NHS FIFE ANNUAL IMMUNISATION REPORT 2023

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ANNUAL IMMUNISATION REPORT 2023

1 EXECUTIVE SUMMARY

1.1 Delivery of effective population immunisation programmes is an NHS Scotland priority. Vaccination programmes aim both to protect the individual and to prevent the spread of these diseases within the wider population and are very effective in reducing the burden of disease. This report highlights the findings from surveillance data on vaccine preventable disease in Fife, as well as vaccine uptake rates across childhood, teenage and adult immunisation programmes.

1.2 Surveillance data demonstrate low incidence rates of vaccine preventable disease during 2022 in Scotland and in Fife. However, some infections saw increases from the very low rates observed during 2020 & 2021 when transmission pathways were disrupted by pandemic restrictions. Emerging concerns relating to vaccine preventable disease in 2022 included the detection of polio virus in wastewater samples in London; an outbreak of mpox (previously known as monkeypox) virus across the UK; and toxigenic C.diphtheriae cases in asylum seekers arriving into England. Disruption of routine immunisation schedules in Europe and globally due to the pandemic mean there is an increased risk of imported vaccine preventable disease cases in Scotland, such as measles.

1.3 There have been declines in vaccination uptake across childhood vaccinations in both Fife and Scotland over the past 10 years, and this continued in 2022, with childhood uptake in Fife sitting below the Scottish average. Uptake rates in Fife were below the 95% target for the primary childhood vaccinations, other than pneumococcal, at 12 months but improved by 24 months. Uptake by deprivation category shows that Fife is has similar uptake to the rest of Scotland in the least deprived quintiles, but has lower uptake among the most deprived than the equivalent population elsewhere in Scotland. The decline in Fife in 2022 at 12 months is associated with declines in uptake among children living the most deprived areas, however, uptake of MMR1 (offered at 1 year) at 24 months improved slightly for the most deprived population in Fife from 2021. By 5 years uptake of the vaccines given at 1 year of age meet the 95% uptake target and are similar to rates seen elsewhere in Scotland. Rates of pre-school vaccinations (given from 3 year 4 months) remain below 90% and have declined slightly from uptake in 2021.

1.4 Uptake in the teenage vaccination programme saw less disruption in the 2020-21 school year in Fife than elsewhere in Scotland, but catch-up programmes in other areas of in Scotland mean that rates in 2021-22 are now similar to Fife; at both local and national level these remain below the WHO target of 95%. Inequalities in uptake in the teenage programme are significant and worsened slightly in 2021-22 school year. Uptake of one dose of HPV vaccination in S4 was >90% among S4 girls in Fife. Uptake of HPV among boys is lower than girls, but was above the strategic framework target of >80% among S3 boys.

1.5 Responsibility for the delivery of the adult shingles & pneumococcal programmes transferred from general practice to the health boards in April 2022. Uptake of vaccination among both those newly eligible (70 years) and the routine catch up cohort

(71 – 79 years) for 2021-2022 shingles programme was similar in Fife and Scotland. Data for pneumococcal vaccination uptake for 2021-2022 are not available at local or national level due to data quality issues. Uptake of seasonal flu and COVID vaccination in Winter 2022/23 was similar in Fife to elsewhere in Scotland and highest in the oldest age groups. Uptake demonstrates a socioeconomic gradient with highest uptake among the least deprived. Inequalities in uptake by ethnicity are also evident.

1.6 Pertussis uptake among pregnant women in Fife remains stable and above the Fife strategic framework performance measure target. Over a five year period 2017 to 2022, all babies born to mothers infected with hepatitis B in Fife received their first dose of hepatitis B within 1 day of birth. Vaccinations delivered through sexual health for men who have sex with men (MSM) include HPV and Hepatitis A & B. In addition, pre-exposure mpox vaccinations for an at-risk sub-group were offered in 2022 as part of the outbreak response. The availability of routine uptake data for the MSM cohort remains limited.

1.7 Actions progressed against the priorities set out in the Fife Immunisation Strategic Framework provide the platform for ongoing close monitoring of uptake rates and governance for improvement the work required to improve uptake and address inequalities identified within the findings of this report.

2 INTRODUCTION

2.1 This is the fifth Annual Immunisation Report for NHS Fife[1]. The purpose of the report is to provide an annual monitoring report of vaccine preventable disease surveillance data, along with uptake data for each vaccine delivered within Fife.

2.2 Immunisation is a global health success story, saving millions of lives every year. Vaccination programmes aim both to protect the individual and to prevent the spread of these diseases within the wider population. When a large proportion of a population have immunity to a particular disease which is normally spread from person to person, chains of transmission are disrupted and the spread of diseases to those not immune can be prevented ('herd immunity'); this protects those who are unable to build up immunity such as those who are immunosuppressed.[2] As a public health measure, they are very effective in reducing the burden of disease and underpin global health security.

2.3 Monitoring the proportion of the eligible population vaccinated enables continuous improvement, and is complemented by monitoring of vaccine preventable disease surveillance data. Inadequate coverage makes the possibility of disease transmission and outbreaks of vaccine preventable disease more likely. High levels of coverage are needed to eliminate highly infectious diseases such as measles. The Scottish Government, as with the rest of the UK, have adopted recommendations made by the World Health Organisation (WHO) that at least 95% of children should be immunised against vaccine preventable disease on the routine schedule.

2.4 The routine childhood & adult schedule in the UK (appendix 1) is based on advice from the independent Joint Committee on Vaccination and Immunisation (JCVI) and provides protection against the following vaccine preventable infections:

- Haemophilus influenza type b (Hib)
- Hepatitis B
- Human Papilloma Virus (HPV)
- Influenza
- Meningococcal disease
- Mumps
- Pertussis (whooping cough)
- Pneumococcal disease
- Polio
- Rotavirus
- Rubella
- Shingles
- Tetanus

2.5 Additional vaccinations that are not on the routine schedule are offered to specific high-risk groups. For example, BCG vaccine which protects against tuberculosis (TB) is offered to those babies who are more likely than the general population to come into contact with someone with TB. In addition, certain travel vaccinations are provided via

[1] Previous Annual Reports submitted 2018, 2019, 2021, 2022 (no submission 2020 due to COVID pandemic).

[2] Herd immunity does not protect against all vaccine-preventable diseases; exposure to tetanus for example is from the environment rather than another person

the NHS such as hepatitis A and typhoid. Vaccination to protect against COVID-19 was introduced in December 2020 and JCVI policy for eligibility for primary and booster programmes continuing to be regularly updated.

2.6 The most recently published data has been used throughout the report. Variation in data release timings and reporting intervals mean that the period covered in this report varies by programme. There are time lags between when a vaccination is first offered within the routine childhood schedule and when uptake is evaluated, for example MMR2 appointments are scheduled from 3 years 4 months but uptake is evaluated based on the cohort of children who reach 5 years in the 2022 reporting period. Therefore uptake data in a particular reporting year reflect delivery practices over a longer period of time preceding this.

Summary of period covered in this report

Cohort	**Reporting Period**
Childhood routine programme	1 January 2022 – 31 December 2022
Teenage routine programme	2021 – 2022 School Year
Adult Shingles programme	September 2021 – August 2022
Seasonal Flu Progamme	September 2022 – March 2023
COVID Winter Booster	September 2022 – March 2023

3 VACCINE PREVENTABLE DISEASE

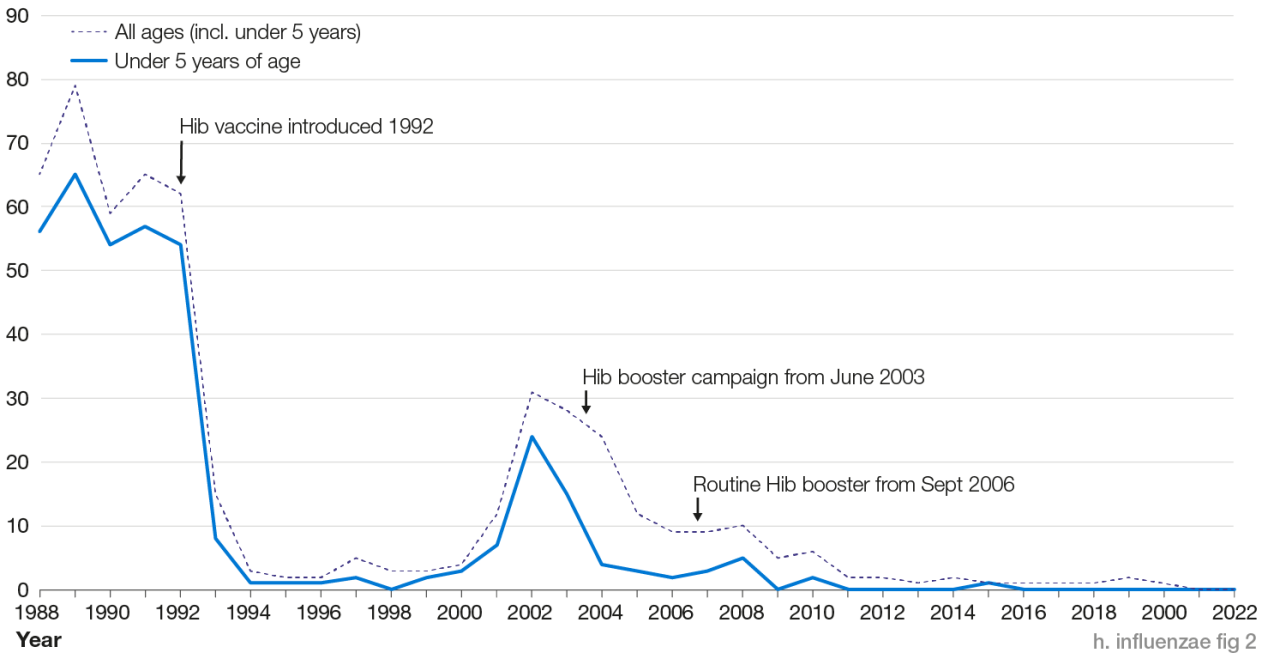
3.1 Data for vaccine preventable diseases are summarised at both a national and Fife level where data is available. Cases notified to Public Health, meeting clinical case definitions but without laboratory confirmation are not included, and individuals may not present to healthcare, or be tested if they have milder presentations of diseases.

3.2 The number of reported cases of vaccine-preventable diseases in Scotland increased in 2022 for some infections from the low rates seen in 2020 & 2021 over the period of COVID restrictions. Figures 1 to 5 show trends in selected vaccine preventable diseases across Scotland over time based on Public Health Scotland surveillance data[3].

Haemophilus influenza

3.3 Haemophilus influenzae can cause acute invasive disease including meningitis and septicaemia. Across Scotland there were 74 H.influenzae cases in Scotland in 2022, of which <5 were within Fife. Vaccination provides the most effective strategy for prevention of the most severe type (*H. influenzae* type b) having a significant impact on disease rates across Scotland since it was introduced in 1992 (figure 1). In Fife, there have been <5 cases of invasive *H. influenzae* type b infection since 2009, and there were no cases in 2022. .

