act 2008 Designation of Competent Persons Regulations 2009 https://www.legislation.gov.uk/ssi/2009/301/contents/made

Aberdeenshire Council has a Protective Services Team which includes Environmental Health Officers, Authorised Officers, Technical Officers, Civic Licensing Scotland Officers, Trading Standards Officers, Enforcement Officers and Animal Health and Welfare Officers. The protective services manager has made his telephone number available for urgent out of hours issues but otherwise there is not an out of hours service provision (this is under review).

Moray Council employs environmental health officers, trading standards officers, and technical officers covering food safety, health and safety, animal health and welfare, housing conditions in additional to public health. Moray Council provides an out-of-hours emergency service who can contact one of the management team 24/7.

The **Grampian Joint Health Protection Coordinating Group** meets monthly to provide tactical oversight of health protection arrangements in the Grampian area, monitoring of progress towards JHPP priorities, and joint review of local notifications, incidents and outbreaks. Standing members include senior colleagues from HPT, infection prevention and control team (IPCT), and medical laboratories; council protective services; APHA; Health and Safety Executive; with invitation to other agencies on an as-required basis.

The **Grampian Joint Health Protection Situational Awareness Group** meets fortnightly to allow for regular sharing of intelligence and opportunities for operational planning.

Scottish Water Public Health Team, HPT and local authorities have well-established arrangements for notification of, and response to, incidents by email and telephone. Aberdeen City, Aberdeenshire and Moray Councils also collaborate closely to share knowledge and experience and ensure as much as possible a consistent approach to Public Health across the Northeast of Scotland.

The Director of Public Health, HPT and Local Authorities are represented at regular meetings of the North of Scotland Regional Resilience Partnership (NoS RRP) and Grampian Local Resilience Partnership (GLRP). HPT and Local Authority protective services participate in national working groups led by Public Health Scotland and the Scottish Health Protection Network and will increasingly do so as these are reconvened or redeveloped post-pandemic. Officers from the authorities are also members of national working groups regularly attending meetings which develop policy, advice and guidance.

4.3 Emergency planning, preparedness and response

The Civil Contingencies Act 2004 and Civil Contingencies Act 2004 (Contingency Planning) (Scotland) Regulations 2005 place statutory duties on a range of public authorities to risk assess the likelihood of threats occurring in their area, and planning to prevent or respond to these. These threats can include infectious diseases and environmental hazards. This multi-agency risk assessment work is undertaken under the auspices of the Regional Resilience Partnerships (RRP) of which there are 3 in Scotland: North RRP, East RRP and West RRP. Within each RRP area are a number of Local

Resilience Partnerships (LRPs): Grampian LRP is part of North RRP along with Tayside LRP and Highland and Islands LRP.

Regional Resilience Partnerships (RRP) and Local Resilience Partnerships (LRP) are the mechanisms in Scotland for multi-agency co-ordination of emergency planning, preparedness and response: organisations and agencies designated Category 1 and Category 2 responders under the Civil Contingencies Act 2004 comprise the **Grampian Local Resilience Partnership**: this includes **NHS Grampian**, Local Authorities (**Aberdeen City Council**, **Aberdeenshire Council**, **The Moray Council)**, Integrated Joint Boards (represented by Health and Social Care Partnerships – Aberdeen City HSCP, Aberdeenshire HSCP and Health and Social Care Moray), **Police Scotland**, **Scottish Fire and Rescue Service**, **Scottish Ambulance Service**, SEPA and MCA, along with Airport operators and Harbour authorities, transport and utility companies [17].

NHS Grampian Civil Contingencies Unit (CCU) leads and coordinates emergency preparedness on behalf of the health board, as part of a coordinated system to ensure the preparedness of public sector services for response to emergencies and major incidents. The CCU is hosted by the Public Health Directorate. An identified Consultant in Public Health / Medicine (CPH/M) provides health protection advice and specialist input to health board planning and preparedness work, as well as contributing to the public health related work of the regional and local resilience partnerships. Specific arrangements exist to provide expertise and scientific and technical advice to a multi-agency response to major incidents: the LRP may request a Scientific and Technical Advice Cell (STAC) to be convened. The STAC will be chaired by the Director of Public Health or CPH/M (unless early circumstances indicate that risks to human health are not considered to be a significant concern).[18]

4.4 Summary

NHS Grampian and associated integration authorities deliver a range of services that deliver against the health protection function. These include clinical services across primary and secondary care settings, diagnostic laboratories (with access to national reference laboratories), infection prevention and control expertise, and a civil contingencies unit and a health protection team embedded within the public health directorate. Local authorities provide the range of statutory protective services. NHS and local authority teams work routinely with national agencies in relation to health protection.

[17] https://ready.scot/how-scotland-prepares/preparing-scotland-guidance/philosophy-principles-structure-and-regulatory

[18] https://ready.scot/how-scotland-prepares/preparing-scotland-guidance/scientific-and-technical-advice-cell-stac-guidance

5 Demographics

5.1 Current population estimates

The most recent mid-year population estimates (2021) show the population of Scotland to be 5,479,900 and NHS Grampian to be 586,530.[19] These were slight rises on the previous year. Migration is the main driver for growth as deaths have outnumbered births for the seventh year in a row. The gap between births and deaths is getting wider over time.

The population of Aberdeen City was 227,430, the population of Aberdeenshire was 262,690 and the population of Moray was 96,410. All three areas had a slightly greater proportion of females compared to males, mirroring Scotland as a whole (51.2% female).

Aberdeen City showed a drop in population between 2020 and 2021, whilst Aberdeenshire and Moray's populations both rose. Some of this is explained by moves from Aberdeen City out to neighbouring areas, which is a pattern also seen in Glasgow and Edinburgh. This may reflect changes due to the COVID-19 pandemic, as people moved from cities into more rural areas due to changing work practices, wanting more outdoor space or more affordable larger housing.[20]

2020 council area profiles show that in all three local authority areas, the 75 and over age group is the smallest. In Aberdeen City, the 25 to 44 age group was the largest. In Aberdeenshire and Moray, the 45 to 64 age group was the largest.[21,22,23]

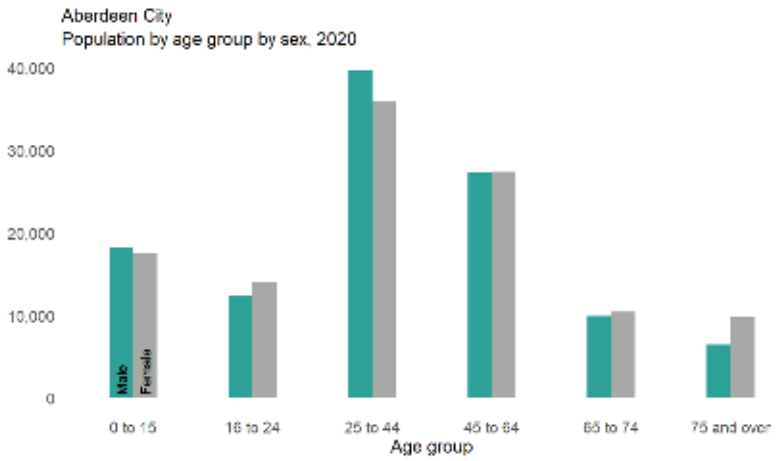


Figure 1

[19] https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates/mid-2021
[20] https://www.bbc.co.uk/news/uk-scotland-62149061
[21] https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/aberdeen-city-council-profile.html
[22] https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/aberdeenshire-council-profile.html
[23] https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/moray-council-profile.html

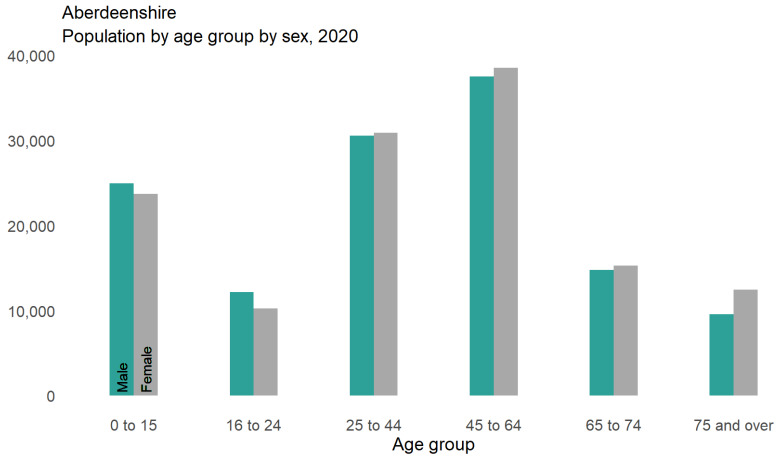


Figure 2

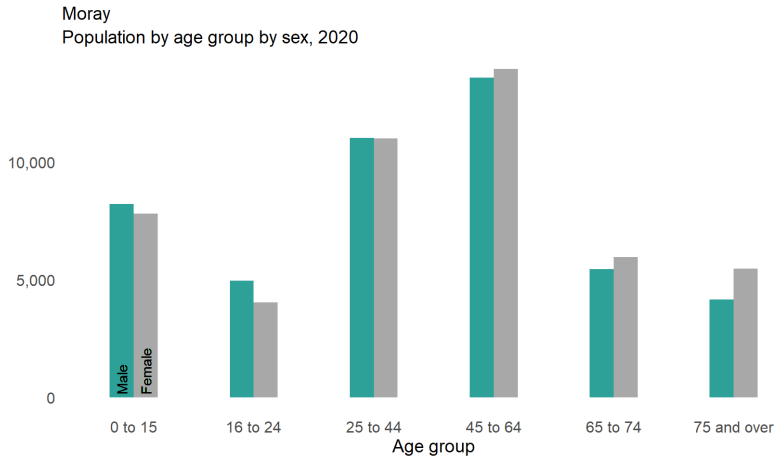


Figure 3

In 2021, around 7% of Scotland's population were non-British nationals. Over half (58%) of non-British people were EU nationals. Cities had the largest proportion of non-British residents. The highest proportions were in Edinburgh (20%) and Aberdeen (18%). The proportion of non-British residents in Aberdeenshire was 6% and in Moray was 2%. Polish was the most common non-British nationality in Scotland.[24]

5.2 Population projections

Using the most recent analysis (which is 2020 based) there is a 0.3% projected increase for the Scottish population by 2028. Migration is projected to be the only source of

[24] https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/population-by-country-of-birth-and-nationality/jul-20-jun-21

population gain. The population of Scotland is projected to decrease after 2028 due to more deaths than births outweighing any additional population from migration.[25] Council and Health Board level population projections are not being produced for 2020 data.

Using the projections available from 2018 data, will overestimate likely population increases however, these are shown here to illustrate how the age profile may change in areas.

In Aberdeen City, between 2018 and 2028, the 0 to 15 age group is projected to see the largest decrease (-3%) and the 75 and over age group is projected to see the largest increase (+16%). The 25 to 44 age group is projected to remain the largest.

In Aberdeenshire, between 2018 and 2028, the 0 to 15 age group is projected to see an even larger percentage decrease (-5%) than in Aberdeen City and the 75 and over age group is projected to see an even larger percentage increase compared to Aberdeen City (+39%). The 45 to 64 age group is projected to remain the largest

In Moray, between 2018 and 2028, the 0 to 15 age group is projected to see an even greater percentage decrease than in Aberdeen City and Aberdeenshire (-14%) and the 75 and over age group is projected to see a large percentage increase (+32%). The 45 to 64 age group is projected to remain the largest age group.