Figure 1: Laboratory reports of invasive Haemophilus influenza type b disease in Scotland, 1988 to 2022



[3] Source: Public Health Scotland Immunisation and vaccine-preventable diseases quarterly reports, published March 2023

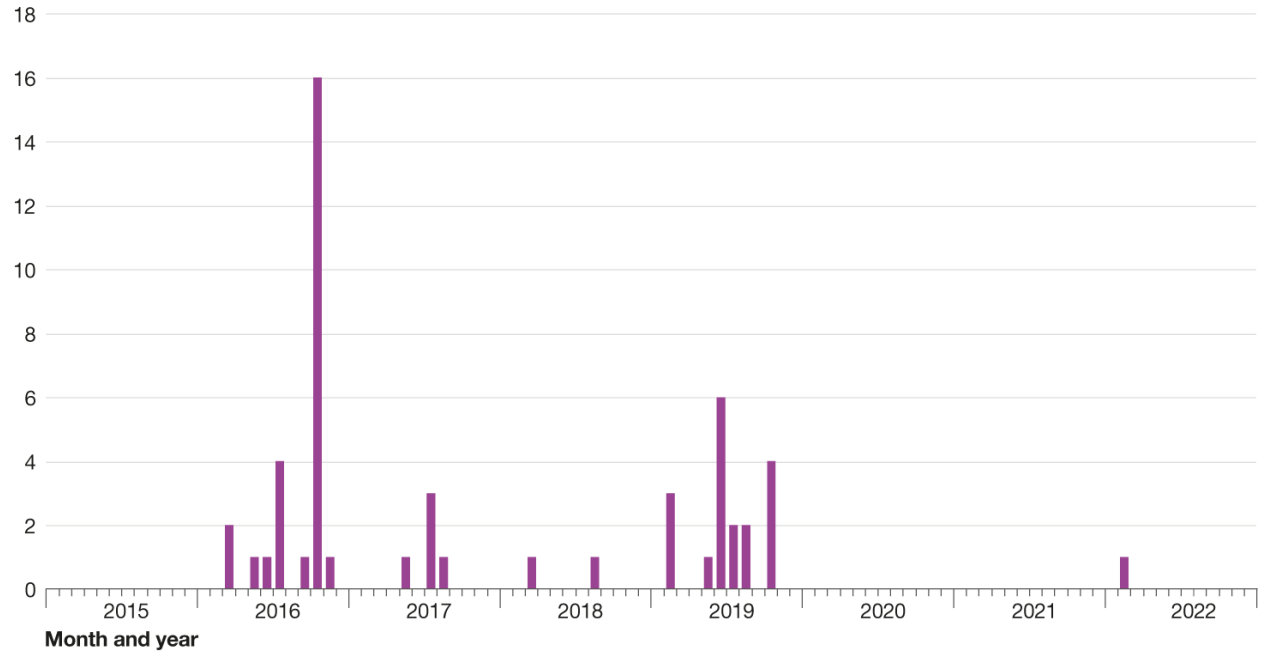
Measles

3.4 Measles is highly infectious and can lead to serious complications, particularly in immunosuppressed individuals and young infants. It is also more severe in pregnancy, and increases the risk of miscarriage, stillbirth or preterm delivery. Measles is a vaccine-preventable disease targeted for elimination in most WHO regions, including the European Region. Sustaining at least 95% routine coverage with 2 doses of a measles-containing vaccine will interrupt transmission of the virus and prevent the return of large outbreaks.

3.5 After briefly achieving measles elimination status in 2016 and 2017, by 2018 measles virus transmission had re-established in the UK. In 2019 there were 880 lab confirmed measles cases in the UK. The last laboratory confirmed cases in NHS Fife occurred in 2019, during which year there were a total of 18 cases across Scotland. There were no cases in Fife or elsewhere in Scotland during 2020 & 2021. There was a single laboratory-confirmed case in Scotland in early 2022 (figure 2).

3.6 An alert issued by WHO Europe in February 2023 identified that missed doses of measles vaccines during the pandemic due to disruption of routine immunisation programmes was resulting in increasing measles activity during 2022 in some European countries. In May 2023, UKHSA issued a press release noting that there had been 49 cases of measles between 1 January and 20 April in England, compared with 54 cases in the whole of 2022. Most of these cases had been in London. Measles activity in Europe and elsewhere in the UK means that Scotland will continue to face an elevated risk of imported cases.

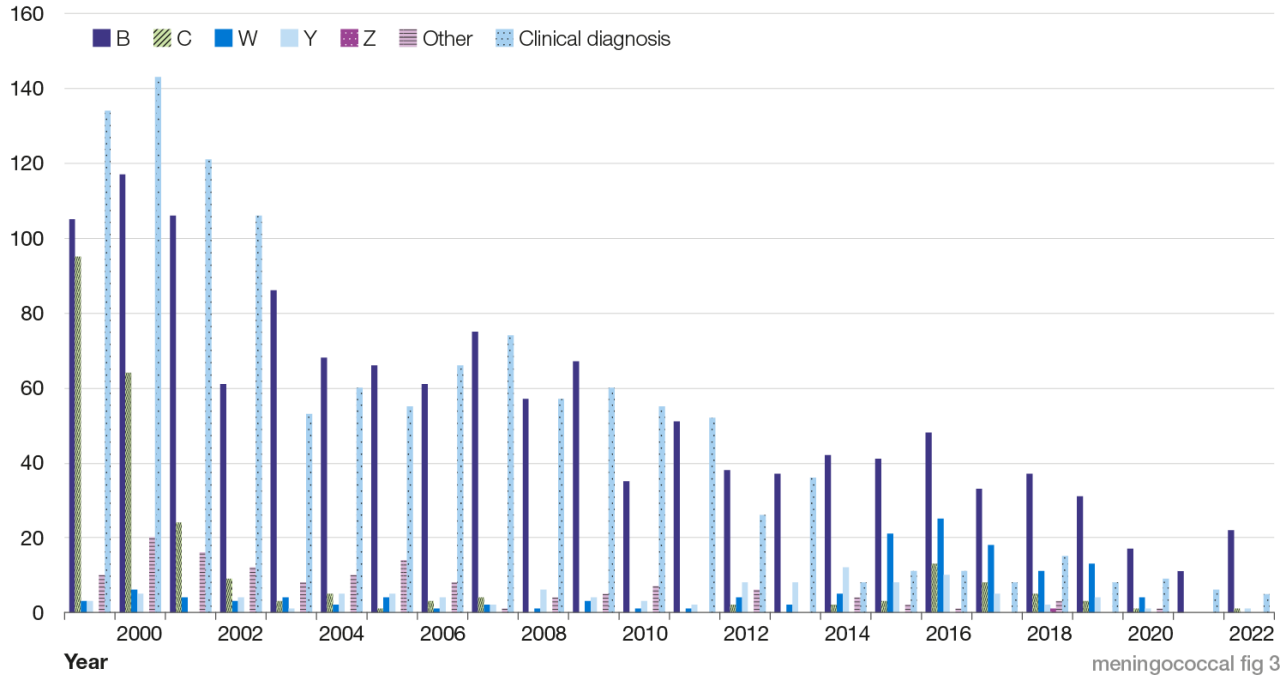
Figure 2: Laboratory confirmed cases of measles in Scotland, 2015 to 2022



Meningococcal disease

3.7 Meningococcal disease can be a significant cause of morbidity and mortality in children and young people. Across Scotland, the number of cases of meningococcal disease increased in 2022 across Scotland from the low case numbers in 2020 & 2021 (figure 3). There was one confirmed invasive meningococcal case in Fife in 2022, and a total of 29 across Scotland, of which 20 were in those aged under 25 years.

Figure 3: Confirmed meningococcal cases by serogroup in Scotland, 1999 - 2022



Pneumococcal disease

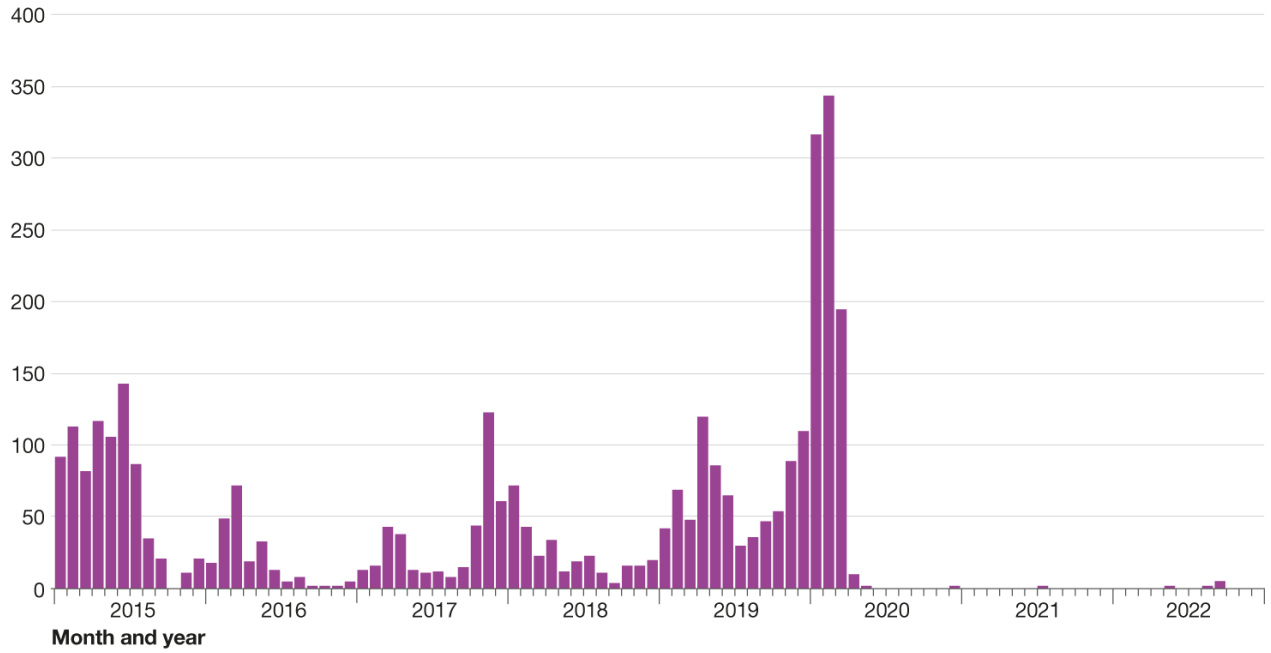
3.8 Invasive pneumococcal disease is caused by infection with the bacterium Streptococcus pneumoniae in normally sterile sites (mainly blood and cerebrospinal fluid) and can be a cause of morbidity and mortality among the very young, the elderly and those with impaired immunity. The total number of cases across Scotland in 2022 was 374, which is higher than the numbers in 2020 & 2021, but remains lower that the average rate in the years prior to the pandemic. Within this total, 45 were aged <5 years (5 of which in Fife). Septicaemia and pneumonia were the most common clinical presentations in children aged under 5 years, and most of those aged under 5 across Scotland had an underlying condition.

Mumps

3.9 Whilst mumps infection may be mild, it can lead to serious complications. Following the introduction of the MMR vaccine in 1988, the incidence of mumps substantially decreased. However, since 2004, there had been ongoing widespread increased incidence of mumps throughout the UK until the introduction of lockdown restrictions in 2020 (figure 4). There were no confirmed cases of mumps reported in Fife in 2022, and only 7 across the rest of Scotland. Laboratory reports will represent an underestimate of

mumps cases, as some cases will only be diagnosed clinically without laboratory confirmation, and cases may not attend healthcare settings for diagnoses.

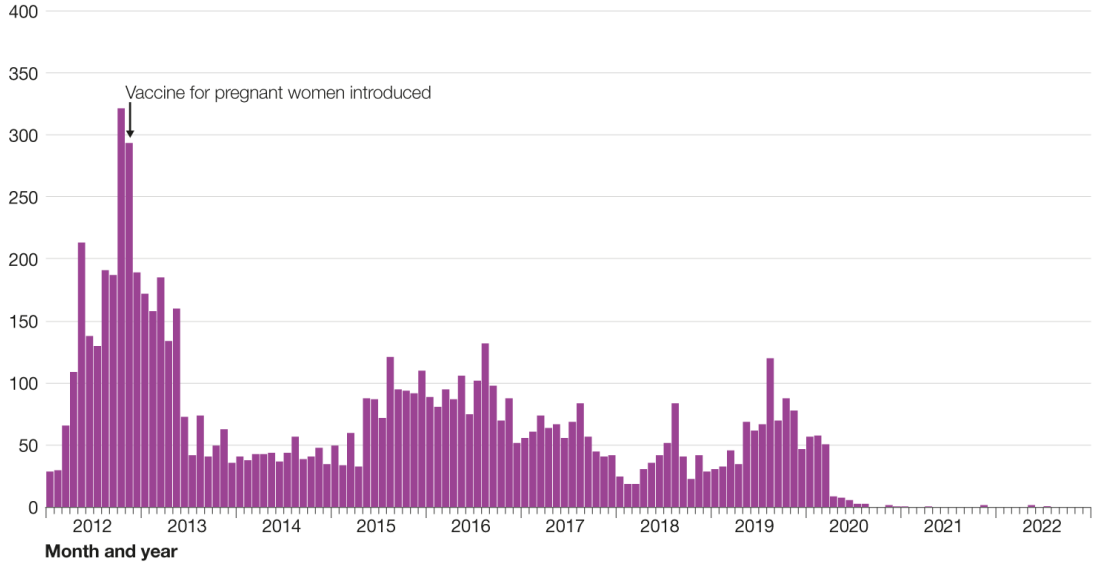
Figure 4: Number of laboratory confirmed cases of mumps in Scotland by month & year, 2015 to 2021



Pertussis (whooping cough)

3.10 Young infants are at particular risk of complications from infection with pertussis which can require hospital treatment and can sometimes be fatal. Since 2012 pertussis vaccination has been offered to all pregnant women. There were no laboratory confirmed cases of *Bordatella pertussis* reported in Fife in 2022. Rates across Scotland also remained low with only 3 confirmed cases reported (figure 5),.

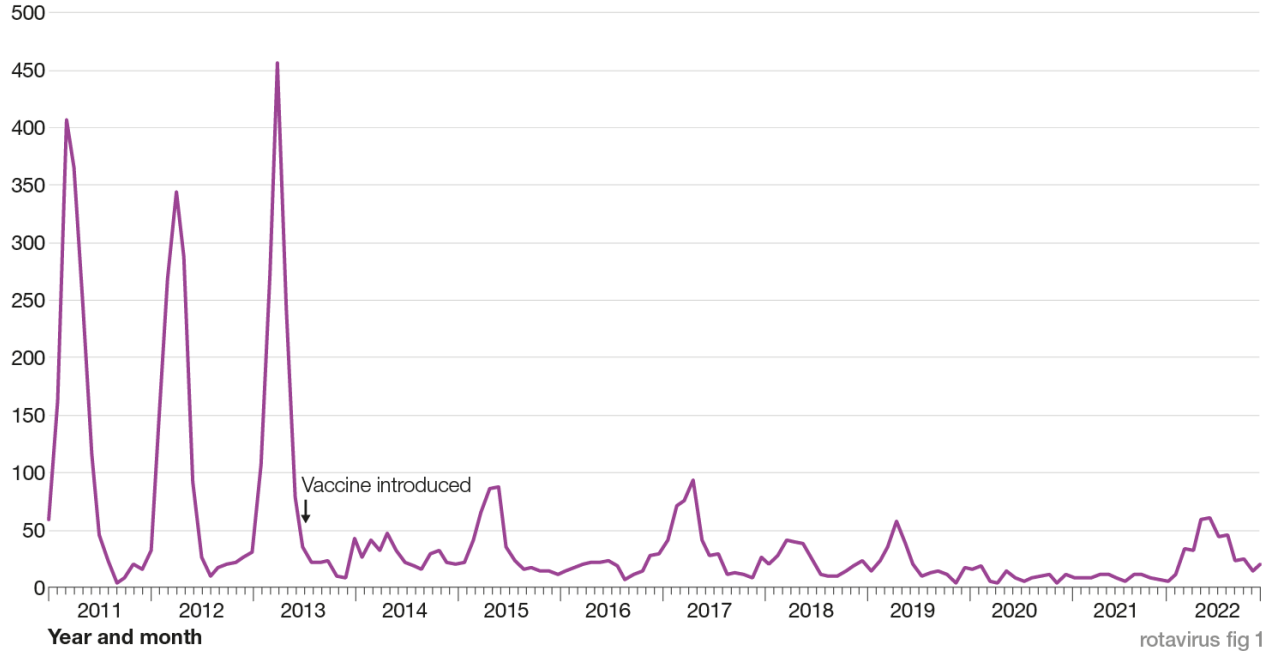
Figure 5: Number of laboratory reports of Bordatella pertussis in Scotland by month & year, 2012 to 2022



Rotavirus

3.11 Rotavirus infections can cause severe diarrhoea, vomiting, stomach cramps and mild fever. Rotavirus infections have reduced significantly across Scotland since the introduction of the immunisation programme in July 2013 (figure 6). Hospitalisation rates for children <5 years and GP consultations gastrointestinal illness for infants <1 year are also monitored and have reduced since introduction of the vaccine.

Figure 6: Laboratory reports of rotavirus in Scotland, 2011 to 2022



Polio

3.12 Poliomyelitis (polio) is an acute viral illness where most infectious cause no symptoms. However, in a small number of people infection can cause temporary or permanent paralysis and can be life threatening. Poliovirus is targeted by the World Health Organization (WHO) for eradication and, due to the efforts of countries worldwide, polio is now eliminated from four of the six WHO regions. Polio outbreaks do occur in countries when the disease is spread amongst people who may not be fully vaccinated. The last imported case of polio in the UK as 1993.

3.13 Vaccine-derived poliovirus type 2 (VDPV2) was detected in sewage samples from London sewage works in 2022, suggesting spread between linked individuals. This led to an offer to all children in London aged 1 year to 9 years of an additional dose of polio-containing vaccine, irrespective of vaccine status in order to prevent cases of paralysis and interrupt transmission. No associated cases of paralysis or human infections of poliovirus have been reported in the UK, but wastewater surveillance activity has increased. Elsewhere, poliovirus detections in wastewater have been associated with clinical cases in Israel and the USA.

Diphtheria

3.14 Diphtheria is an acute bacterial infection caused by the diphtheria toxin produced by toxogenic Corynebacterium diphtheriae and toxogenic Corynebacterium ulcerans. Symptoms of upper respiratory tract diphtheria infection include membranous pharyngitis, which can lead to life-threatening airway obstruction. Cutaneous diphtheria may cause pus-filled blisters on legs, hands and feet and ulceration of the skin. The last case of toxigenic diphtheria in Scotland was in 2020. The UK Health Security Agency reported an increase in cases of toxigenic C.diphtheriae among asylum seekers newly arriving into England in 2022, with similar increases reported in Europe.

Rubella

3.15 Rubella is generally a mild illness, but if acquired by women in early pregnancy (in the first 16 weeks) can cause congenital rubella syndrome leading to serious birth defects. Before the introduction of rubella vaccination, more than 80% of adults had evidence of previous exposure to rubella. The UK has achieved eliminated status under WHO criteria in 2016 and this has been maintained since. There have been no cases across Scotland since 2017.

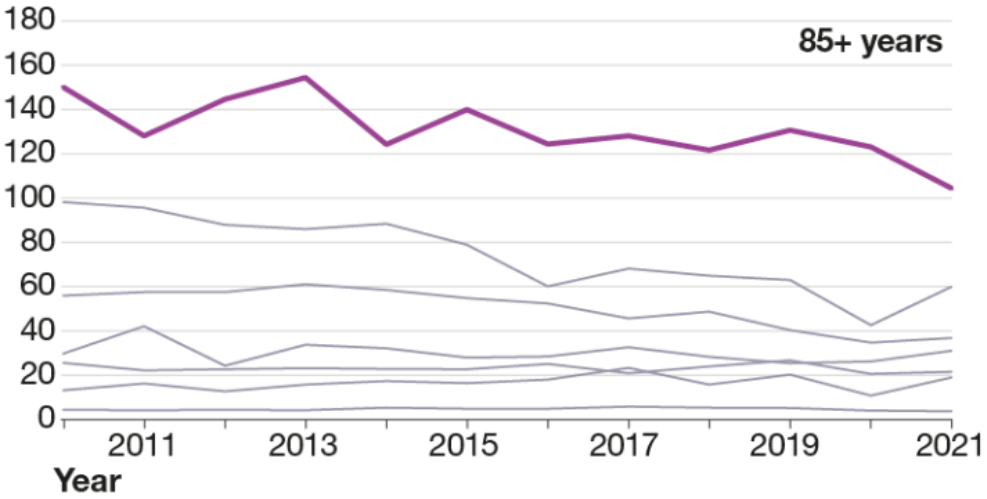
Human Papilloma Virus

3.16 Human papillomavirus (HPV) infections are very common and over 225 types of HPV have been identified, 40 of which infect the genital tract. In Europe HPV types 16 and 18 are responsible for approximately 75% of cervical cancer cases, 90% of anal cancer cases, 85% of head and neck cancers and 50% of penile cancers; HPV types 6 and 11 are responsible for approximately 90% of genital wart cases. Surveillance data has shown that the HPV vaccine has reduced the highest grade of cervical pre-cancer at age 20 by almost 90% in Scotland.

Shingles

3.17 Herpes zoster or shingles is caused by reactivation of latent varicella zoster virus. The main complication of shingles is post-herpetic neuralgia which can persist and severity increases with age. The vaccination programme was introduced in 2013 with a routine offer to those aged 70 and opportunistic offer to those aged 71 to 79 who have not been immunised. Shingles is not a notifiable disease, so the number of hospital admissions are used for surveillance purposes. The latest surveillance data published by Public Health Scotland shows a gradual downward trend for the oldest age group (figure 7).

Figure 7: Rate of admission per 100,000 population for shingles and related complications for those aged >85 years, 2010 – 2021



Tetanus

3.18 Tetanus is a disease resulting from a neurotoxin produced during infection with *Clostridium tetani*. Immunisation against tetanus is the most effective method of disease prevention, and has been part of the childhood immunisation schedule since 1961. Tetanus is now very rare in the UK due to the success of the immunisation programme[4].

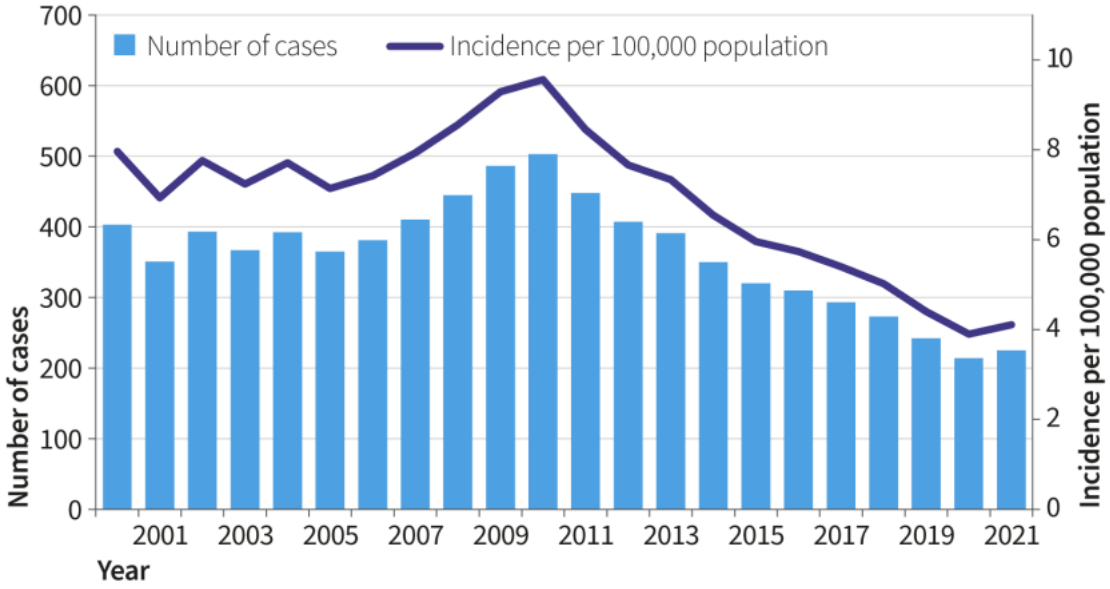
Tuberculosis

3.19 Transmission of tuberculosis (TB) is by inhalation of infected droplets. After infection, the bacteria can remain latent in the body for a long time causing no symptoms of disease. The latest release of the national surveillance report was March 2023 which included data to 2021[5]. The number of TB notifications in Scotland showed a consistent downward trend during the period 2010 to 2020. In 2021, 225 tuberculosis cases in Scotland were reported, which was a small increase from 2020. More than two thirds of cases in 2021 were born outside the UK and the most reported risk factor was being a refugee or asylum seeker. Around a third of cases live in the most deprived quintile on the Scottish Index of Multiple Deprivation. Incidence in Fife in 2021 was 1.9 per 100,000 which is lower than the Scottish average (4.1 per 100,000; figure 8).