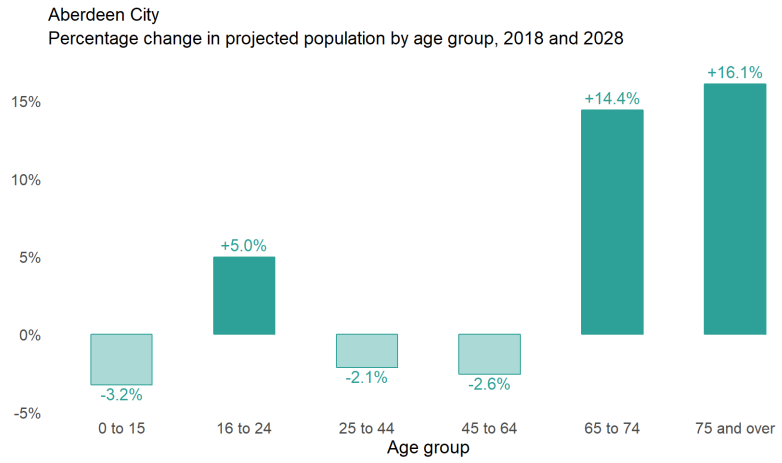


Figure 4

25 https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-projections/population-projections-scotland/2020-based

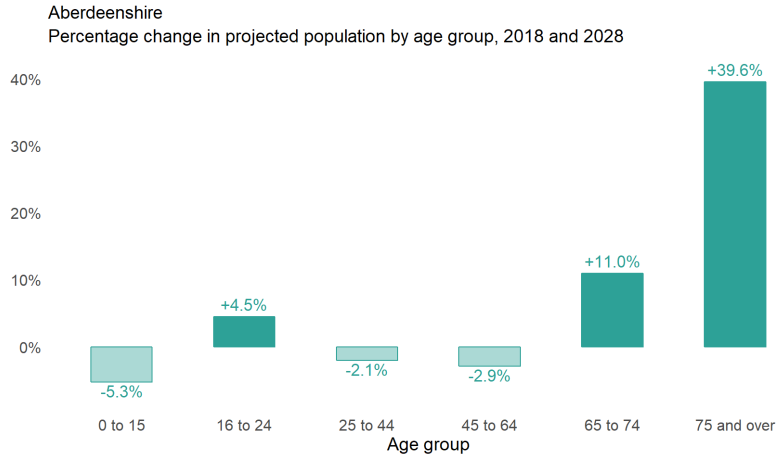


Figure 5

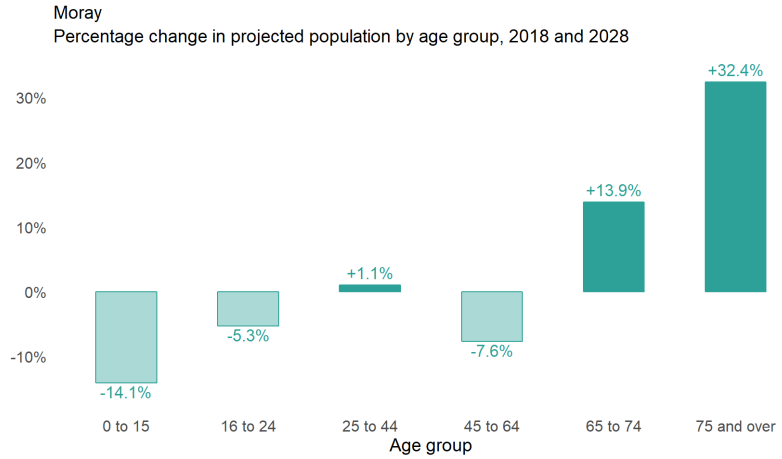


Figure 6

5.3 Life expectancy and healthy life expectancy

Scotland's life expectancy at birth in 2018 to 2020 was 81 years for females and 77 years for males. This was a drop from the previous year's estimate by 6 weeks for females and almost 18 weeks for males and is the largest annual decrease since records began. The predominant reason for the drop was COVID-19 deaths.[26] In general, life expectancy has been increasing over recent decades. However, the rate of improvement has slowed over the past ten years.[27]

[26] https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/life-expectancy/life-expectancy-in-scotland/2018-2020

[27] https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/life-expectancy/healthy-life-expectancy-in-scotland/2018-2020

During 2018-2020, Aberdeen City life expectancy at birth was 81 for females and 77 for males. In Aberdeenshire, it was 82 for females and 79 for males. And in Moray, it was 82 years for females and 79 for males.

The most recent healthy life expectancy (HLE) figures for Scotland (2018 - 2020) show that HLE for both males and females has decreased over the previous year (2017 - 2019).

The Scottish average for male HLE at birth was 61 years. The Grampian health board area had the seventh highest male HLE at birth in Scotland (63 years). Male HLE at birth for Aberdeen City was 58 years (below the Scottish average), Aberdeenshire was 67 years and Moray was 62 years.

For females, the Scottish average was 62 years. The Grampian health board area had the sixth highest HLE at birth in Scotland (64 years). Female HLE at birth for Aberdeen City was 61 (below the Scottish average), Aberdeenshire was 66 years and Moray was 63 years.

The gap in HLE at birth between the most and least deprived areas was 24 years for males and 24 years for females. Both males and females in the most deprived areas spend more than a third of their life in poor health.

5.4 The Scottish Index of Multiple Deprivation

The most recent Scottish Index of Multiple Deprivation (SIMD) was published in 2020. Despite not having the greatest proportion of deprived datazones in local authorities in Scotland, there are geographical areas of socioeconomic deprivation within Grampian.[28]

Low income neighbourhoods can expose residents to greater environmental hazards.[29] In addition, infections can spread more easily in over-crowded conditions and amongst populations who have fewer opportunities to stay at home when symptomatic. Cold and damp housing, malnutrition, smoking and alcohol and drug use, can also increase the risk of infection after exposure. Access to information and advice, knowledge and understanding, socialised custom and practice, can all influence risk perception and behaviour.

5.5 Summary

Scotland's population is ageing, with the population projected to decrease after 2028 due to deaths outweighing any births, with insufficient inward migration to mitigate this. Although there are not up to date population projections at a small area level, older estimates show that the population within NHS Grampian is projected to age, with decreases in the proportions of 0 to 15 year olds, and rises the proportions of individuals aged 75 and older. This data suggest that these patterns will be more pronounced in Aberdeenshire and Moray than in Aberdeen City.

[28] https://www.gov.scot/publications/scottish-index-of-multiple-deprivation-2020v2-data-zone-look-up/
[29] https://doi.org/10.1093/eurpub/ckp221

In general, Grampian has less deprived areas than other regions in Scotland. But this can mask the fact there are areas of high deprivation. Looking at averages can mask this and risk ignoring vulnerable populations.

Life expectancy in all three local authority areas was higher than the Scottish figures, particularly so in Aberdeenshire and Moray. Healthy life expectancy in Grampian is higher than the Scottish average, although this is driven predominantly by high HLE in Aberdeenshire. HLE in Aberdeen City was lower than the Scottish average. There are large discrepancies between HLE in deprived and less deprived areas, and the relatively high HLE in Aberdeenshire is likely linked strongly to there being fewer deprived datazones compared to other areas in Grampian.

A recent drop in life expectancy nationally is predominantly due to COVID-19 deaths, indicating the impact of new infections on the population. However, this is on a background of a slowing or even a reduction in LE and HLE nationally. This is reflected in many other developed countries.

Currently, Aberdeen City has a larger proportion of a younger working age population compared to Aberdeenshire and Moray. However, all areas in Grampian will face challenges as the proportion of the working age population reduces. From the NHS Grampian and HPTs perspective this could lead to greater workforce challenges. There will also be a rise in older people who may need care, particularly if HLE reduces. Increasing social care needs can impact on the HPT in the form of a rising care-related workload.

Aberdeen City in particular shows great diversity in population, with almost 1 in 5 individuals being a non-British national. This is likely reflective of the international nature of the Aberdeen economy due to the oil and gas industry and the presence of a number of large higher education institutions. The oil and gas industry is an international industry, meaning there are greater opportunities for imported infections due to travel. Current and projected hazards to health.

6. Current and projected hazards to health

6.1 Notifiable diseases/organisms

Notifiable diseases and organisms are set out in Schedule 1 of the *Public Health Etc (Scotland) Act 2008* (appendix 3). The following sections set out the recent epidemiology of notifiable disease and organisms in Grampian.

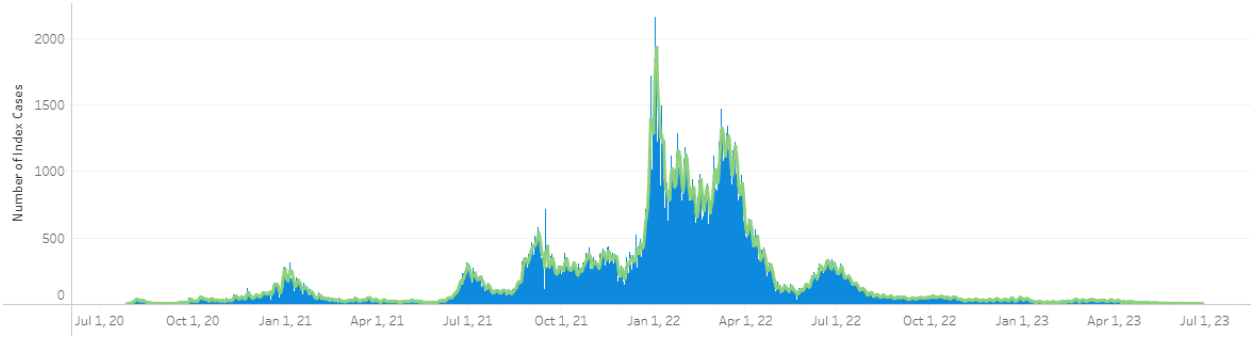
6.1.1. Respiratory infections

- **COVID-19 (SARS-CoV-2)**

Infectious agent: virus (SARS-CoV-2) Status: notifiable as a disease (COVID-19) and organism (SARS-CoV-2) Transmission: droplet / airborne Pathogenicity: from asymptomatic to severe disease and death Primary prevention: vaccination, droplet / airborne precautions, environmental and personal hygiene

SARS-CoV-2 was an emergent virus in 2019 that caused a global pandemic starting in 2020. The disease is now endemic in Scotland and the UK.

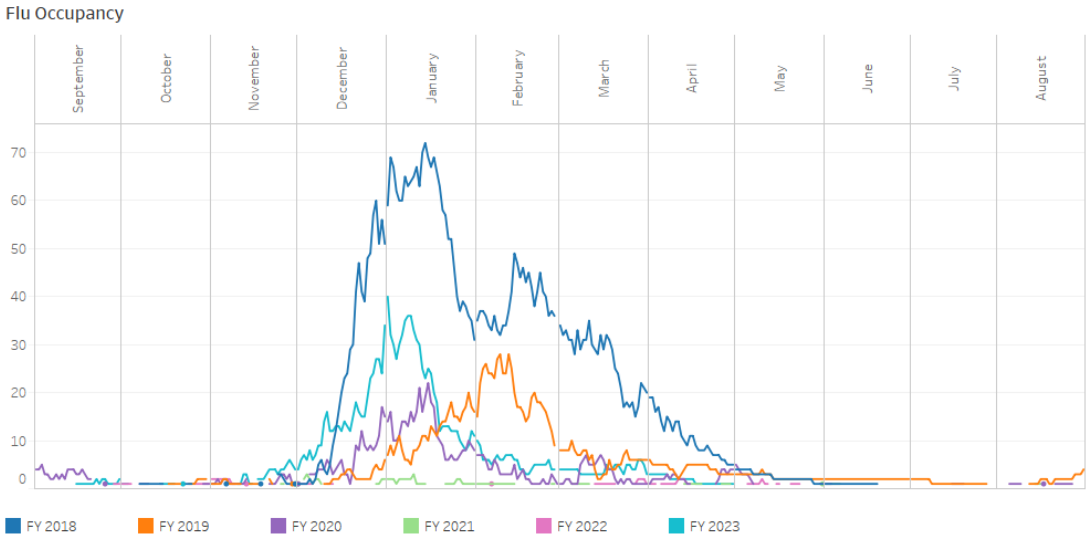
The figure shows the number of laboratory confirmed cases on a daily basis in Grampian since the start of the pandemic (3-day rolling average in green). Note that case notifications were influenced by the availability of testing, which changed over the course of time. Of note, there is no testing other than for symptomatic hospital inpatients and care home residents now.



- **Influenza**

Infectious agent: virus (influenza virus) Status: notifiable organism Transmission: droplet / airborne Pathogenicity: from asymptomatic to severe disease and death Primary prevention: vaccination, droplet / airborne precautions, environmental and personal hygiene

Influenza is a viral infection and a significant cause of excess hospitalisations and deaths during the winter months. Influenza can increase the risk of secondary bacterial infections including pneumonia and meningococcal disease. The figure shows hospital occupancy data in Grampian for the past five years.



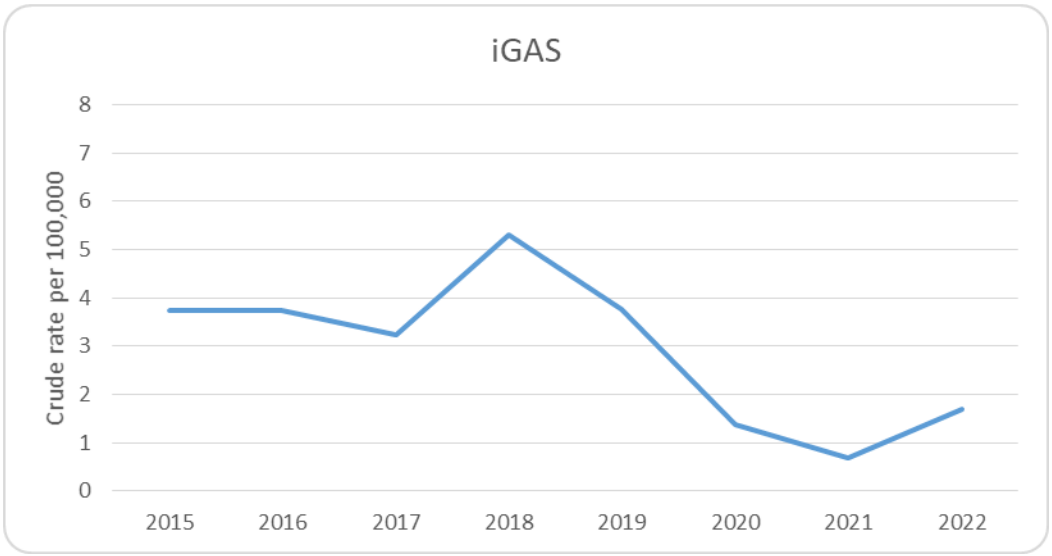
- **Group A Streptococcus**

Infectious agent: bacteria (*Streptococcus pyogenes*)
Status: notifiable as an invasive disease (necrotising fasciitis) and invasive organism
Transmission: droplet, direct contact, fomite
Pathogenicity: from asymptomatic carriage to severe disease and death
Primary prevention: droplet / airborne precautions, environmental and personal hygiene

Group A streptococcus commonly colonises the skin, nose and throat. It can cause a range of disease from soft tissue infections, impetigo, tonsillitis and scarlet fever, through to more severe, invasive infections including toxic shock syndrome and necrotising fasciitis. Invasive disease sometimes follows an earlier viral illness. The incidence of invasive group A streptococcal disease decreased during the Covid-19 pandemic, but began increasing in late 2022. There has been a resurgence of invasive group A streptococcal infections during 2023 (data not shown).