[4] https://www.gov.uk/government/publications/tetanus-in-england-annual-reports/tetanus-in-england-2022

[5] https://publichealthscotland.scot/publications/tuberculosis-annual-report-for-scotland/2021-tuberculosis-annual-report-for-scotland/

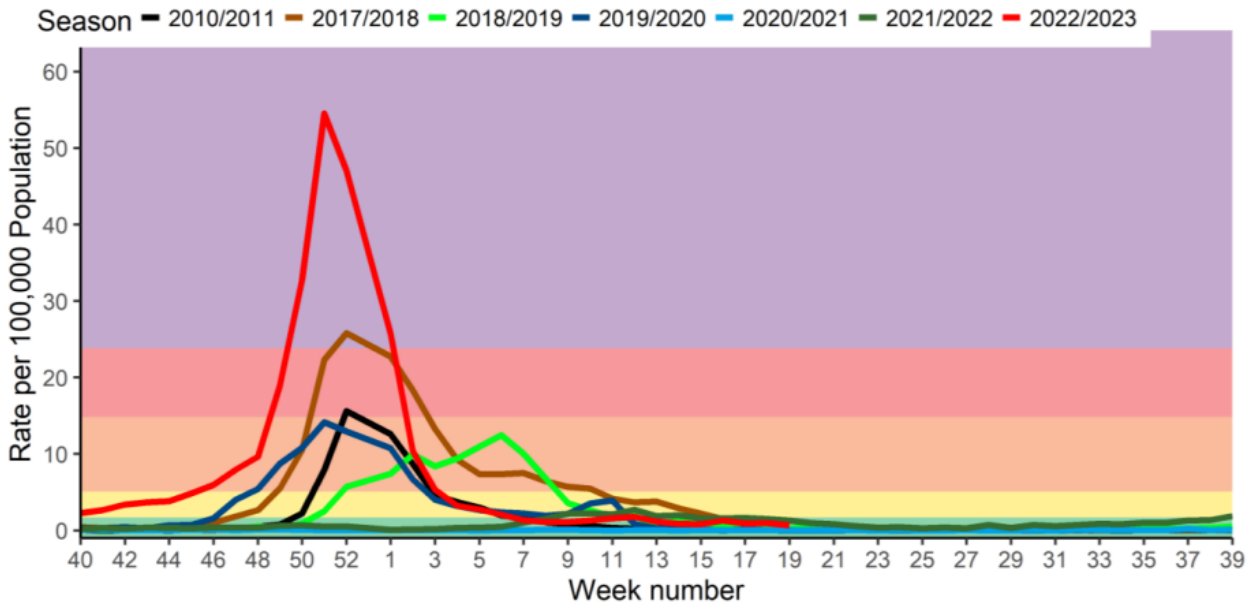
Figure 8: Number of tuberculosis cases and incidence per 100,000 population in Scotland, 2000 to 2021



Influenza

3.20 Influenza is associated with significant morbidity and mortality during the winter months, particularly in those at risk of complications of flu, e.g. the elderly, those with chronic health problems, and pregnant women. The spectrum of influenza illness varies from asymptomatic illness to mild/moderate symptoms to severe complications, including death. Spread can occur rapidly in the community, and especially in hospital and institutional settings. The most effective means of prevention is flu vaccine, which is tailored to the likely viruses in circulation each season. The annual UK influenza surveillance report for the 2022-23 season has not yet been published. Influenza activity peaked at extraordinary levels in Fife in weeks 50-52 of 2022, which rapidly reduced to moderate levels of activity by week 2 2023, a similar pattern to that seen across Scotland (figure 9). A sharp rise in hospital admissions due to influenza was also seen over this period. Across Scotland, 94% of laboratory confirmed samples have been influenza A.

Figure 9: Influenza incidence rate (per 100,000 population) in 2022/23 compare with previous seasons, Scotland.



COVID

3.21 Changes in testing policy through 2022 mean that trend data for COVID infection based on samples taken from community or hospital data are difficult to interpret. An estimate of community prevalence can be derived from analysis of wastewater concentrations of the virus, taken from sites across Scotland (figure 10).

Figure 10: Average trends in wastewater COVID-19 from January 2022 to May 2023

Mpox

3.22 Mpox is a zoonotic infection, caused by the monkeypox virus, that occurs mostly in West and Central Africa. Prior to 2022, cases diagnosed in the UK had been either imported from countries where mpox is endemic or contacts with documented epidemiological links to imported cases. Between 2018 and 2021, there had been 7 cases of mpox in the UK. There was no documented community transmission in previous outbreaks.

3.23 Detection of cases of mpox infection acquired within the UK were confirmed in England from 6 May 2022. The outbreak has mainly been in gay, bisexual, and other men who have sex with men, without history of travel to endemic countries. Up to 31 December 2022 there were 3,732 confirmed and highly probable mpox cases reported in the UK. Of these, most were in England, with 97 in Scotland[6]. Cases peaked in England in mid-July 2022, and had rapidly declined by September 2022[7].

[6] https://www.gov.uk/government/publications/monkeypox-outbreak-epidemiological-overview/mpox-monkeypox-outbreak-epidemiological-overview-4-may-2023

[7] https://www.gov.uk/government/publications/monkeypox-outbreak-technical-briefings/investigation-into-monkeypox-outbreak-in-england-technical-briefing-8

4 VACCINE UPTAKE

4.1 Vaccination coverage is the percentage of people from the target population who have received a specific vaccine. The risk to public health increases if immunisation rates fall below herd immunity levels as this makes the possibility of communicable disease transmission more likely. In line with the WHO target, the standard for routine childhood immunisations up to five years of age is set at 95% uptake.

Childhood routine immunisations

4.2 The standard reporting ages for childhood vaccine completion rates in the UK is 12 months, 24 months and five years of age. The data presented is based on the published data from Public Health Scotland and relates to year end data to December 2022.

4.3 In 2022 (babies born 1 Jan 2021 to 31 December 2021), the 95% target for uptake at 12 months for the primary immunisations delivered at the 8 week, 12 week and 16 week appointments was met in Fife for PCV, but not for the 6-in-1 (DTP/Pol/Hib/Hep B), MenB and Rotavirus vaccinations (table 1, figure 11). In 2022 Fife rates saw a small decline in uptake, which was comparable to that seen in the rest of Scotland. A fall in rates has been recorded in Fife since 2021 for vaccinations delivered during the first 12 months, only PCV has remained above 95%.

4.4 Uptake of the completed two dose course of rotavirus vaccine is lower than completed courses of the other vaccines offered in the first year of life because it is given within strict age limits, with the first dose before 15 weeks and second dose before 24 weeks of age. It is also a live vaccine and so may be contraindicated if a child has other health conditions.

4.5 Scottish Index of Multiple Deprivation (SIMD) data is available based on GP practice level data, these are matched onto national reference files to obtain information on SIMD, with SIMD quintile assigned based on the postcode of the practice. A socioeconomic gradient can be seen in uptake at 12 months, with lower uptake in quintile 1 (most deprived). In 2022 the 95% target is met across all vaccines for quintiles 4 and 5 (least deprived), which is a pattern seen across Scotland. Uptake of the 5-in-1/6-in-1 vaccine at 12 months follows this trend (figure 12), however uptake in the most deprived (quintile 1) in Fife has been lower than uptake for quintile 1 in Scotland since 2019.

Table 1: Immunisation uptake rates by 12 months of age in NHS Fife, by year 2018 to 2022

	2018	2019	2020	2021	2022
5-in-1/ 6-in-1	95.7	95.7	95.3	94.6	94.6
PCV	96.0	96.2	96.0	96.0	95.9
Rotavirus	93.7	94.0	94.3	92.7	92.1
MenB	95.6	95.9	95.7	94.4	94.2

Figure 11: Immunisation trend by 12 months for 5-in-1/6-in-1 and Meningitis B, NHS Fife (solid lines) & Scotland (dashed lines); 2012 to 2022

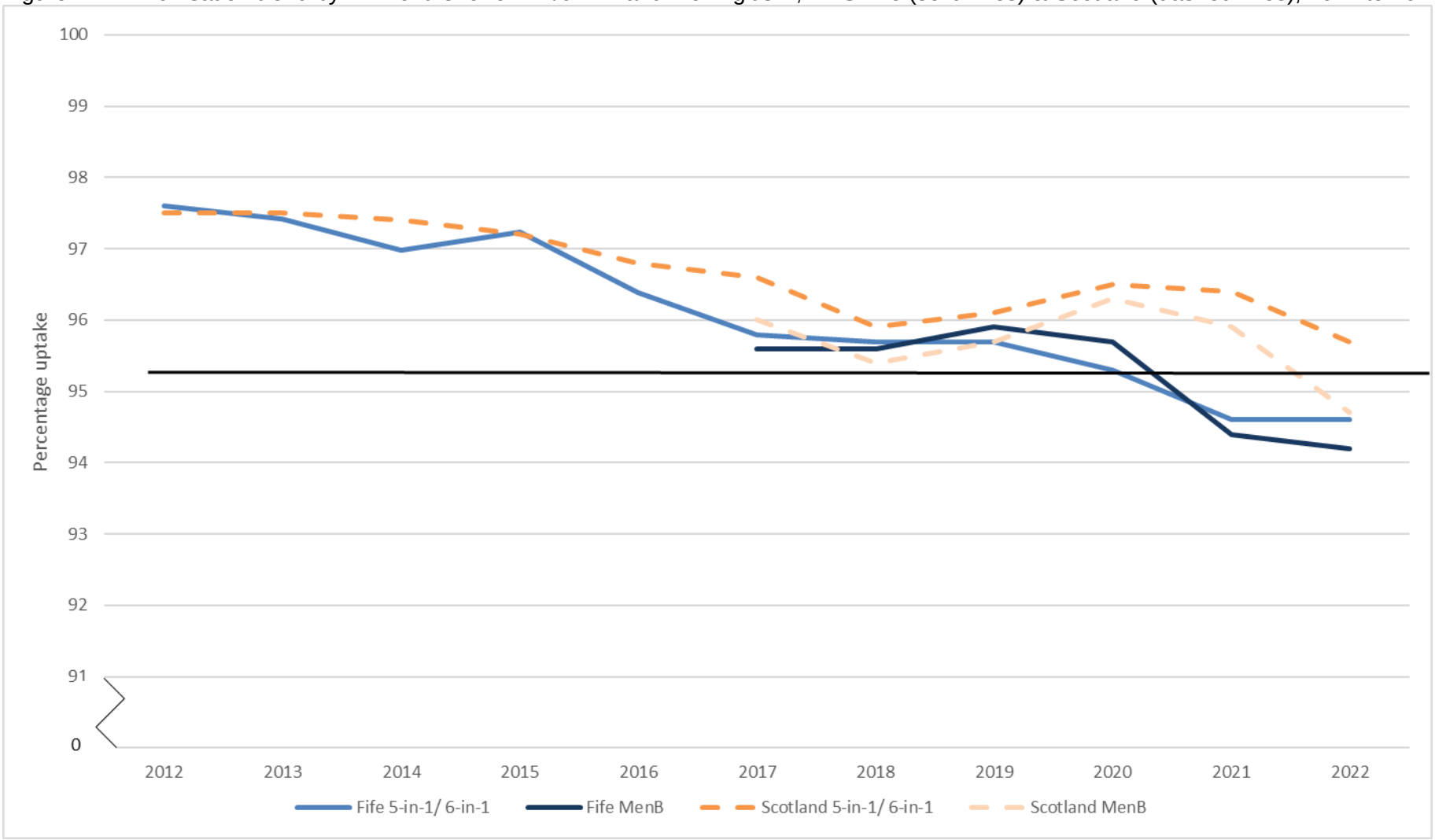
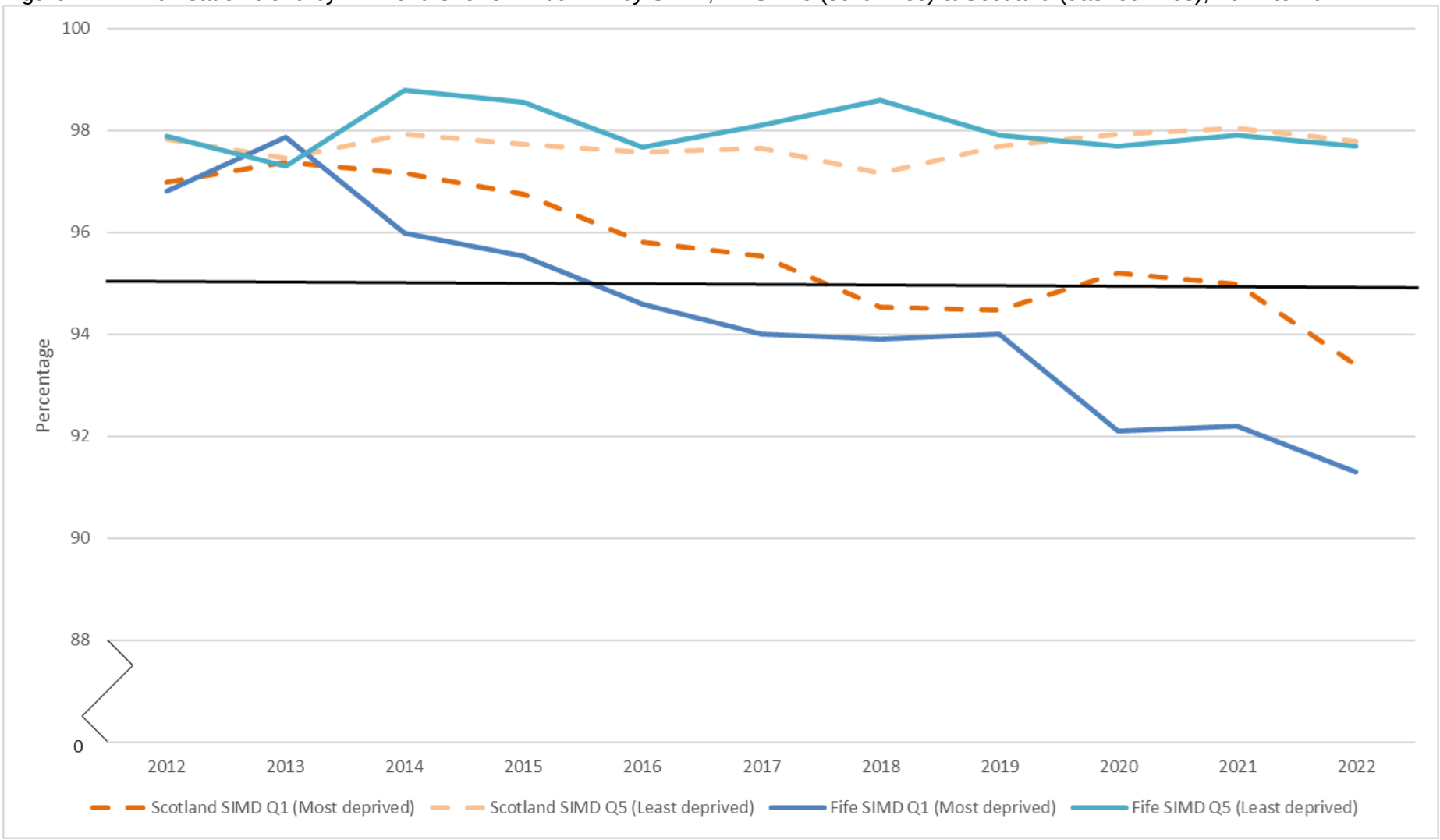


Figure 12: Immunisation trend by 12 months for 5-in-1/6-in-1 by SIMD, NHS Fife (solid lines) & Scotland (dashed lines); 2012 to 2022



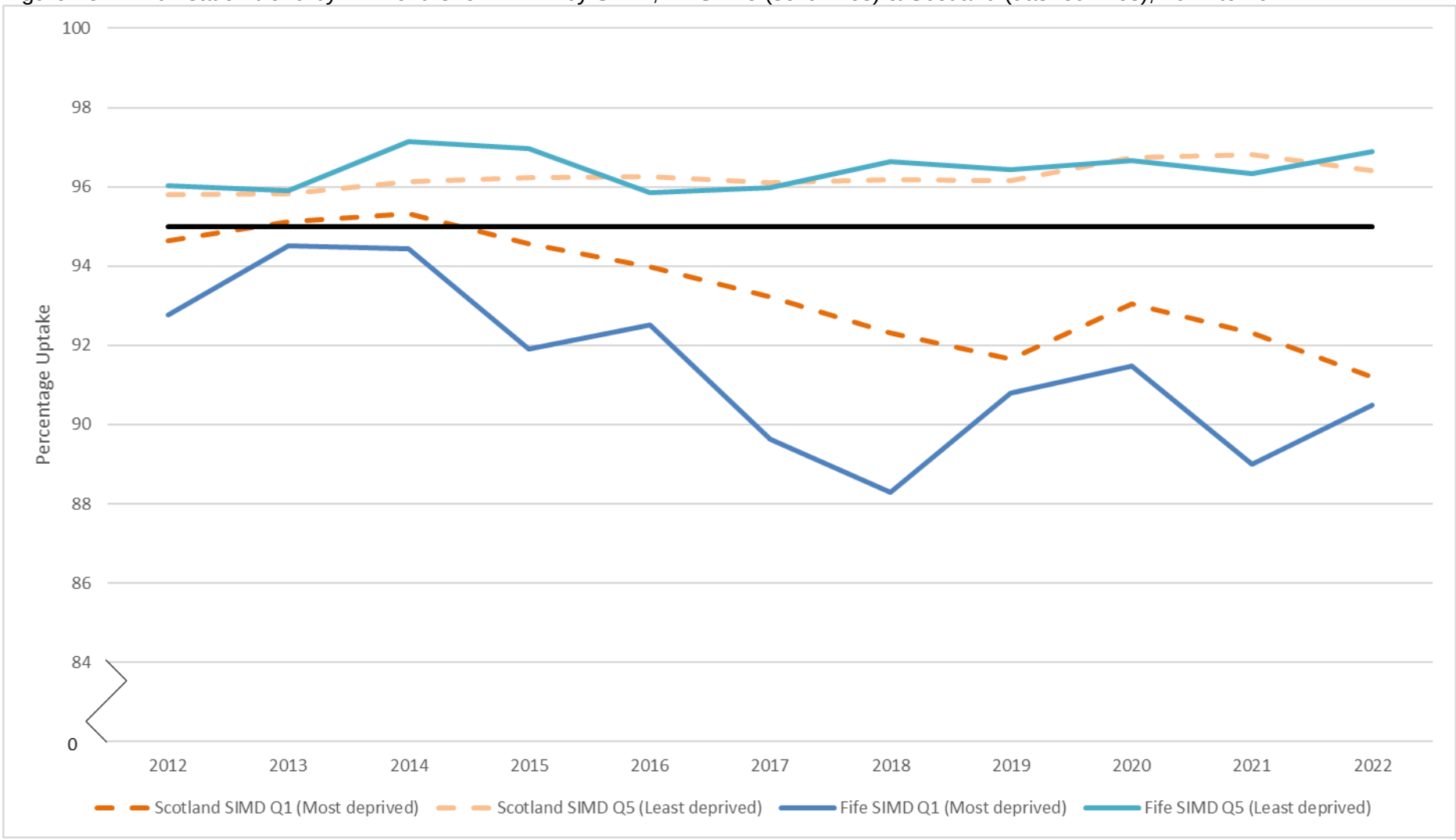
4.6 Uptake rates by 24 months of age (children born 1 January to 31 December 2020) show that by 24 months, uptake of the primary 6-in-1 vaccine are above the 95% target (table 2). However, rates are below 95% for the vaccine doses given on or after a child's first birthday: first dose of MMR vaccine, Hib/MenC, PCV boosters, and Men B booster are below 95% at 24 months and are lower than rates in the rest of Scotland. The fall in rates in 2022 is mirrored in the rest of Scotland.

4.7 Again, uptake of immunisations at 24 months of age is lowest in the most deprived areas (quintile 1) compared to the least deprived (quintile 5). This trend is in line with the trend across Scotland. However, the 95% target is met by SIMD quintiles 3 to 5 for all vaccines at 24 months. Uptake rates in 2022 for MMR 1 in Fife were similar to those in Scotland for the most deprived and least deprived (figure 13).

Table 2: Immunisation uptake rates by 24 months of age in NHS Fife, by year 2018 to 2022

		2018	2019	2020	2021	2022
Primary:						
	5-in-1/ 6-in-1	97.3	96.8	96.5	96.4	95.8
	MMR1	93.2	93.9	93.7	93.2	92.9
Booster:						
	Hib/MenC	93.2	94	93.7	93.0	92.6
	PCVB	93.3	93.7	93.6	93.3	92.8
	MenB Booster	92.6	93.3	93.2	92.7	92.1

Figure 13: Immunisation trend by 24 months for MMR1 by SIMD, NHS Fife (solid lines) & Scotland (dashed lines); 2012 to 2022



4.8 By 5 years, the Hib/MenC and MMR1 vaccines (given at 1 year) are similar in uptake in Fife to elsewhere in Scotland, suggesting that catch-up activity has taken place between 2 and 5 years (table 3). However, uptake of the vaccines normally given around three years four months of age (4-in-1[8] and 2nd dose MMR) remains below 95% at 5 years in Fife. This is also the case elsewhere in Scotland; Fife has continued below the Scottish average since 2017 on MMR2, but the gap appears to have narrowed in the second half of 2021 (figure 14).

4.9 SIMD data was made available for the 4-in-1 and MMR2 vaccine in 2022. As with SIMD trends at earlier reporting ages uptake is lower for quintile 1 (most deprived) compared to quintile 5 (least deprived) (figure 15).

Table 3: Immunisation uptake rates by 5 years of age in NHS Fife, by year 2018 to 2022

	2018	2019	2020	2021	2022
MMR1	96.3	96.4	96.1	96.1	95.4
Hib/MenC	95.5	96.1	95.6	95.8	95.2
4-in-1	88.7	87.6	88.7	89.7	88.3
MMR2	88.4	87.4	88.4	89.3	88.0

[8] Diphtheria, tetanus, pertussis (whooping cough), and polio

Figure 14: Immunisation rates by 5 years for MMR1 and MMR2, NHS Fife (solid lines) & Scotland (dashed lines); 2012 to 2022