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of invasive Group A Streptococcal (iGAS) infections in Grampian								
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	22	22	19	31	22	8	<5	10



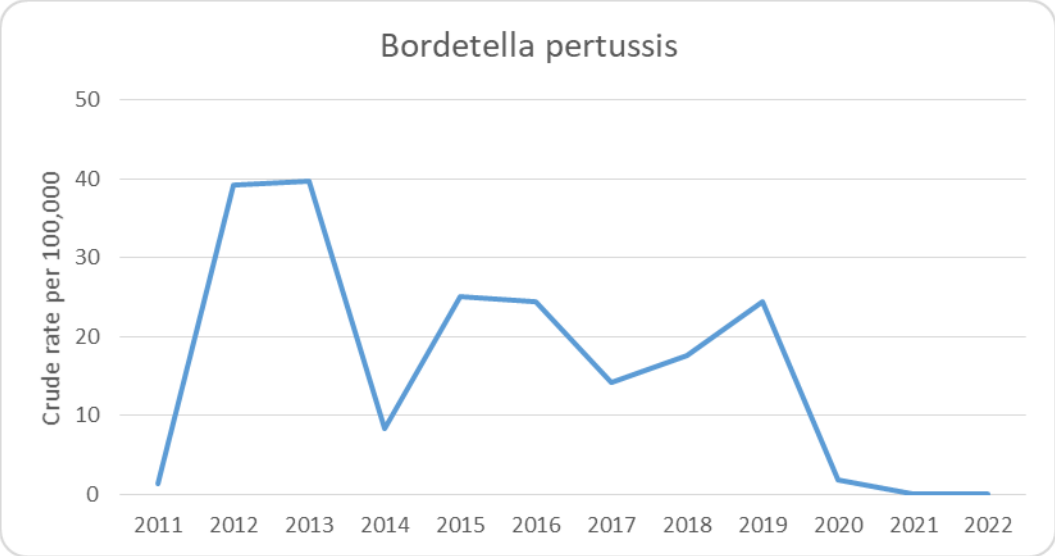
- **Pertussis (whooping cough)**

Infectious agent: bacteria (*Bordetella pertussis*)
Status: notifiable organism
Transmission: droplet
Pathogenicity: infants at greater risk of severe disease
Primary prevention: vaccination (maternal and infant)

Whooping cough remains a significant threat to infants. The incidence of whooping cough declined during the Covid-19 pandemic. The risk of a resurgence remains.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of *Bordetella pertussis* in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	8	225	230	49	147	144	83	103	143	11	0	0



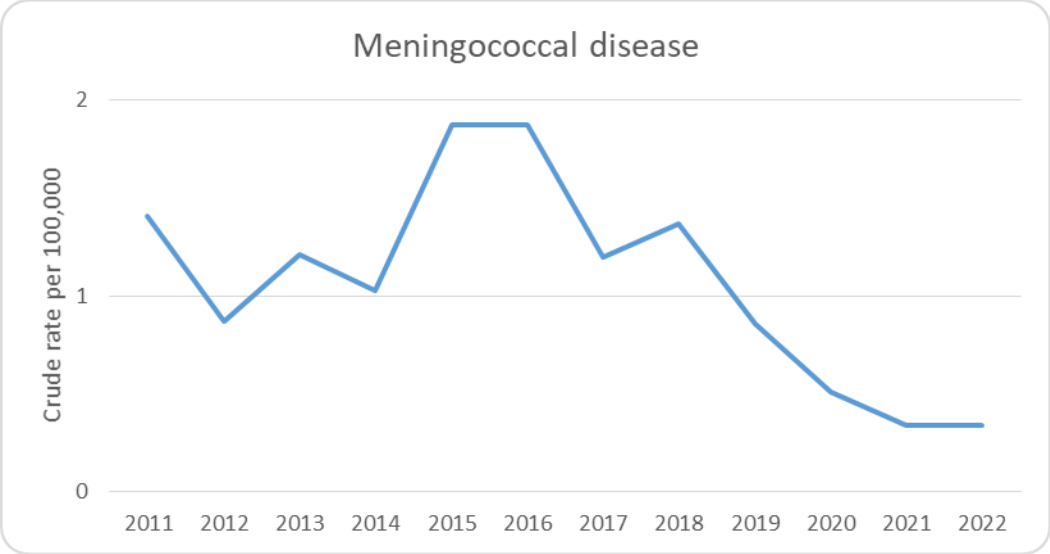
- **Meningococcal disease**

Infectious agent: bacteria (*Neisseria meningitidis*)
Status: notifiable disease and notifiable organism
Transmission: droplet
Pathogenicity: from asymptomatic carriage to severe disease and death
Primary prevention: vaccination

Neisseria meningitidis commonly colonises the nose and throat. It can cause severe invasive disease including meningitis and septicaemia. Vaccination against *N meningitidis* was initially introduced in 1999, with a further introduction of vaccination against the B serotype in 2015. Incidence of meningococcal disease has reduced and remains low.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of meningococcal meningitis or septicaemia in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	8	5	7	6	11	11	7	8	5	3	0	<5



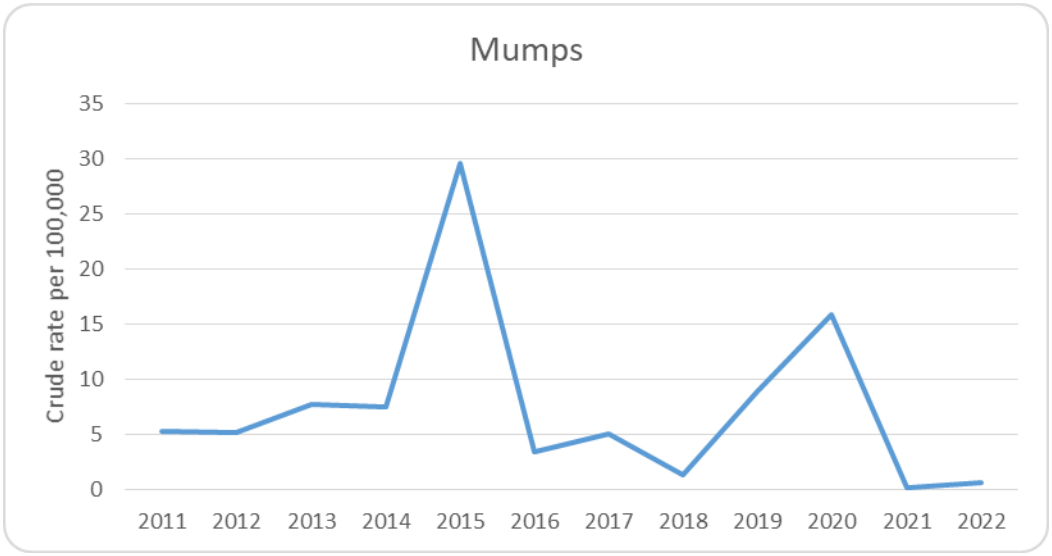
- **Mumps**

Infectious agent: virus (mumps virus)
Status: notifiable disease and notifiable organism
Transmission: droplet
Pathogenicity: usually self-limiting illness, though risk of complications (viral meningitis, pancreatitis, orchitis, arthritis, myocarditis)
Primary prevention: vaccination

Mumps is usually a self-limiting illness but can cause a range of complications. Mumps is usually clinically notified. There is a likely to be an under-ascertainment of infection in the population.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of mumps in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	30	30	45	44	174	20	30	8	52	93	<5	<5



- **Tuberculosis (TB)**

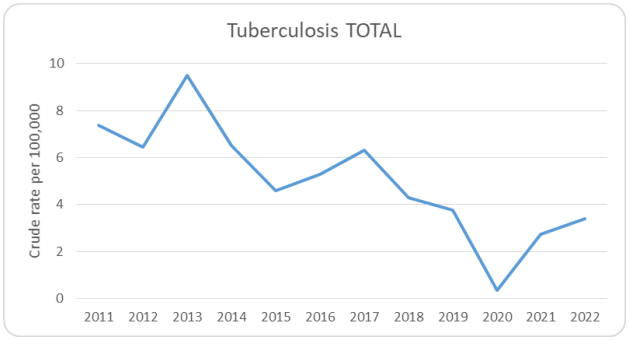
Infectious agent: bacteria (*Mycobacterium tuberculosis complex* and *Mycobacterium bovis*)
Status: notifiable disease and notifiable organism
Transmission: airborne
Pathogenicity: from asymptomatic primary infection, to latent infection, through to active disease which can cause death if untreated
Primary prevention: vaccination

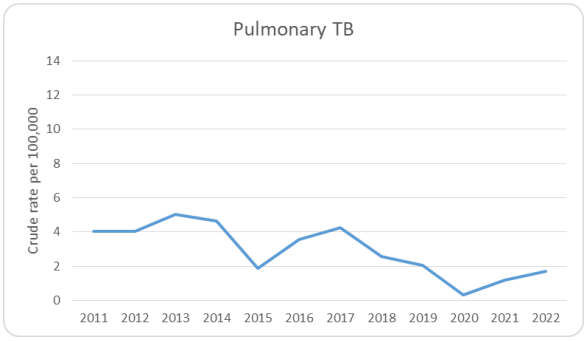
Untreated tuberculosis is a fatal disease. Those who have active infection in their lungs ('pulmonary TB') can be infectious to others. TB can cause infection in tissues throughout the body. Screening of contacts can identify 'latent' TB. This can be treated to prevent active infection in the future.

The incidence of active tuberculosis has reduced over the past decade. (Latent case data not shown.)

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of tuberculosis in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
All tuberculosis	42	37	55	38	27	31	37	25	22	<5	16	20
Pulmonary tuberculosis	23	23	29	27	11	21	25	15	12	<5	7	10





6.1.2 Gastrointestinal infections and zoonoses

Campylobacteriosis

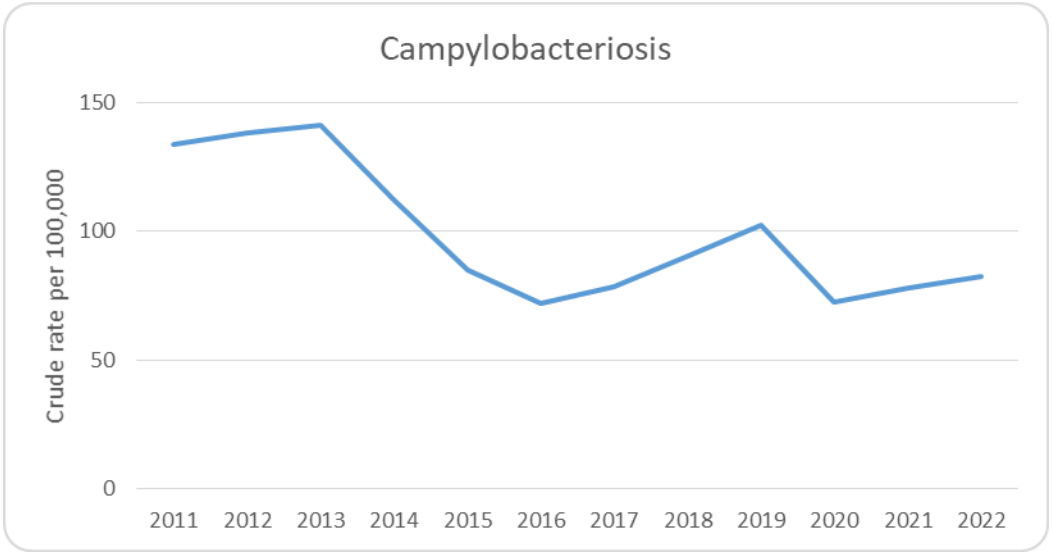
Infectious agent: bacteria (*Campylobacter*)
Status: notifiable organism
Transmission: foodborne, waterborne
Pathogenicity: usually self-limiting diarrhoeal illness, though risk of prolonged illness and complications (arthritis, Guillain-Barré syndrome)
Primary prevention: pasteurisation, food production controls, food hygiene, sanitation, handwashing

Campylobacter is a common cause of infectious diarrhoea, often associated with contaminated raw poultry and failures in food hygiene.