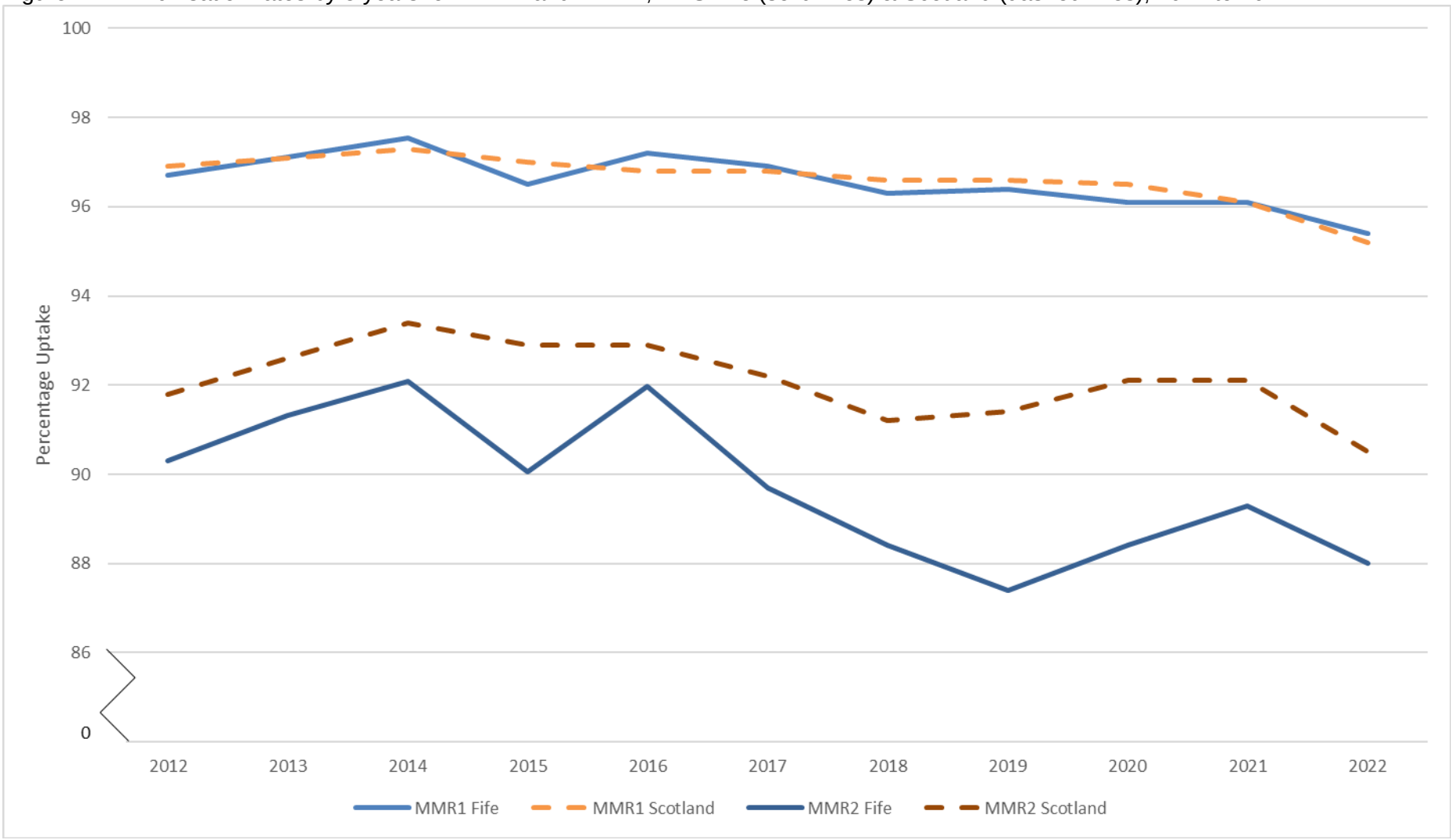
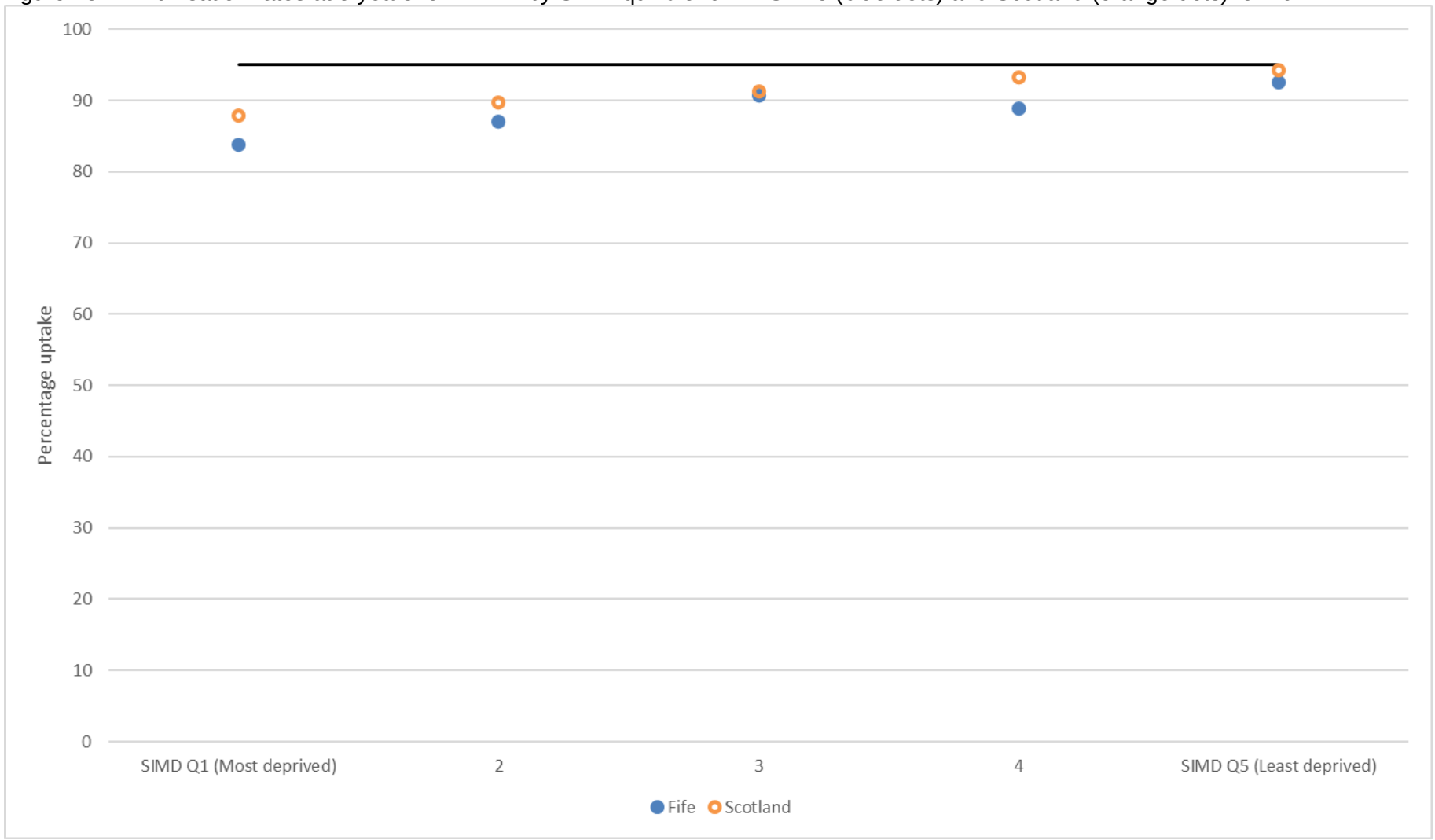


Figure 15: Immunisation rates at 5 years for MMR2 by SIMD quintile for NHS Fife (blue dots) and Scotland (orange dots) for 2022



4.10 Data is also available at six years of age (prior to 2006 this was the standard reporting age instead of five years); rates are slightly improved at this age indicating that some children are receiving pre-school immunisations after 5 years (table 4). At 6 years MMR 1 (delivered at 1 year) is similar to that seen elsewhere in Scotland, but MMR2 and the 4 in 1 booster remain below the Scottish average.

Table 4: Immunisation uptake rates by 6 years of age in NHS Fife, by year 2018 to 2022

	2018	2019	2020	2021	2022
MMR1	96.3	96.4	96.2	95.6	95.6
4-in-1	92.8	91.6	90.9	91.4	91.5
MMR2	92	91.2	90.7	91.1	91.3

Teenage immunisations

Teenage Booster

4.11 A combined booster immunisation is delivered for tetanus, diphtheria and polio (Td/IPV, given around 14 years of age) along with an immunisation protecting against four strains of meningococcal bacteria (MenACWY). Due to the pandemic, delivery of the teenage programme was disrupted to varying degrees across health boards in Scotland depending on where they were in their delivery plans at the time of lockdown. This should be considered when comparing the Fife data to the Scottish average (table 5, figure 16) where it is clear that the 2020-21 school year delivery was disrupted to a far greater extent in the rest of Scotland than in Fife.

4.12 The teenage booster programme in Fife demonstrates clear socioeconomic gradient in vaccination uptake that is similar to that seen in the rest of Scotland (figure 17). Mop-up activity means that by the end of S4 the uptake rates are slightly higher.

Table 5: Td/IPV and MenACWY uptake rates by end of S3 and end of S4, Fife & Scotland, 2021-22

	S3		S4	
	Fife	Scotland	Fife	Scotland
Td/IPV	67.3	71.6	86.7	74.9
MenACWY	67.5	71.7	86.3	73.8

Figure 16: Immunisation rate for MenACWY uptake at S3 & S4, NHS Fife (solid lines) & Scotland (dashed lines); school year 2017/18 to 2021/22

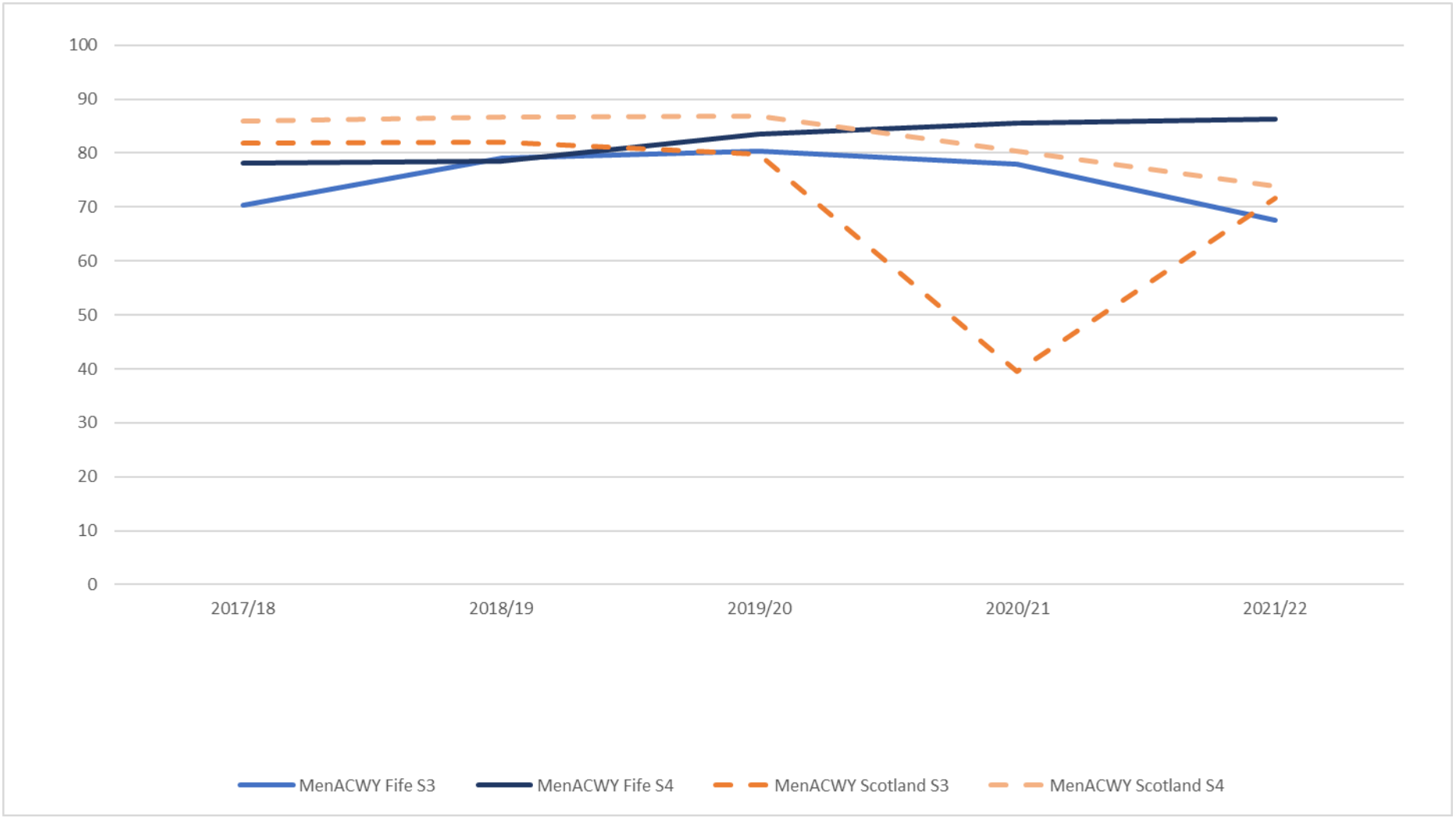
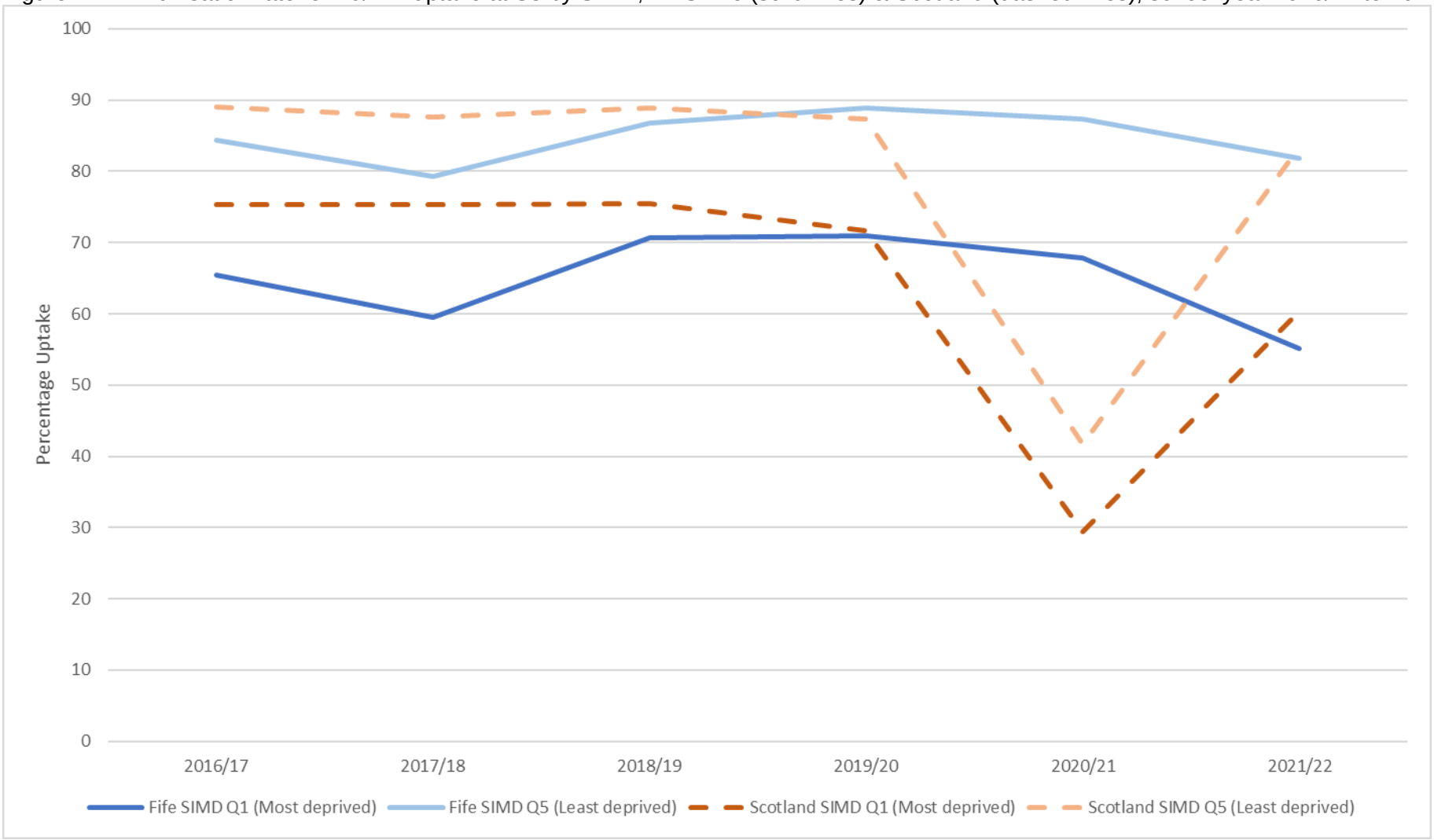