The incidence of campylobacteriosis has declined over the past decade.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of campylobacteriosis in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	763	792	819	657	500	423	460	530	600	426	457	485



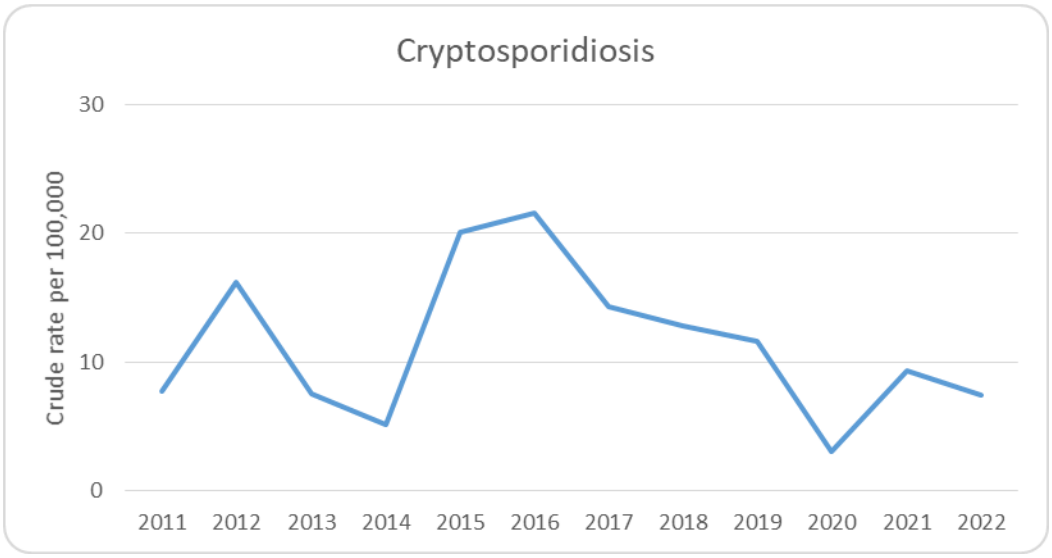
- **Cryptosporidiosis**

Infectious agent: protozoa (*Cryptosporidia*)
Status: notifiable organism
Transmission: faecal-oral, waterborne
Pathogenicity: self-limiting diarrhoeal illness, severe in immunocompromised people
Primary prevention: handwashing, sanitation / water treatment

Cryptosporidia cause an infectious diarrhoea, usually associated with contaminated water supplies or contact with animals. Scottish Water have made significant investment in membrane filters in their water treatment works to remove *cryptosporidia* from raw water.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of cryptosporidiosis in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	44	93	44	30	118	127	84	75	68	18	55	44



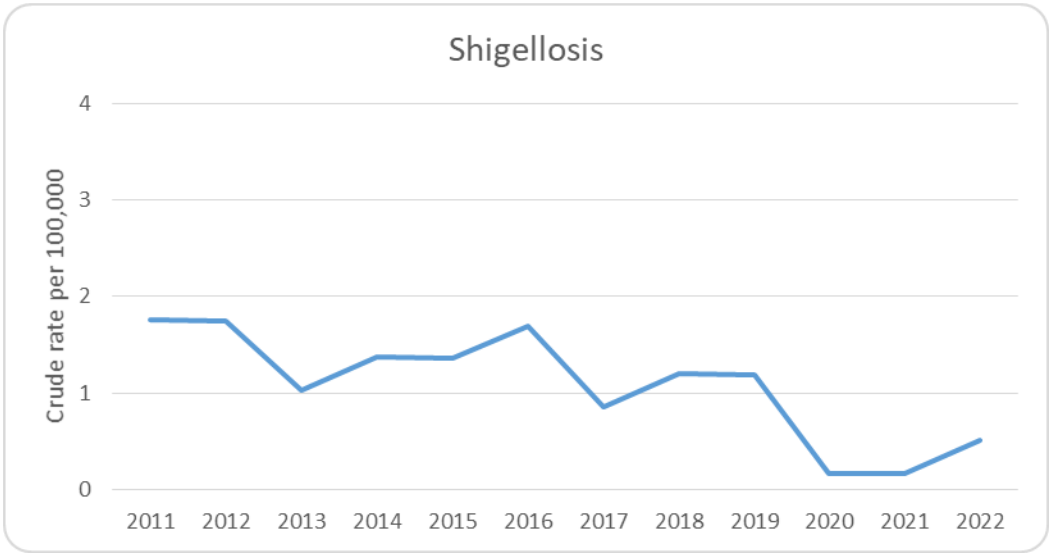
- **Shigellosis** (dysentery)

Shigellosis is causes by four species of *Shigella* bacteria. The endemic species tends to cause milder illness, while imported species can cause more severe disease.

Infectious agent: bacteria (*Shigella species*)
Status: notifiable organism
Transmission: faecal-oral, foodborne, waterborne, sexual
Pathogenicity: self-limiting to severe illness requiring hospitalisation
Primary prevention: handwashing, sanitation

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of shigellosis in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	10	10	6	8	8	10	5	7	7	<5	<5	<5



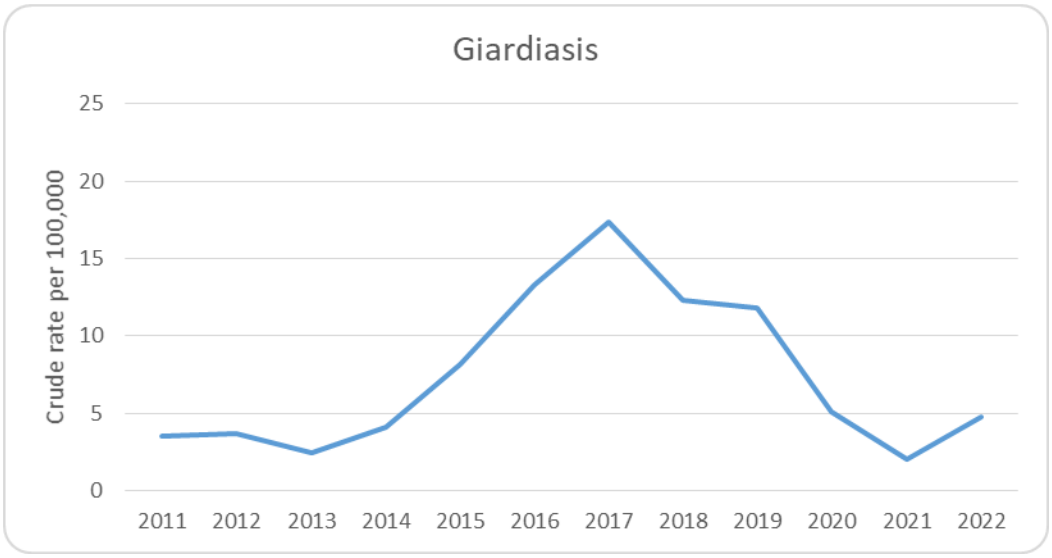
Giardiasis

Grampian has one of the highest incident rates of giardiasis in Scotland.[30] The conventional hypothesis that cases are most often associated with overseas travel has been recently questioned. Private water supplies may be an important exposure hazard.[31]

Infectious agent: protozoa (*Giardia*)
Status: notifiable organism
Transmission: faecal-oral, waterborne, foodborne
Pathogenicity: asymptomatic infection or carriage through to prolonged gastroenteritis
Primary prevention: handwashing, sanitation / water treatment, food hygiene

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of giardiasis in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	20	21	14	24	48	78	102	72	69	30	12	28



[30] https://doi.org/10.1186/s13071-020-04160-9
[31] https://doi.org/10.1016/j.crpvbd.2022.100084

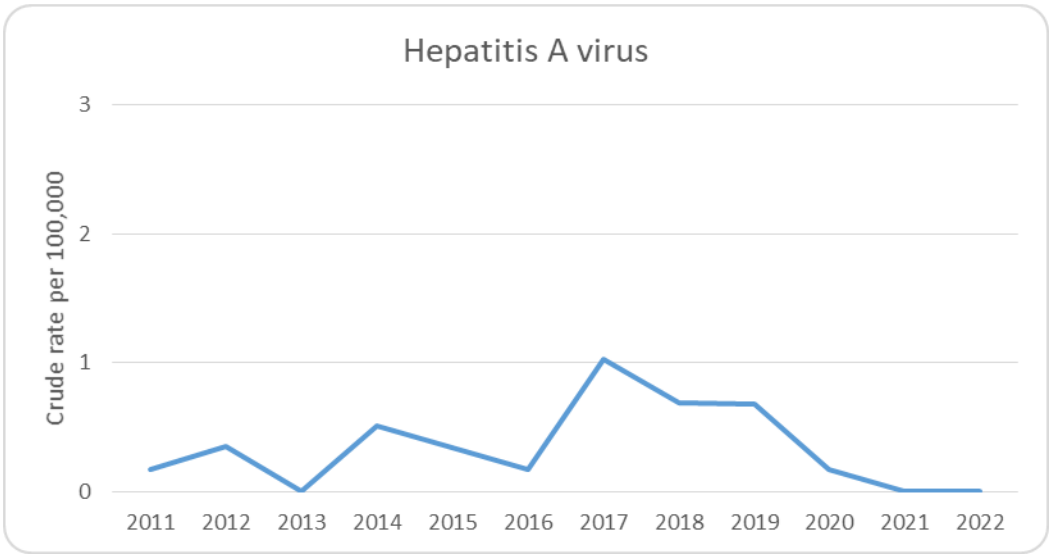
Hepatitis A

Infectious agent: virus (hepatitis A virus)
Status: notifiable organism
Transmission: faecal-oral, foodborne, waterborne, sexual
Pathogenicity: asymptomatic to sudden liver failure
Primary prevention: handwashing, sanitation, food hygiene, vaccination

Hepatitis A virus is a relatively rare infection in Scotland. Its significance arises from the potential for asymptomatic infection and transmission in children and serious complications in adults.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of hepatitis A in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Hepatitis A virus	<5	<5	0	<5	<5	<5	6	<5	<5	<5	0	0



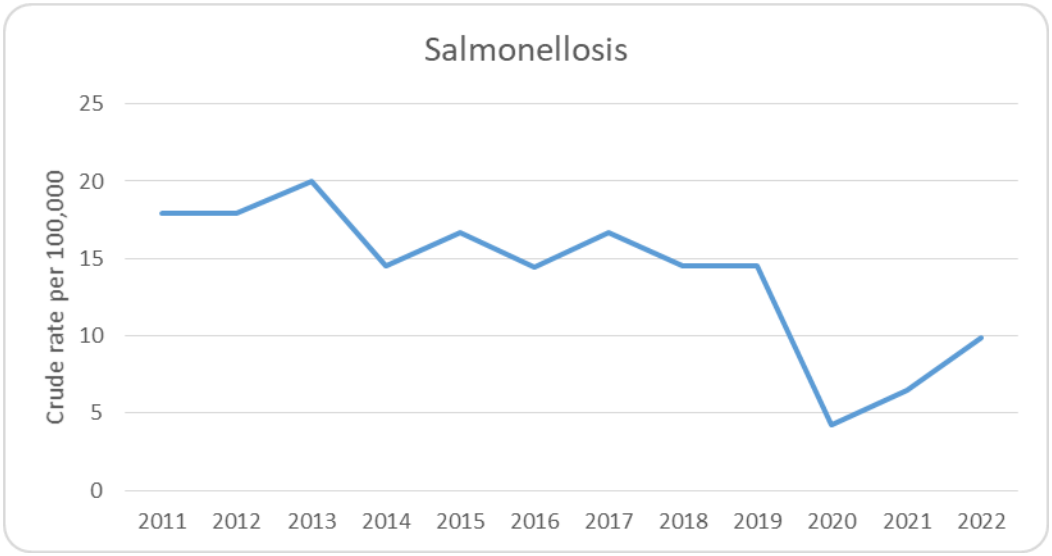
Salmonellosis

Infectious agent: bacteria (*Salmonella*)
Status: notifiable organism
Transmission: foodborne, zoonotic (including pet reptiles), faecal-oral
Pathogenicity: self-limiting through to invasive complications and death
Primary prevention: poultry vaccination, food production controls, food hygiene

Salmonella is a relatively common cause of infectious diarrhoea, often associated with poultry and failures in food hygiene.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of salmonellosis in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Salmonella	102	103	116	85	98	85	98	85	85	25	38	58



Shiga-toxin-producing *E coli* (O157 / VTEC / STEC)

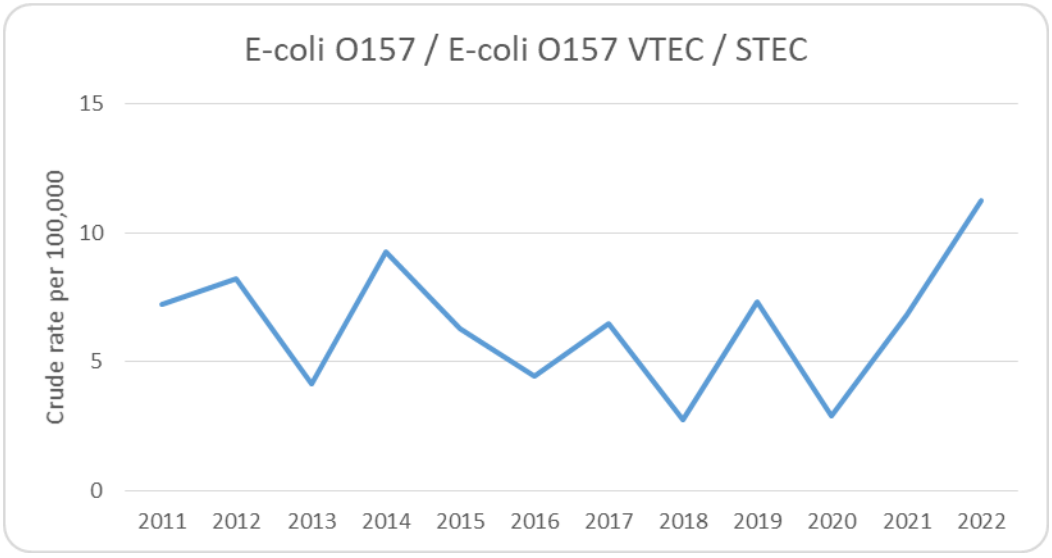
Infectious agent: bacteria (Shiga toxin-producing *Escherichia coli*)
Status: notifiable disease (haemolytic uraemic syndrome) and notifiable organism
Transmission: faecal-oral, foodborne, waterborne
Pathogenicity: asymptomatic to severe illness requiring hospitalisation, complications can cause disability or death
Primary prevention: food production controls, food hygiene, pasteurisation, handwashing, sanitation / water treatment

A toxin produced by certain strains of enterohaemorrhagic *Escherichia coli* can cause haemolytic uraemic syndrome, characterised by haemolytic anaemia, thrombocytopenia, and acute renal failure. This can lead to disability or death, especially in young children or older adults.