Figure 17: Immunisation rate for Td/IPV uptake at S3 by SIMD, NHS Fife (solid lines) & Scotland (dashed lines); school year 2016/17 to 2021/22



Human Papilloma Virus (HPV)

4.1 The Scottish HPV immunisation programme started in 2008, with inclusion of secondary school boys from 2020. Until January 2023 two doses of HPV vaccine were offered to all children (males & females) in Fife in S1 and S2, usually within the Spring term. Follow up opportunities are offered at S3 for those that miss their HPV vaccination at S1 or S2. Although the two-dose schedule was still being implemented during the 2021-22 school year, this report focuses on dose 1 uptake only given that a single dose programme has now been implemented based on JCVI advice.

4.2 HPV vaccination uptake in Fife at S1 and S2 for males and females is shown in table 6, figures 18 and 19. In general, uptake among males is slightly lower than females. Uptake of dose 1 at both S1 and S2 is higher in Fife than elsewhere in Scotland. There is a substantial socioeconomic gradient between the least and most deprived quintiles at S3 (figure 20). Uptake fell for the most deprived quintile in the 2021-22 school year compared with 2020-21; it is not clear whether the inclusion of boys in the SIMD data for 2021-22 is the cause, or if it reflects a decrease in uptake for both girls over this period.

Table 6: HPV uptake at S1 and S2 by sex, NHS Fife & Scotland, 2021-22

	Dose 1 S1		Dose 1 S2	
	Female	Male	Female	Male
Fife	68.9	55.8	83.6	76.2
Scotland	77.5	69.6	86.4	80.9

Figure 18: 1st dose HPV immunisation uptake rates for girls by the end of the school year 2016/2017 to 2021/2022, at S1 and S4, NHS Fife (solid lines) and Scotland (dashed lines)

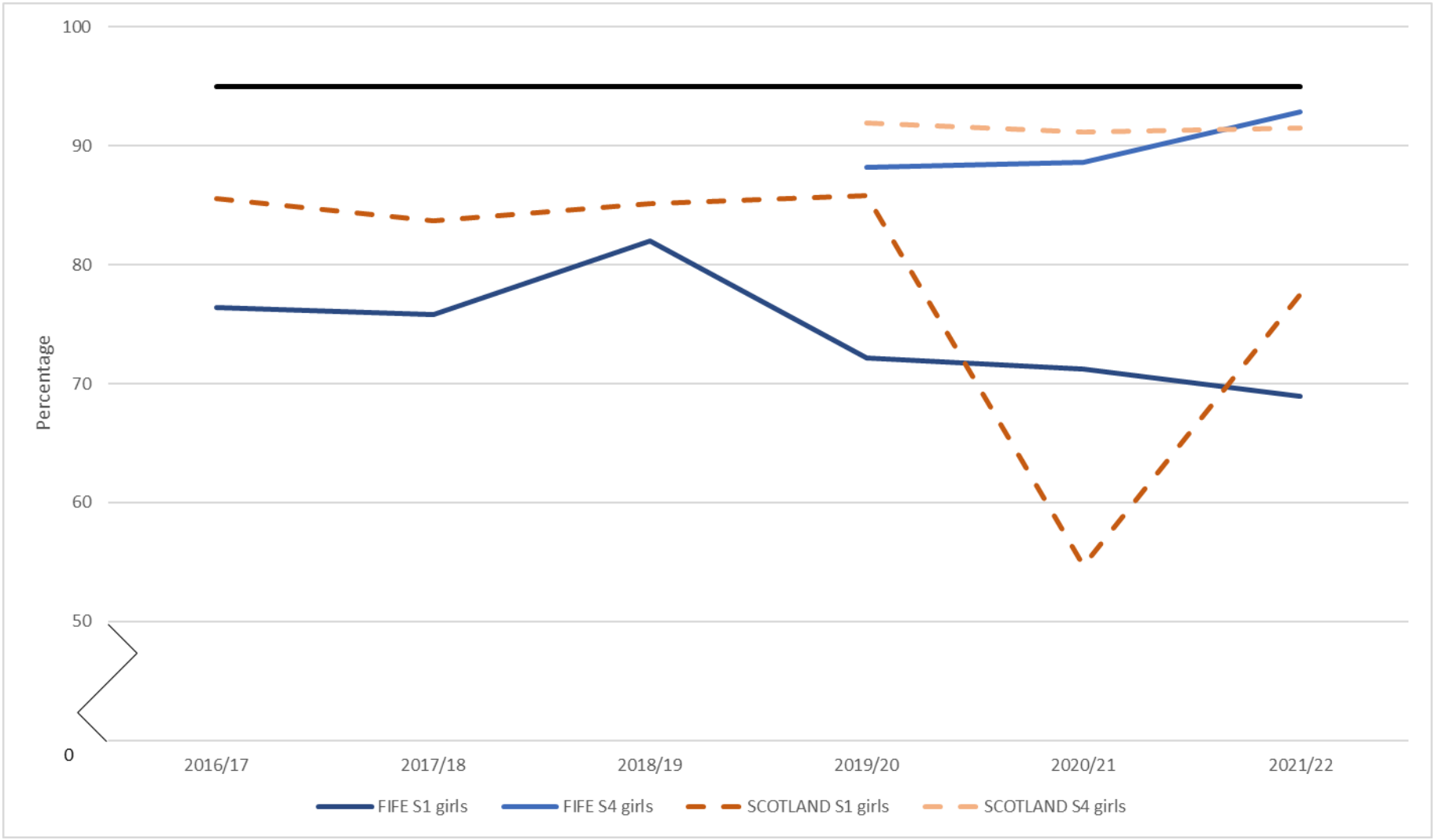


Figure 19: 1st dose HPV immunisation uptake rates for boys by the end of the school year 2019/2020 to 2021/2022, at S1 and S2, NHS Fife (solid lines) and Scotland (dashed lines)

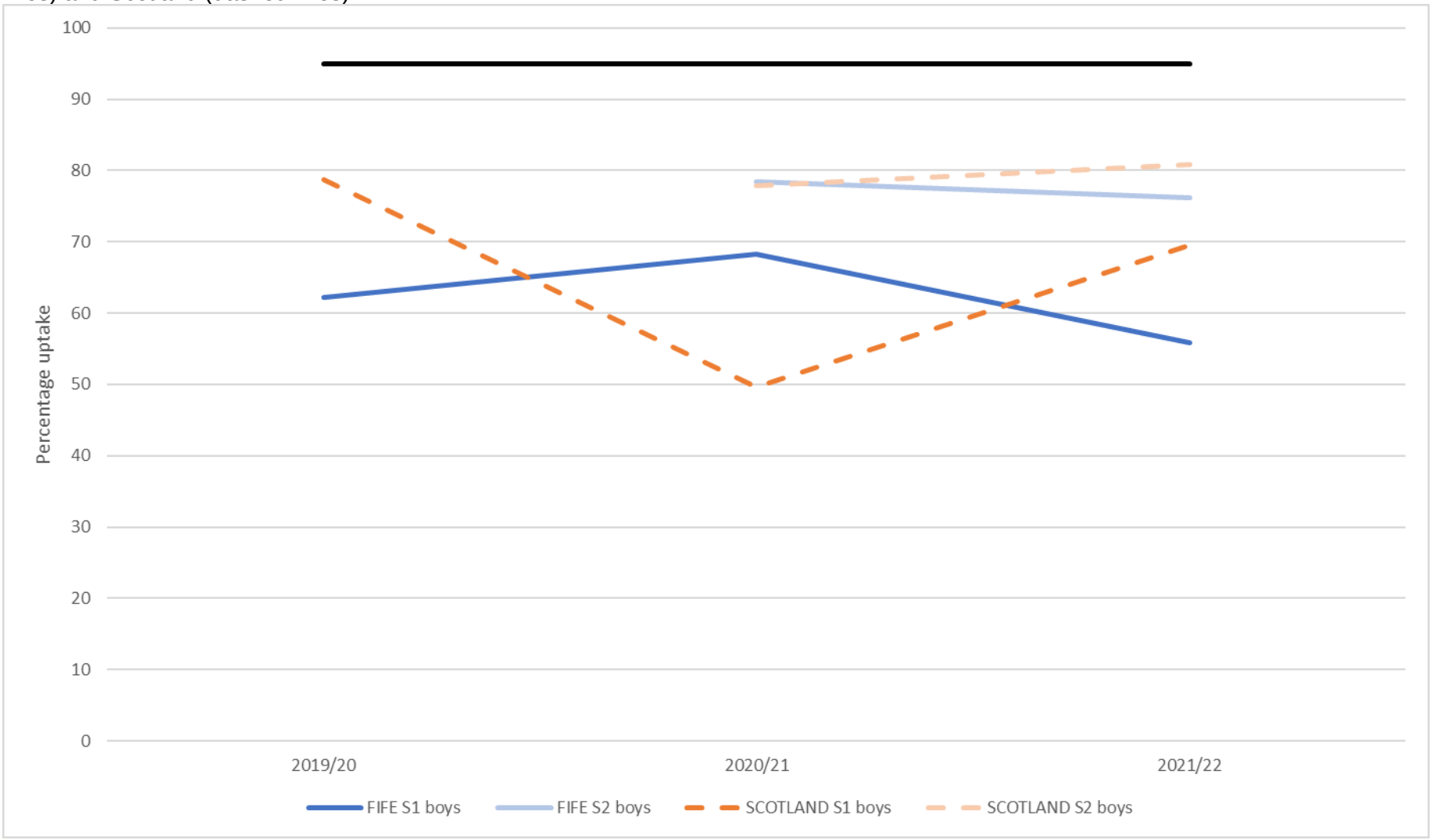
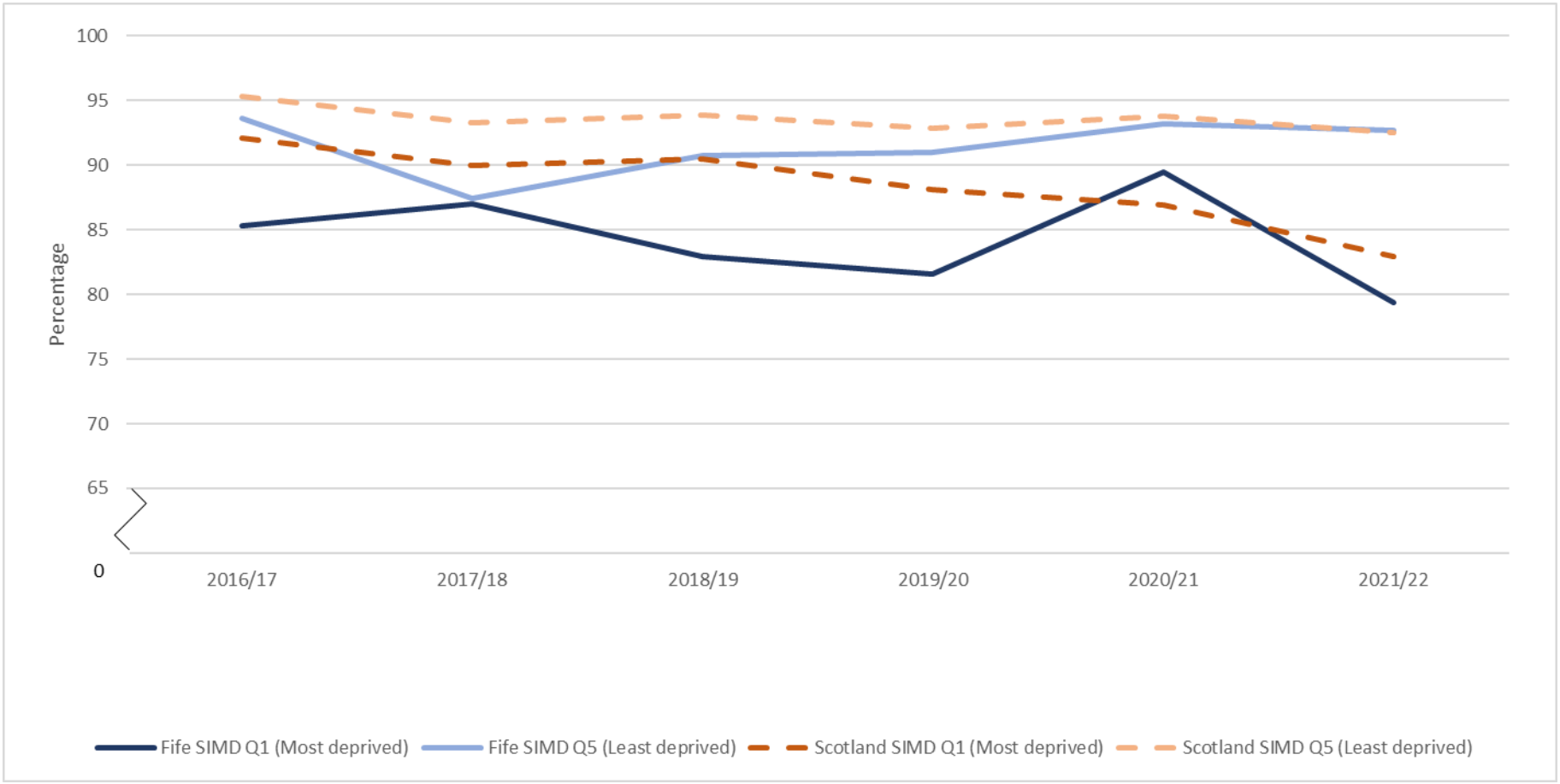