Grampian has one of the highest rates of infection in Scotland.[32] This will likely reflect the reservoir of infection (ruminant animals) and potential routes of infection (environmental contamination, private water supply contamination).

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of *E coli* O157 / VTEC / STEC in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	41	47	24	54	37	26	38	16	43	17	40	66



[32] https://www.publichealthscotland.scot/publications/stec-in-scotland-enhanced-surveillance-and-reference-laboratory-data

Typhoid and paratyphoid

Infectious agent: bacteria (*Salmonella typhi* and *Salmonella paratyphi*)
Status: notifiable diseases (typhoid and paratyphoid) and notifiable organisms
Transmission: faecal-oral
Pathogenicity: both potentially severe, untreated typhoid is fatal in 10-15% of cases
Primary prevention: handwashing, sanitation, food hygiene

Enteric fever is a rare imported infection. Its importance relates to the potential for foodborne spread and severe outcomes.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of typhoid and paratyphoid in Grampian

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Typhoid	<5	<5	<5	<5	0	<5	<5	0	<5	0	0	<5
Paratyphoid	<5	0	0	<5	0	0	<5	0	0	0	0	<5

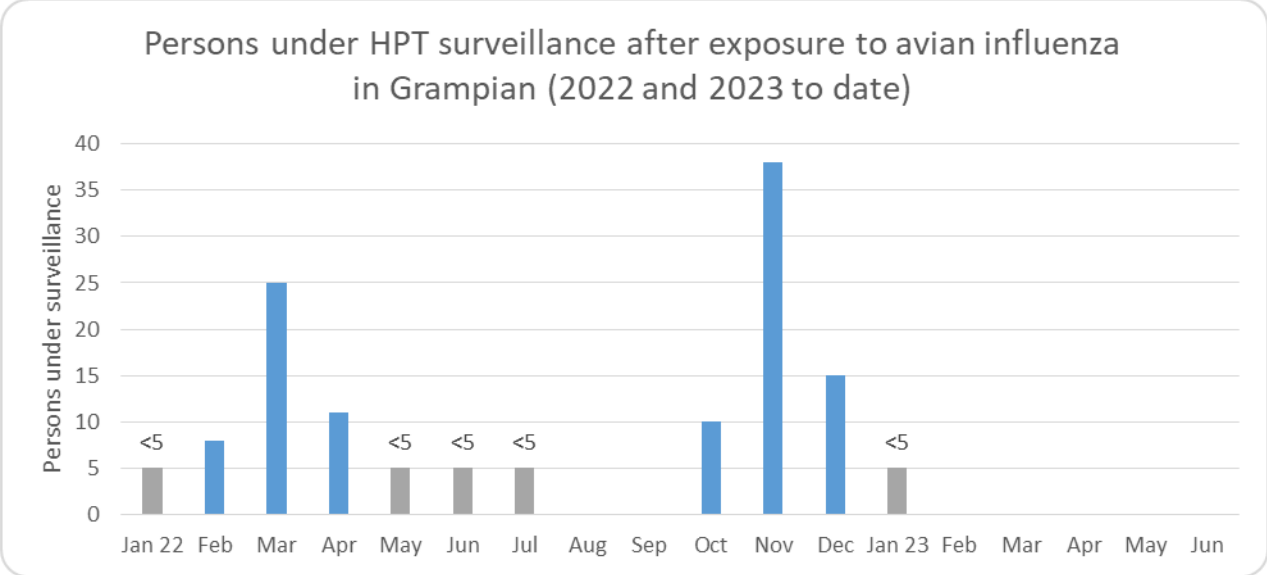
6.1.3 Other zoonoses

Avian influenza

Infectious agent: virus (influenza virus subtypes H5N1, H7N9, H5N6 and H5N8) Status: notifiable animal disease Transmission: airborne Pathogenicity: risk of transmission to humans is low, but high case fatality rate Primary prevention: infection control measures for poultry workers, timely poultry outbreak detection and culling

A significant global outbreak of avian influenza in birds was observed in 2022.[33] The spread of infection to mammals highlights the potential for antigenic shifts to produce a human pandemic subtype.[34] Persons exposed to infected poultry flocks are provided with HPT follow-up throughout the potential incubation period. No cases of human infection have been detected in Grampian.

The figure below shows the number of persons kept under health protection surveillance after being identified as having been exposed to infected birds.



[33] https://www.bbc.co.uk/news/science-environment-63097119
[34] https://www.nature.com/articles/s41577-023-00868-8

6.1.4 Sexually Transmitted Infections and blood borne viruses

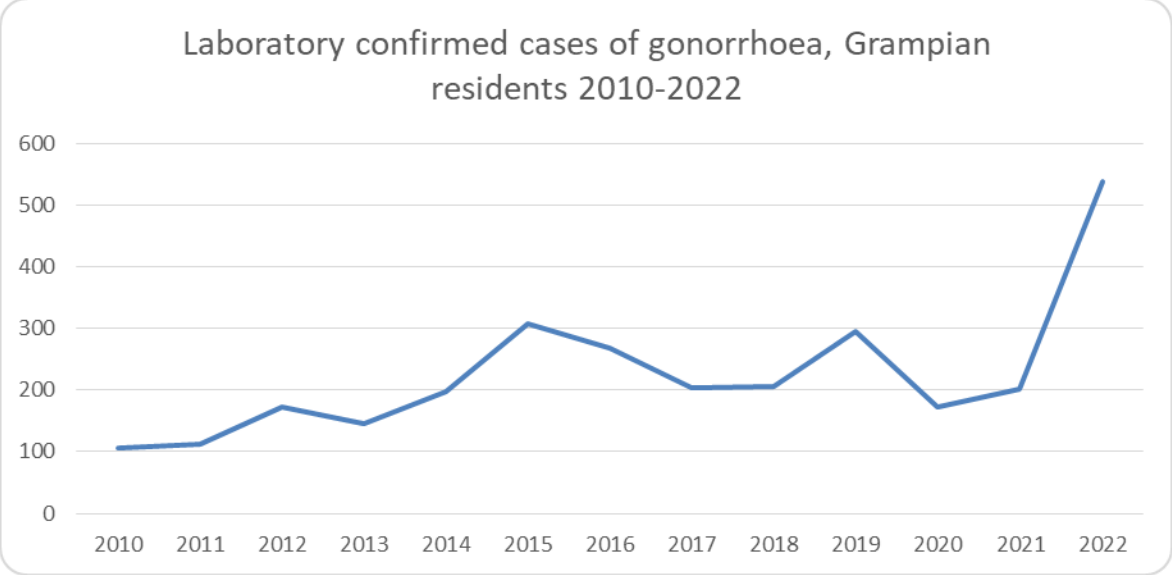
Gonorrhoea

Infectious agent: bacteria (*Neisseria gonorrhoeae*)
Status: not notifiable
Transmission: sexual
Pathogenicity: asymptomatic to symptomatic urethritis with secondary complications including pelvic inflammatory disease, septic arthritis, conjunctivitis
Primary prevention: condom use

A significant increase in incidence was observed in Grampian as across Scotland in 2022, with a continuing increase during 2023 (data not shown).[35] The increase is attributed to reduced access to asymptomatic and symptomatic testing during the pandemic.

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Lab confirmed cases	105	113	173	146	198	307	269	204	205	294	173	201	539



[35] https://www.publichealthscotland.scot/publications/gonorrhoea-infection-in-scotland

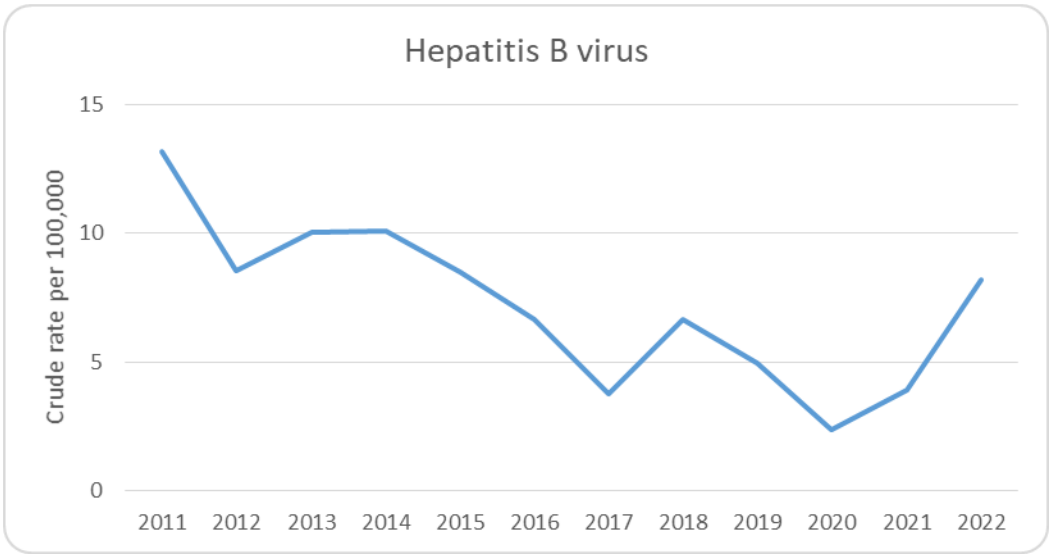
Hepatitis B

Hepatitis B virus usually causes an acute self-limiting illness, but in a proportion of cases infection will become chronic. Chronic infection is associated with long-term liver disease.

Infectious agent: virus (hepatitis B virus)
Status: notifiable organism
Transmission: bloodborne, vertical, sexual
Pathogenicity: can cause cirrhosis, liver cancer, liver failure
Primary prevention: vaccination, needle exchanges / single use needles / piercing equipment, blood donation screening, condom use

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of hepatitis B in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	75	49	58	59	50	39	22	39	29	14	23	48



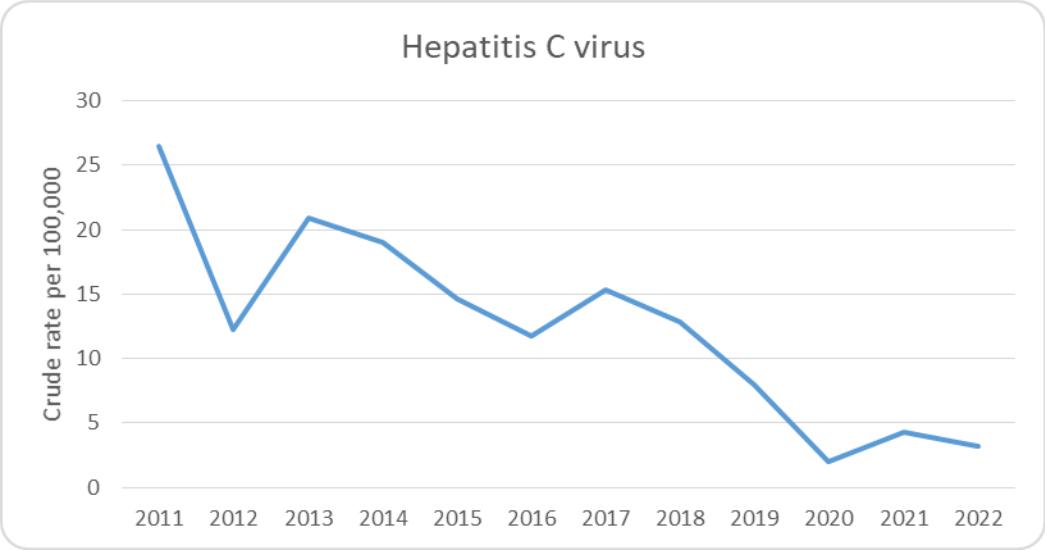
Hepatitis C

Hepatitis C virus can cause an acute self-limiting illness, but over half of those infected will develop chronic infection. Chronic infection is associated with long-term liver disease.

Infectious agent: virus (hepatitis C virus)
Status: notifiable organism
Transmission: bloodborne, vertical, sexual
Pathogenicity: can cause cirrhosis, liver cancer, liver failure
Primary prevention: needle exchanges, single use needles / piercing equipment, blood donation screening, condom use

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notifications of hepatitis C in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	151	70	121	111	86	69	90	75	47	12	25	19



6.2 Healthcare associated infections

NHS Grampian Infection Prevention and Control Team undertake surveillance of healthcare associated infections and follow-up on any alert organism or condition as per appendix thirteen of the national infection prevention and control manual.

Nationally, Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) Scotland collate and publish healthcare associated infection data.[36] Three key indicator infections are *Clostridioides difficile* infection (CDI), *Escherichia coli* bacteraemia (ECB) and *Staphylococcus aureus* bacteraemia (SAB).[37]

6.3 Antimicrobial resistance

Antimicrobial resistance refers to the loss of drugs' ability to kill or slow the growth of infection causing microbes.[38] This has the potential to lead to significantly increased morbidity and mortality in the population.[39] Factors associated with the rise of antimicrobial resistance are over-prescribing of antibiotics, non-completion of prescribed treatment courses, over-use of antibiotics in livestock and fish farming.

Antimicrobial Resistance & Healthcare Associated Infection (ARHAI) Scotland lead on a range of healthcare and 'One Health' (combined human, animal and environment) programmes across Scotland.[40] This includes hospital screening programmes for multi-drug resistant organisms.[41] Screening is undertaken with at-risk patients for methicillin-resistant *Staphylococcus aureus* (MRSA) and carbapenemase-producing *Enterobacteriaceae* (CPE) screening, both of which are notifiable under public health legislation, as well as Vancomycin Resistant Enterococci (VRE) and Extended Spectrum beta-lactamase production (ESBL). Surveillance helps with monitoring the prevalence of such organisms in the population.[42]

[36] https://www.nss.nhs.scot/publications/quarterly-epidemiological-data-on-clostridioides-difficile-infection-escherichia-coli-bacteraemia-staphylococcus-aureus-bacteraemia-and-surgical-site-infection-in-scotland-october-to-december-q4-2022/
[37] https://www.nss.nhs.scot/publications/healthcare-associated-infections-2020-annual-report/; https://www.nss.nhs.scot/publications/arhai-scotland-2021-annual-report/
[38] https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance
[39] https://www.ecdc.europa.eu/en/antimicrobial-resistance
[40] https://www.nss.nhs.scot/browse/antimicrobial-resistance-and-healthcare-associated-infection
[41] https://www.nss.nhs.scot/antimicrobial-resistance-and-healthcare-associated-infection/data-and-intelligence/multi-drug-resistant-organism-admission-screening/
[42] https://www.nss.nhs.scot/media/3394/sonaar-2021-report.pdf

6.4 Environmental hazards

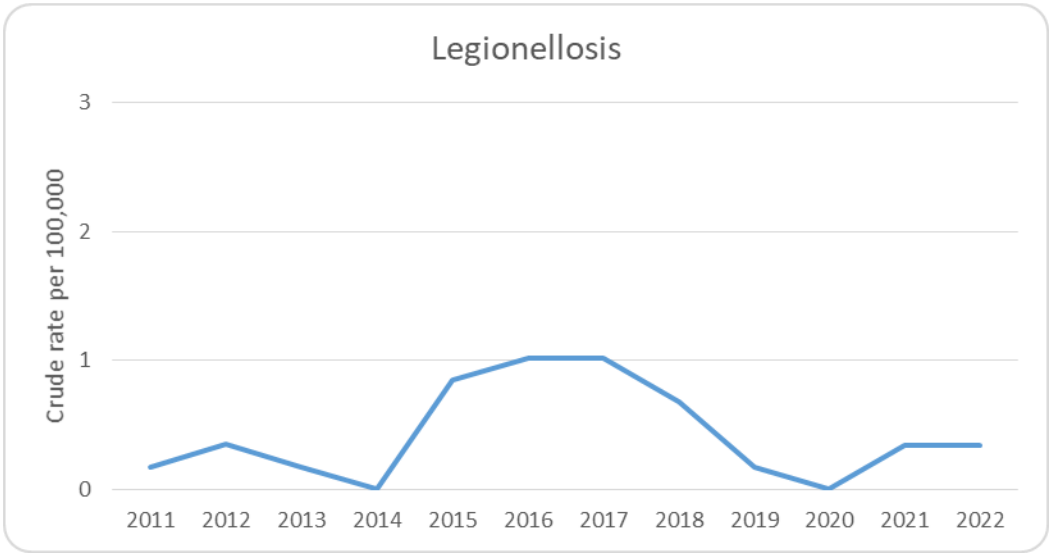
Legionellosis

Legionella is a ubiquitous environmental bacteria that grows in water at temperatures of 20-45°C. Contaminated water systems that produce aerosols increase the risk of inhalation of the bacteria, which can cause severe pneumonia ('Legionnaire's disease').

Infectious agent: bacteria (*Legionella genus*)
Status: notifiable organism
Transmission: aerosolised water
Pathogenicity: mild (Pontiac disease) to severe (Legionnaire's disease)
Primary prevention: water system controls and regulations (health and safety)

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notified cases of legionnaire's disease in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Notified cases	<5	<5	<5	0	5	6	6	<5	<5	0	0	<5



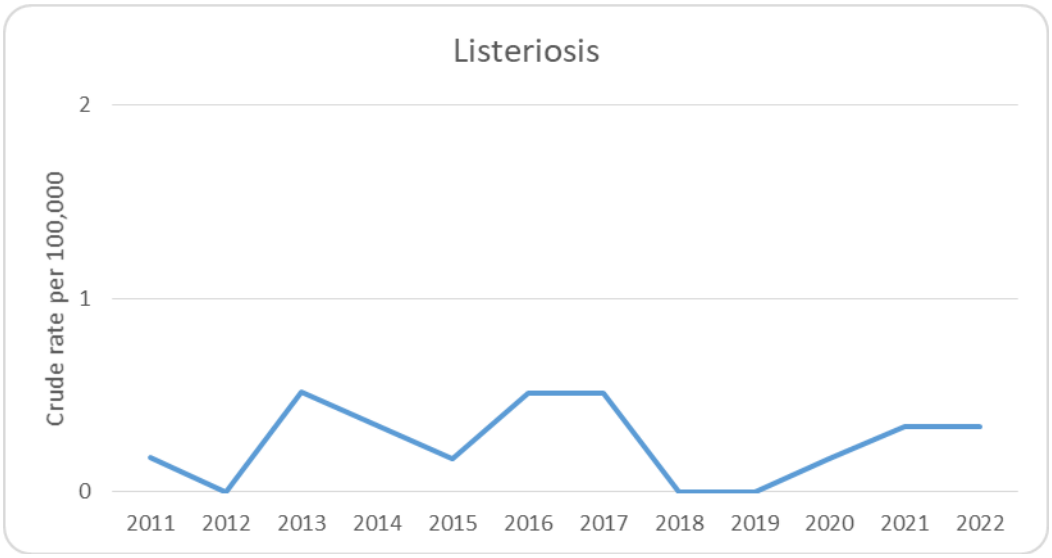
Listeriosis

Listeria is a ubiquitous environmental bacterium that can contaminate ready to eat foods. It can cause a self-limiting flu-like-illness in health adults, but life-threatening invasive disease in pregnancy or immunosuppressed or elderly persons.

Infectious agent: bacteria (*Listeria monocytogenes*)
Status: notifiable organism
Transmission: foodborne
Pathogenicity: asymptomatic infection to invasive disease and death, especially in pregnancy or in immunosuppressed or elderly persons
Primary prevention: food production controls, food hygiene

The table shows the annual number of cases per year in Grampian and the figure shows the rate per 100,000 population.

Notified cases of listeriosis in Grampian												
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Listeriosis	<5	0	<5	<5	<5	<5	<5	0	0	<5	<5	<5



Drinking water – microbiological, chemical and radiological hazards

Public water supplies in Scotland are supplied by Scottish Water. The Drinking Water Quality Regulator for Scotland (DWQR) regulates the quality of water supplied by Scottish Water, ensuring that drinking water supplies meet the requirements of The Public Water Supplies (Scotland) Regulations 2014.[43] To meet these regulations, Scottish Water regularly samples water from water treatment works, service reservoirs and randomly selected consumer taps. In 2020, there was 99.9% compliance with water quality standards from samples taken in Scotland.[44] The Scottish Water Public Health team routinely notify HPT and Local Authority Environmental Health of any bacteriological, chemical or water system issues or incidents which have implications for public health.

Private water supplies (PWS) are regulated by local authorities. There are over 22,000 PWS in Scotland, supplying over 182,000 people (around 3% of the population). Other people also come into contact with PWS, for example visitors and tourists to premises with PWS. Poor maintenance or inadequate treatment processes can expose people to drinking water contaminated with *Campylobacter*, *Cryptosporidium*, *Giardia* and/or Shiga-toxin-producing *Eschericia coli*.

"Regulated" supplies are those which supply 50 or more people a day or more than $10m^3$ of water per day, and/or form part of a commercial or public activity.[45] "Type B" supplies are all other domestic PWS. Over 80% of PWS in Scotland are "type B". All regulated supplies must be risk assessed by the relevant local authority every 5 years and must be sampled every year. Regulated PWS in Scotland showed 90% water quality compliance in 2019, with the most common reasons for failing being the presence of coliforms (including *E. coli*), pH and colour. Type B supplies are not subject to routine monitoring, and are instead sampled on request.

Of those sampled in 2019, 84% showed compliance with key water quality parameters. Data on PWS for each NHS Grampian Local Authority is in Table 1. Aberdeenshire is the Local Authority which has by far the greatest number of PWS in Scotland (35% of all PWS). [46]

Table 1: Summary of PWS by NHS Grampian Local Authority area

Local authority	Regulated Supplies	Type B Supplies	Total Supplies	Total Population
Aberdeen City	8	46	54	258
Aberdeenshire	301	7,666	7,967	31,153
Moray	265	589	854	4,910

[43] https://dwqr.scot/media/hita5vuz/annual-report-public-supplies-main-report-2020.pdf
[44] https://www.scottishwater.co.uk/-/media/ScottishWater/Document-Hub/Key-Publications/Annual-Reports/210722SCW2204AnnualReport2022AWNonRestricted_V3.pdf
[45] https://www.mygov.scot/private-water-rights-responsibilities
[46] https://www.dwqr.scot/media/lt5pph0n/pws-annual-report-2019-final-annexes.pdf

Table 1 Summary of Private Water Supplies by NHS Grampian Local Authority Area

Local authority	Regulated Supplies	Type B Supplies	Total Supplies
Aberdeen City	6	46	52
Aberdeenshire	581	7470	8051
Moray	269	567	836

PWS can also be a source of exposure to radioactive radon gas.[47]

The number of notified infections in Grampian which were waterborne in origin has not been quantified.

6.5 Food producers and food outlets – microbiological, chemical and other hazards

Food Standards Scotland estimate that there are 43,000 cases of foodborne illness, associated with 5,800 GP presentations and 500 hospital admissions, each year in Scotland.[48] The number of notified infections in Grampian which were foodborne in origin has not been quantified.

Hazard Analysis and Critical Control Point methods have been widely adapted across the food industry, in order to prevent microbiological, chemical or physical contamination occurring.[49]

6.6 Air quality – microbiological, chemical and radiological hazards

Indoor ventilation is known to be important in preventing the spread of respiratory viral infections such as Covid-19.

Indoor and outdoor air pollution remains a risk to human health. Hazards are associated with emissions from industry, transport, energy and agriculture, as well as domestic heating and cooking.[50]

Radioactive radon gas can accumulate in buildings. Grampian has a relatively high level of radon gas emission.[51]

[47] https://www.ukradon.org/information/privatewater
[48] https://www.foodstandards.gov.scot/consumers/food-safety/foodborne-illness
[49] https://www.food.gov.uk/business-guidance/hazard-analysis-and-critical-control-point-haccp
[50] https://www.environment.gov.scot/our-environment/air/air-quality
[51] https://www.ukradon.org/information/ukmaps

Chemical exposures

Exposure to chemicals can occur through water, food or air contamination; and in industrial, occupational or domestic, educational or leisure settings. Many chemical exposures are routinely managed in those settings under health and safety and occupational health regulations (e.g. COSHH); by first responder agencies including Scottish Fire and Rescue, Scottish Ambulance Service and Police Scotland; or by national agencies including Scottish Environment Protection Agency.

Where there is a wider risk to the population as a result of a chemical incident, local authority environmental health and NHS Grampian health protection team may be required to convene an incident management team. A large scale incident may also require activation of the Local Resilience Partnership, which in turn might require NHS Grampian health protection team to convene and chair a Scientific and Technical Advisory Cell.

Scottish Environmental Incident Surveillance System (SEISS) is a national web-based system which provides information on environmental incidents in Scotland. According to SEISS, the number of environmental incidents reported in 2020 in Region 6 was 1.2 per 100,000 of the population. Region 6 includes Grampian along with other areas.

Table: Environmental Incident occurrence data in Scotland in 2020

		Chemical								Micro				Radiation
SEISS Region	Total No. of Incidents	Air	Land	Water	Air & Land	Land & Water	Air & Water	Air, Land & Water	Indoor Environment	Water	Air, Land & Water	Food	Air	
1	7	3	0	0	2	0	0	1	1	0	0	0	0	0
2	10	3	0	0	0	0	0	0	7	0	0	0	0	0
3	11	2	0	0	2	0	0	1	6	0	0	0	0	0
4	21	3	0	0	1	0	0	2	15	0	0	0	0	0
5	6	3	0	0	1	0	0	0	2	0	0	0	0	0
6	12	4	1	0	2	0	0	0	3	2	0	0	0	0
Total	**67**	**18**	**1**	**0**	**8**	**0**	**0**	**4**	**34**	**2**	**0**	**0**	**0**	**0**

Figure: SEISS Regions (1 to 6)

6.7 Deliberate release – chemical, biological, radiological, nuclear (CBRN)

CNRN refers to actual or threatened use of Chemical, Biological, Radiological or Nuclear materials with the intention to cause harm. CBRN encompasses a wide range of agents and materials including biological (anthrax, plague, ricin etc.), chemical (nerve agents, mustard gas, cyanide, phosgene etc.), radioactive (polonium) and nuclear (nuclear bombs) It may take time to recognise a CBRN incident as a deliberate release incident, and the initial response would likely involve usual organisations and agencies (such as fire, ambulance and police). Initial suspicion of a deliberate CBRN incident would lead to activation of the local resilience partnership, and subsequent escalation to national government and UK security services. At local level, planning and preparedness efforts including staff training and awareness; procurement, storage and deployment of countermeasures; and strengthening partnerships.[52] *

PHS and Centre for Radiation, Chemical and Environmental Hazards (CRCE) play an advisory role to provide information to health professionals and first responder organisations during CBRN incidents. For preparedness and response to CBRN incidence at board level, the responsibilities of Grampian include the following (NHS Scotland Resilience).

1. Nominate a strategic lead to ensure that a CBRN incident plan is in place and up-to-date
2. Major incident plans appropriately reflect contingencies for providing care and treatment for the spectrum of CBRN-related casualties, including the identification and monitoring of people contaminated with hazardous material
3. Appropriate equipment, including Personal Protective Equipment (PPE) and facilities are available
4. Staff are trained for the roles they are expected to fulfil during a CBRN incident
5. Undertake scenario-planning with relevant partner agencies to ensure capability to respond to and/or mitigate the effects of any such incident.
6. Respond to health protection needs of people who are either exposed to, or worried about exposure to CBRN incidents in line with the national Guidance on Management of Public Health Incidents.
7. Depending on the scale and impact of an incident, convene and chair a STAC, providing advice to the local LRP/RRP on human health, risk management strategies, countermeasures and longer-term health monitoring
8. Develop local plans for recovery that identify relevant procedures and resources to address potentially complex issues in the aftermath of a CBRN incident

Although CBRN incidents are rare in the UK, this may change in the future due to advances in technology and increased likelihood of terrorists using unconventional weapons.*

[52] UKHSA. Corporate report UKHSA Advisory Board: preparedness for chemical, radiological and nuclear threats. 2023

6.8 The climate emergency, infectious diseases and extreme weather events

In 2021 the Lancet published a commentary which stated, "the science is unequivocal; a global increase of 1·5°C above the pre-industrial average and the continued loss of biodiversity risk catastrophic harm to health that will be impossible to reverse".[53]
In 2023, the intergovernmental panel on climate change (IPCC) published its AR26 Synthesis Report,[54] which stated that "in the near term, global warming is more likely than not to reach 1.5°C even under the very low GHG emission scenario… and likely or very likely to exceed 1.5°C under higher emissions scenarios".[55]

Climate change is expected to produce a range of hazards for human health. The IPCC reports that "in the near term, every region in the world is projected to face further increases in climate hazards… [including] an increase in heat-related human mortality and morbidity…, food-borne, water-borne, and vector-borne diseases…, and mental health challenges…, flooding in coastal and other low-lying cities and regions, biodiversity loss in land, freshwater and ocean ecosystems…, and a decrease in food production in some regions".[56]

Scotland should expect greater extremes of heat in summer and cold in winter, more frequent extreme weather events, increased heavy rainfall, flooding and drought. This will impact upon food security and water infrastructure.[57] Modelling suggests the north-east of Scotland will experience the largest increase in water shortages whilst the west of Scotland is likely to experience greater rainfall. This may particularly affect private water supplies, which are often poorly maintained by domestic owners.

A warmer climate in Scotland may see the spread of parasitic diseases[58] and vectors for disease, such as ticks and mosquitos. Rare tick-borne diseases such as babesiosis and encephalitis are already being seen in England.[59] In Europe, climate change is already associated with the spread and establishment of West Nile virus into new regions.[60]

Storms, flooding, drought or heatwaves pose a hazard to human health. Preparedness for such events is an important matter for multiagency resilience partnerships and their member organisations.

Climate change will have unequal impacts. Globally and nationally, the most vulnerable populations experience the greatest impact of climate change whilst having been less likely to have contributed to it. Individuals living in more deprived areas are more likely to

[53] https://doi.org/10.1016/S0140-6736(21)01915-2
[54] https://www.ipcc.ch/report/ar6/syr/
[55] https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf (page 56)
[56] https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf (page 15)
[57] https://www.crew.ac.uk/sites/www.crew.ac.uk/files/publication/CRW2018_05_report_FINAL.pdf
[58] https://doi.org/10.1177/1178633617732296
[59] https://www.gov.uk/government/news/rare-tick-borne-infections-diagnosed-in-england
[60] https://doi.org/10.1136/bmj.m3081

be exposed to climate hazards, are more vulnerable to the effects of climate hazards and have less resources to recover from damage caused by climate hazards.[61]

NHS Grampian is developing a **Climate Emergency and Sustainability Framework** and associated delivery plan. See also the PHS briefing for local government and partners.[62]

6.9 Pandemic preparedness

Infectious organisms with pandemic potential are characterised by ease of transmission, lack of human immunity, and high case morbidity and mortality. Such organisms might arise due to the evolution of known organisms (such as avian influenza subtypes) or due to the emergence of new organisms from environmental or zoonotic reservoirs. Over two thirds of human infectious diseases are zoonotic. Global deforestation, agricultural development and urbanisation increasingly bring human and animal, vectors and Infectious agents, into closer contact. International travel and migration increase the risk of emergent infectious diseases in one part of the world quickly spreading across the globe.

Pandemic preparedness involves three key elements: public health arrangements; health and social care arrangements; wider 'resilience' arrangements. Each of these require local plans that incorporate and reflect national planning assumptions and resources.

- **Public health arrangements** include plans for public and professional communications, enacting transmission controls (case notification, contact tracing, quarantine / isolation, outbreak management, vaccination), undertaking surveillance and providing intelligence to inform wider system decisions and actions.

- **Health and social care arrangements** include NHS and Integration Joint Board (IJB) plans for hospital care for the sick, alongside prioritised maintenance of ongoing primary, community and secondary health and social care services.

- **Wider resilience arrangements** include multi-agency plans for the maintenance of societal functions and public order.

Nationally, the Standing Committee on Pandemic Preparedness was convened in 2022 as a permanent advisory group to the Scottish Government.[63] The Committee's interim report, published in August 2022, recommended the creation of a Centre of Pandemic Preparedness in Scotland. Public Health Scotland are planning national workshops to inform the implementation of this recommendation over the summer of 2023.

[61] https://www.un.org/en/desa/climate-change-and-social-inequality
[62] https://publichealthscotland.scot/publications/working-together-to-build-climate-resilient-healthy-and-equitable-places-a-briefing-for-local-government-and-partners/
[63] https://www.gov.scot/groups/standing-committee-on-pandemic-preparedness

6.10 Public trust in scientific experts

Public health incidents can cause widespread fear and alarm. Public communications via a range of media can be used to share information and provide advice. During the covid-19 pandemic a range of interventions were either mandated or advised. Scientific rationales circulated alongside misinformation and conspiracy theories.[64] People's willingness to trust in scientists affected their willingness to adopt preventive and protective interventions.[65] People's willingness to trust in politicians and governments was also important.[66,67,68] Commentators have recommended increasing public participation to increase public trust.[69,70] This is consistent with wider calls to increase public participation in public sector organisations and services.[71] This raises the question of how agencies and organisations involved in public health incidents maximise public trust, perhaps particularly amongst population groups most at risk of harm.

[64] https://doi.org/10.1007/s43576-021-00042-x
[65] https://doi.org/10.1073/pnas.2108576118
[66] https://doi.org/10.1007/s44155-023-00035-3
[67] https://doi.org/10.3389/fcomm.2022.940585
[68] https://doi.org/10.1177/00027162221083686
[69] https://doi.org/10.1080/03080188.2022.2152243
[70] https://www.weforum.org/agenda/2021/11/heres-how-to-repair-the-damage-covid-19-has-done-to-science/
[71] https://www.coproductionscotland.org.uk/

7. Stakeholder input

7.1 Stakeholder interviews

Staff from NHS Grampian Health Protection Team, NHS Grampian infection control team and local authority protective services teams were interviewed by a specialty doctor from the HPT. The key issues identified are summarised below.

- Partnership working

Working relationships were reported to be positive. Improved communications as a result of pandemic arrangements were welcomed and should be maintained. Greater understanding of the role of each team was valued. The potential for closer working between the Health Protection Team and those working on health improvement, vaccinations and immunisations, screening programmes, and civil contingencies was highlighted.

- Workforce

Workforce pressures were regularly mentioned. There are shared challenges in relation to ageing workforces, training capacity, and recruitment difficulties. New roles have been developed, such as Health Protection Officers, and Environmental Health Technical Officers. Regional working being tested across health boards in the east of Scotland.

- Training and CPD

There is enthusiasm for joint CPD or training opportunities, including table-top exercises. There is a willingness to provide experience for those training in the different health protection professions.

- Surveillance

Further developing local surveillance systems was highlighted as important. Experience from the pandemic could be applied to this development. Genomic methods in microbiology will increase visibility of links between cases. The experience of the pandemic will be valuable when planning and responding to future emergent pandemic agents.

- Key threats identified:
  - Climate change
  - Sustainability of water supplies
  - Quality of housing stock
  - Importation of infection (international travel, migration)
  - Lack of clarity about IPC provision (e.g. for dental settings)
  - Standards of IPC in some settings (e.g. care homes)
  - Concerns about vaccine uptake in some areas

7.2 Stakeholder workshop

A workshop was run at a one-day learning event on 20 September 2023 organised by the Joint Health Protection Coordinating Group. The workshop focus was on reviewing perceived relevance and progress against the eight priorities in the current Joint Health Protection Plan (JHPP) 2022/24. The priorities are given under four headings (namely surveillance, prevention, preparedness, response). The workshop output has been summarised below and, after discussion at the Grampian Joint Health Protection Coordination Group, will be used to influence the priorities for in the next JHPP 2024/22.

Surveillance

Question 1: In a few words describe how you feel about these two priorities.

Generally on board with surveillance priorities but many groups found it hard to comment as they were unaware of the surveillance we do, the data we collect, and had not seen the needs assessment. A feeling that more work needs to be done to share the information to the partners we work with at all levels, better dissemination of the information we share to relevant partners. Might be an IG challenge.

Question 2: Do we need to prioritise anything else under the heading of surveillance?

Overarching theme seemed to be how accessible the data we collect is, wanting it to be shared across all partners. Feelings that it would be a better surveillance system and serve the whole system better if we combined all partners' surveillance into one large local surveillance system. Questions about how the data is used to spark action, how is it discussed etc. Maybe a general lack of knowledge about how Health Protection uses surveillance locally and how we contribute to national level surveillance.

Prevention

Question 1: In a few words describe how you feel about these two priorities.

General consensus seems to be that prevention is quite hard to measure, and that priority one seems a bit too vague and high level. Feeling that maybe due to resources across the system we are maybe more disconnected from Health Promotion and Community planning partnerships. Our health promotion work ends up becoming solely reactive and not often easy to see the pre-emptive work.

Question 2: Do we need to prioritise anything else under the heading of prevention?

Theme of setting measurable objectives and a need to invest in data and evaluation to ensure health promotion activity is making best use of resource and shift to more proactive than relying on reactive responses. Focus on most vulnerable groups and work within wider partnerships. Need to focus on community safety especially in socio-economic disadvantaged areas. A feeling that still the work needs to be more joined up

and not held by one area. Measuring the impacts and use that to build the case for prevention going forward.

Preparedness

Question 1: In a few words describe how you feel about these two priorities.

Keep these priorities on the radar, ensure they are not forgotten. How the preparedness priorities look will be different for the different agencies but we need to continue to work together. There were also suggestions that more joint exercises and training new trainees from each agency with short placements would be helpful. Finally a few comments around the wording in the priority and that credentialing might be too ambiguous.

Question 2: Do we need to prioritise anything else under the heading of preparedness?

Awareness that we need to ensure we are not working in silos, and what each organisation can or can't do, our communications are better now than they have been but there is still room for improvement. Workforce planning is challenging and lies with the individual services and budget cuts have made a real impact. Understanding workforce priorities of other services and in the impact of change. Looking at the whole system process. Another suggestion of joint emergency exercises to test potential response to incidents/outbreaks/workforce planning. Cross-organisation training.

Response

Combined Questions 1&2

For both of the questions in around response the most universal comment seems to be a need to re-word our second priority for response and ensure that it is less 'woolly' and has clear outcome measures. The second theme was building and maintaining communications and relationships with our partners. Ensuring that we are ready for a response rather than muddling through it at the time. Having diagnostic and IT communications of results and clear defined roles.

8. Synthesis and implications

Infectious diseases

Food, water and animals (and their environs) are common routes for many of the notifiable infectious diseases seen in Grampian. Routine regulatory activities undertaken by the range of agencies and organisations reviewed above likely prevent cases of waterborne, foodborne, bloodborne and zoonotic infections. Regulatory controls can impose an economic cost which some may be tempted to circumvent. Therefore controls can only be as effective as the resources that are invested to assess, monitor and police them.

Meanwhile domestic and international travel by people and animals allows for the importation of infections. If the global climate and ecological crises increase the likelihood of emergent infections, inwards migration, antimicrobial resistance and outbreaks elsewhere in the world, this will itself increase the risks to the local population through such importation. As temperatures in Scotland and the UK increase, the risk of imported infections becoming endemic also increases.

- *All agencies and organisations involved in health protection should be able to quantify their essential activities and translate this into **minimum workforce requirements** to be met or exceeded. Essential activities will include those intended to assess, monitor and police regulations which are in place to protect the population's health, as well as to identify, investigate, control and report on incidents.*

- *Early **detection of zoonotic infectious disease in animals**, to allow timely identification of people who have been exposed and put at risk, requires the maintenance of veterinary services to investigate symptomatic animals, the maintenance of robust notification systems between veterinarians, veterinary laboratories and APHA, and NHS Grampian Health Protection Team and local authority environmental health teams.*

- *Early **detection of human cases of infectious disease** requires the maintenance of clinical services to investigate symptomatic individuals, the maintenance of a robust notification system between clinicians and diagnostic and reference laboratories and the Health Protection Team, and the allocation of health intelligence resource to support the ongoing development of digital surveillance tools to support outbreak detection, investigation and control.*

Many infectious diseases show an age-related pattern. Many infections have a tendency to be more severe in younger infants and children (e.g. pertussis, measles) or in older adults (e.g. pneumococcal pneumonia, influenza). Changing demographics therefore have the potential to change local epidemiology and increase the need and demand for health care, perhaps particularly amongst older adults.

- *The prevention of infectious disease requires ongoing **health promotion to encourage high levels of personal and environmental hygiene**, and ongoing resources to support robust **infection prevention and control practices** across settings for infants and children (such as nurseries and schools) as well as across settings where older adults might be exposed (such as healthcare and social care settings).*

- *The prevention of infectious disease requires ongoing efforts to **maximise vaccine uptake** for infections which are vaccine-preventable.*

Environmental hazards

Some environmental hazards can be mitigated by individuals through personal and environmental hygiene; examples might include kitchen and food safety when handling and preparing raw meat and poultry, or handwashing before eating after contact with animals or the outdoor environment.

Some environmental hazards are subject to regulatory controls, such as food safety legislation or legionella prevention measures in industrial water systems. However, controls can fail and incidents can happen.

- *Early identification of chemical, radiological or other incidents which put the public's health at risk allows earlier intervention to prevent further exposure and harm. This requires ongoing concerted efforts across multiagency local resilience partners to **ensure appropriate notification pathways** are included in operating protocols and procedures.*

- *Appropriate notification pathways requires clarity among partners as to who the **appropriate lead agency** is for different types of incident – and this should be reflected in local resilience partnership and local NHS incident plans.*

Chemical, biological, radiological, nuclear incidents

- *Resilience Partnerships have a vital preparedness role in planning for the multiagency response to both accidental HAZMAT and deliberate CBRN incidents.*

Climate emergency and extreme weather events

- *NHS Grampian's Climate Emergency and Sustainability Framework and associated delivery plan should dovetail with local resilience partnership plans for responding to the health hazards associated with the climate emergency.*

- *NHS Grampian's Major Infectious Diseases Plan (which addresses pandemic preparedness across the NHS and IJBs) should dovetail with the local resilience partnership's major infectious diseases plan (which addresses pandemic preparedness from a multiagency perspective).*

Public trust in scientific experts

- *NHS Grampian's activities to promote community-led health might be a conduit for engaging with community leaders and community champions about how to facilitate and enhance public communications during emergencies and significant incidents.*

Wider actions to protect and improve public health

Efforts to improve housing quality, nutrition, physical fitness, avoidance of tobacco smoke, avoidance of overcrowding, might be expected to improve people's resilience against infection. Efforts to increase health literacy, awareness of hazards, and access to information and advice can influence knowledge and understanding from an early age, which in turn can influence risk perception and behaviour.

- *Recognition that efforts by those engaged in wider activities to improve population health can have positive implications for the protection of the population's health.*

9. Conclusion

This health protection needs assessment has set out a definition of health protection and described current health protection arrangements in light of this. It has reviewed current and projected demography, and current and potential future hazards to public health. In the synthesis section above it has highlighted the importance of ensuring a workforce adequate to the essential functions of the agencies and organisations involved, and it has made specific recommendations in relation to infectious diseases, environmental hazards, and emergency planning arrangements.

The next iteration of the joint health protection plan for 2024/26 should reflect the issues identified in this needs assessment.

Appendix 1 – PHS health protection topics

The PHS website gives a list of topics covered:[72]

- Air pollution and health
- Antimicrobial use and resistance
- Avian influenza
- Blue-green algae
- Body piercing and tattooing
- Botulism
- Brucella
- Built environment
- Campylobacter
- Chemical and environmental incidents
- Chemical, biological, radiological, and nuclear (CBRN)
- Chickenpox
- Chlamydia
- Chlamydophila psittaci
- Clostridioides difficile infection (CDI)
- Contaminated land
- Coronavirus (COVID-19)
- COVID-19 - EAVE II Study
- Creutzfeldt-Jakob disease (CJD)
- Cryptosporidium
- Cyclospora
- Decontamination
- Diphtheria
- Enhanced surveillance of coronavirus (COVID-19)
- Escherichia coli bacteraemia surveillance
- Escherichia coli O157 (STEC)
- Genital herpes
- Giardia
- Gonorrhoea
- Haemophilus influenzae
- Hajj travel
- Hepatitis A
- Hepatitis B
- Hepatitis C
- Hepatitis E
- HIV
- Human papillomavirus (HPV)
- Incineration
- Influenza
- Legionella
- Leptospirosis
- Listeria
- Lyme Disease
- Malaria
- Measles
- Meningococcal disease
- Middle East Respiratory Syndrome Coronavirus (MERS-CoV)
- Multi-drug Resistant Organism (MDRO) admission screening
- Mumps
- Needle Exchange Surveillance Initiative (NESI)
- Norovirus
- Parvovirus B19
- Pneumococcal disease
- Point prevalence surveys of healthcare associated infections and antimicrobial prescribing
- Poliomyelitis
- Pollution prevention and control
- Public health microbiology
- Quality improvement tools
- Rabies
- Radiation
- Reference laboratories
- Rotavirus
- Rubella
- Salmonella
- Scottish Urinary Tract Infection Network
- Seasonal respiratory Infectious agents
- Sexually transmitted infection
- Shigella
- Shingles
- Staphylococcus aureus bacteraemia surveillance
- Streptococcal infections
- Surgical site infection
- Surveillance of HAI in intensive care units
- Syphilis
- Tetanus
- Toxoplasma
- Travellers' health
- Tuberculosis
- Unconventional oil and gas
- Viral haemorrhagic fevers
- Whooping cough
- Yellow fever vaccination centres
- Yersinia
- Zika
- Zoonoses

[72] https://www.hps.scot.nhs.uk/a-to-z-of-topics

The PHS website describes their priority topics:[73]

- antimicrobial resistance (AMR)
- healthcare associated infection (HAI)
- blood borne viruses (BBVs)
- environmental public health (EPH)
- gastrointestinal and zoonotic infections
- immunisations
- public health microbiology
- respiratory infections
- sexually transmitted infections (STIs)
- travel health
- emerging infections

[73] https://www.hps.scot.nhs.uk/about-us

Appendix 2 – SHPIR health protection topics

The topics covered on SHPIR:[74]

- Air Quality
- Air Travel
- Airborne Hazard Emergency Response
- Anthrax
- Anthrax (Deliberate Release)
- Antimicrobial Resistance
- Antitoxins
- Antivirals
- Asbestos
- A-series nerve agents
- Avian Influenza
- Bloodborne Viruses
- Blue Green Algae
- Body Piercing
- Botulism
- Botulism (Deliberate Release)
- Brucella (Deliberate Release)
- Brucellosis
- Campylobacter
- Candida auris
- CHEMET
- Chemical and Environmental Incidents
- Chemical suicides
- Chemical, Biological, Radiological and Nuclear
- Chickenpox
- Clostridioides difficile Infection
- Contact Information
- COP26
- COVID-19
- COVID-19 health and social care settings
- COVID-19 IPC
- COVID-19 laboratories
- COVID-19 non-healthcare settings
- Creutzfeldt-Jakob Disease
- Cyclospora
- Decontamination
- Deliberate Release
- Diphtheria
- Drug Misuse
- Ebola
- Emergency Planning
- Environmental Public Health
- Escherichia coli
- Flooding
- Food Safety
- Foodborne Disease
- Foodborne Outbreaks
- Fourth generation agents
- Gastrointestinal and zoonotic disease
- Glanders and melioidosis (Deliberate Release)
- Gonorrhoea
- Good Practice Statements
- Group A streptococcal Infection
- Haemophilus influenzae
- Healthcare Associated Infections (HAI)
- Hepatitis A
- Hepatitis B
- Hepatitis C
- Hepatitis E
- HIV
- Human papillomavirus
- Human parainfluenza viruses
- Human Remains
- Immunisation
- Immunoglobulin
- Impetigo
- Incident Learning
- Incident Response and Management
- Infection Control
- Infection Prevention and Control (IPC)
- Influenza
- Informed Consent
- Investigation of Death
- Legionella
- Malaria
- Marine ecosystems
- Measles
- Meningitis
- Meningococcal Infection
- Middle East Respiratory Syndrome Coronavirus
- Monkeypox
- Mumps
- Mycoplasma pneumoniae
- National Infection Prevention and Control Manual
- Noise
- Norovirus
- Novichok
- Nuisance
- Occupational Exposure
- Organophosphorus compounds
- Out of Hours Services
- Outbreak Surveillance
- Outbreaks
- Pandemic Influenza
- Paratyphoid
- Parvovirus B19
- Patient Group Directions
- Personal Protective Equipment (PPE)

[74] https://www.shpir.hps.scot.nhs.uk

- Plague
- Plague (Deliberate Release)
- Pneumococcal infections
- Polio
- Pollution
- Pollution Prevention and Control (PPC)
- Port Health
- Public Health Alert
- Public Health Incidents
- Q Fever (Deliberate Release)
- Rabies
- Radiation
- Reference Laboratories
- Respiratory diseases
- Respiratory Syncytial Virus
- Ricin (Deliberate Release)
- Risk Communication
- Rubella
- Salmonella
- SHPN
- Scottish Vaccine Update
- Seasonal Respiratory Infectious agents
- Sexually Transmitted Infections
- Shingles
- Smallpox
- Smallpox (Deliberate Release)
- Staphylococcus aureus
- Staphylococcus aureus bacteraemia
- Streptococcal infections
- Surveillance
- Syphilis (Treponema pallidum)
- Tattooing
- Tetanus (Clostridium tetani)
- Toxins
- Travel Health
- Tuberculosis
- Tularaemia (Deliberate Release)
- Typhoid
- Unusual Illness
- Vaccines
- Viral Haemorrhagic Fever
- Viral Haemorrhagic Fevers (Deliberate Release)
- Viral Rashes
- Waste Disposal
- Water Quality
- West Nile virus
- Whooping cough
- Zika virus
- Zoonoses

Appendix 3 – Notifiable diseases and organisms

Part 1 Notifiable diseases

- Anthrax
- Botulism
- Brucellosis
- Cholera
- Clinical syndrome due to E.coli O157 infection
- [F1Coronavirus disease 2019 (COVID-19)]
- Diphtheria
- Haemolytic Uraemic Syndrome (HUS)
- Haemophilus influenzae type b (Hib)
- Measles
- Meningococcal disease
- [F2Monkeypox]
- Mumps
- Necrotizing fasciitis
- Paratyphoid
- Pertussis
- Plague
- Poliomyelitis
- Rabies
- Rubella
- Severe Acute Respiratory Syndrome (SARS)
- Smallpox
- Tetanus
- Tuberculosis (respiratory or non-respiratory)
- Tularemia
- Typhoid
- Viral haemorrhagic fevers
- West Nile fever
- Yellow Fever

Part 2 Notifiable organisms

- Bacillus anthracis
- Bacillus cereus
- Bordetella pertussis
- Borrelia burgdorferi
- Brucella genus
- Campylobacter genus
- [F3Carbapenemase-producing Gram-negative organisms (excluding those with intrinsic carbapenem resistance from any human specimen)]

- Chlamydia psittaci
- Clostridium botulinum
- Clostridium difficile
- Clostridium perfringens
- Clostridium tetani
- Corynebacterium diphtheriae (toxigenic strains)
- Corynebacterium ulcerans
- Coxiella burnetii
- Crimean-Congo haemorrhagic fever virus
- Cryptosporidium
- Dengue virus
- Ebola virus
- Echinococcus genus
- Verocytotoxin-producing E.coli (VTEC)
- Francisella tularensis
- Giardia lamblia
- Guanarito virus
- Haemophilus influenzae type b (from blood, cerebrospinal fluid or other normally sterile site)
- Hantavirus
- Hepatitis A virus
- Hepatitis B virus
- Hepatitis C virus
- Hepatitis E virus
- Influenza virus (all types, including those caused by a new sub-type)
- Junín virus
- Kyasanur Forest disease virus
- Lassa virus
- Legionella genus
- Leptospira genus
- Listeria monocytogenes
- Machupo virus
- Marburg virus
- Measles virus
- [F4Monkeypox virus]
- Mumps virus
- Mycobacterium bovis
- Mycobacterium tuberculosis complex
- Neisseria meningitidis
- Norovirus
- Omsk haemorrhagic fever virus
- Plasmodium falciparum, vivax, ovale and malariae
- Polio virus
- Rabies virus

- Rickettsia prowazekii
- Rift Valley fever virus
- Rubella virus
- Sabia virus
- Salmonella (all human types)
- SARS-associated coronavirus
- [F5Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)]
- Shigella genus
- Enterotoxigenic Staphylococcus aureus
- Staphylococcus aureus (all blood isolates)
- Methicillin-resistant Staphylococcus aureus (MRSA)
- Streptococcus pyogenes (from blood, cerebrospinal fluid or other normally sterile site)
- Streptococcus pneumoniae (from blood, cerebrospinal fluid or other normally sterile site)
- Toxoplasma gondii
- Trichinella genus
- Varicella-zoster virus
- Variola virus
- Vibrio cholerae
- West Nile fever virus
- Yellow Fever virus
- Yersinia enterocolitica
- Yersinia pestis
- Yersinia pseudotuberculosis