Figure 20: 1st dose HPV immunisation uptake rates by the end of the school year 2016/17 to 2021/22, at S3, NHS Fife (solid lines) and Scotland (dashed lines)[9]



[9] SIMD data up to 2020/21 was reported for girls. From 2021/22 onwards data is reported for all pupils.

Summary of vaccine uptake inequalities in childhood and teenage programmes

4.3 Appendix 2 provides a summary of inequalities in vaccination uptake using four different measures of inequalities. Data from previous years are shown for comparison. The first two measures are straightforward calculations of the absolute range (difference between rates in the most and least deprived quintiles) and the relative range (the ratio of the uptake in the most deprived group compared to uptake in the least deprived group). These two measures overlook the changes in the intermediate groups and do not take into account the sizes of the groups being compared. As such, two alternative measures of absolute and relative inequality - the Slope Index of Inequality (SII) and Relative Index of Inequality (RII) are also calculated. The SII can be interpreted as the absolute effect on uptake of moving from the most deprived to the least deprived grouping. The RII is a measure of the relative inequality of uptake rates and compares ratios rather than absolute differences.

4.4 Both the SII and RII suggest that inequalities increase in older childhood age groups and are greatest in the teenage booster programme. The data also suggest that at 24 months inequalities have slightly improved from 2021, however in other age groups they have worsened. We will continue to measure inequalities in the annual data to see if these trends continue.

Adult and selective immunisation programmes

4.6 Responsibility for the delivery of the adult shingles & pneumococcal programmes transferred from general practice to the health boards in April 2022.

Pneumococcal (PPV23)

4.7 PPV23 is one-off vaccine for those aged 65 years and over and those under 65 with underlying conditions, that protects against 23 serotypes of pneumococcal disease. A small cohort require repeat vaccination every 5 years. Data for pneumococcal vaccination uptake for 2021-2022 have not been published as yet by PHS.

Shingles

4.8 Shingles vaccine is offered routinely to those aged 70 years, and individuals aged between 71 and 79 who have not previously been vaccinated remain eligible for the one-off vaccine. The programme was first introduced in 2013 using Zostavax, however, as this was a live vaccine it could not be given to those who were severely immunosuppressed. From December 2021 a non-live vaccine, Shingrix, was introduced following recommendation from the JCVI, and can be given to those for whom Zostavax is contraindicated.

4.9 There was a formal temporary suspension of the shingles programme in Scotland from 09/04/20 to 01/09/20 due to the pandemic, and although opportunistic vaccination could take place if the patient presented for another scheduled appointment and was well, activity during this period was very limited.

4.10 Shingles vaccination data is reported annually by PHS starting in September each year. Uptake of vaccination among both those newly eligible (70 years) and the routine catch up cohort (71 – 79 years) for 2021-2022 shingles programme was similar in Fife and Scotland and has improved from rates in 2020-21.

Table 7: Shingles Zostavax vaccination coverage among eligible routine cohort (70 years) and eligible catch up cohort (71 – 79 years) NHS Fife & Scotland, September 2021 – August 2022

	2020 - 2021		2021 - 2022	
	Fife	Scotland	Fife	Scotland
Routine eligible cohort (70 years)	29.1%	24.5%	45.8%	45.1%
Routine catch-up cohort (71 to 79 years)	62.3%	59.7%	66.9%	63.1%

Influenza

4.11 For the 2022/23 flu season adults aged 50 and over, health and social care workers and individuals at risk aged 18 years or over were eligible to receive the flu vaccine between the 5th of September 2022 and the 31st of March 2023. Most vaccines were co-administered with the COVID-19 winter booster vaccine (89%). Vaccination activity also took place in community pharmacies who offered a flu ‘mop-up’ offer to eligible groups.

4.12 During the 2022/23 season, 130,961 adult flu vaccinations were administered, which is a 64.5% uptake in the total eligible population. This is similar to that reported for Scotland of 63.7% at the end of the programme. Vaccination uptake was high amongst the over 65s at 86% (Scotland 85%) (table 8).

Table 8, Uptake Seasonal Flu Vaccine Adults 2022/23

	18-64 at risk	50-64	65+
Fife	56.7%	55.8%	86.0%
Scotland	56.9%	55.5%	85.5%

(Source: PHS FVCV Delivery & Planning flash report, PHS COVID-19 statistical report (dashboard)

COVID-19

4.13 As with the seasonal flu vaccine the COVID-19 winter booster programme ran from the 5th of September 2022 to the 31st of March 2023. Eligible groups for the 2022/23 COVID-19 winter booster programme included adults aged 50 years or over, frontline health and social care workers, and at-risk individuals aged 5 years and over.

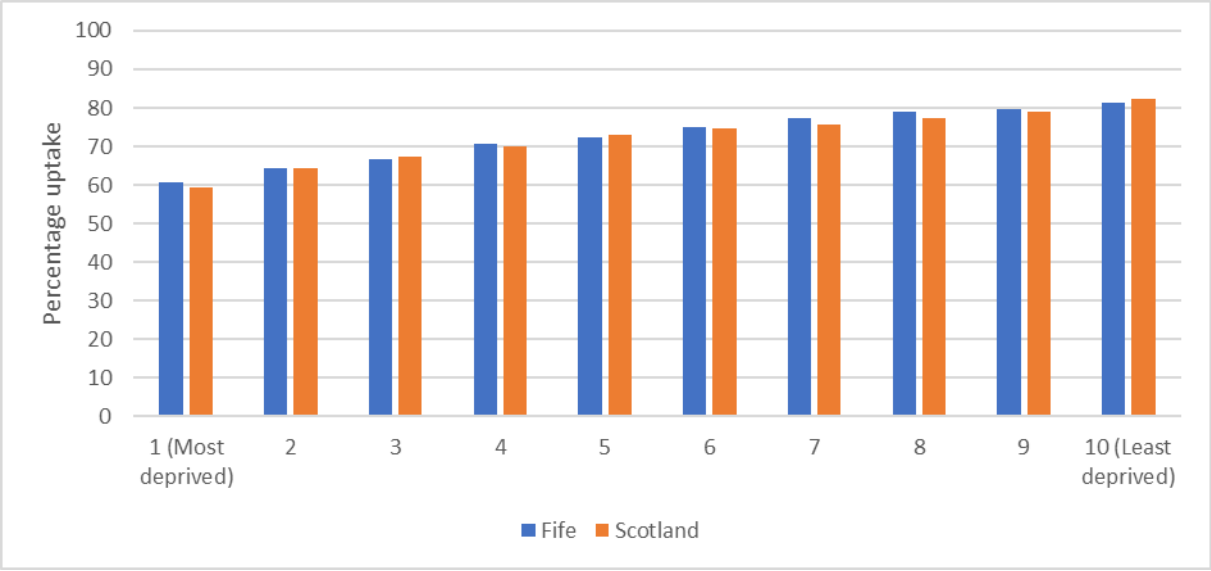
4.14 A total of 133,096 vaccines were administered during the programme, 72.9% uptake among the total eligible cohort, which is similar to the uptake reported for the rest of Scotland. During the 2022/23 season the uptake rates in Fife were lower than for the rest of Scotland for individuals aged 50-64 years and those aged 65 and over, however uptake in the over 65s continued to be high at 86% uptake (table 9). Uptake amongst the at-risk cohort was comparable in Fife with elsewhere in Scotland. Uptake is lower in areas which are most deprived (figure 21). Uptake is also lower in some ethnic minority groups, specifically the Polish, African and Pakistani communities.

Table 9: Uptake COVID-19 Winter Booster Vaccine 2022/23

	5-64 at risk	50-64	65+
Fife	63.9%	55.8%	86.0%
Scotland	63.8%	66.0%	90.6%

(Source: PHS FVCV Delivery & Planning flash report, PHS COVID-19 statistical report (dashboard))

Figure 21: Uptake of COVID-19 winter booster vaccine by SIMD decile for eligible groups 2022/23 programme.



(*Source: PHS Performance reporting, FVCV Autumn/Winter programme 2022/23*)

Other Selected vaccinations

Pertussis in pregnant women

4.15 Uptake of pertussis was 88% among pregnant women who registered a birth between 1/4/22 to 31/3/23 (badgernet data). Due to different approaches to recording data across Scotland it is difficult to make a direct comparison with the rest of Scotland. Data issues affecting all Boards mean that comparisons with the rest of Scotland. Uptake of seasonal vaccinations among this cohort are challenging, however uptake of COVID vaccination among this cohort is indicated to be significantly lower.

Babies born to mothers with Hepatitis B

4.16 The risk of developing chronic hepatitis B infection depends on the age at which infection is acquired. Chronic infection occurs in 90% of those infected perinatally but is less frequent in those infected as children (e.g. 20 to 50% in children between one and five years of age)[10]. Post-exposure immunisation is provided to infants born to hepatitis B infected mothers, identified through antenatal screening, to prevent mother to child transmission at or around the time of birth. Immunisation of the infant should start as soon as possible after birth, and no later than 24 hours, and be followed by a dose four and eight weeks later and a further dose at one year of age. From August 2017, as hepatitis B is included in the routine childhood immunisation programme, the dose at eight weeks in the selective neonatal programme is provided in DTaP/IPV/Hib/HepB as part of the routine programme, as well as additional doses given at 12 and 16 weeks.

4.17 Over the 5 year period 2017 to 2022, a total of 15 babies were born to mothers infected with hepatitis B resident in Fife, and all newborns received the first dose of vaccine within 1 day of their DOB (100% dose 1 delivered on schedule). Over the same period, 11

[10] https://www.gov.uk/government/publications/hepatitis-b-the-green-book-chapter-18

infants (73% of cohort) had received all required doses by the time they turned 12 months.

BCG for newborn at risk

4.18 The existing pathway for delivery of BCG vaccination for at risk children below 1 year was disrupted in 2021 and 2022; this is reflected in the lower uptake rates in 2021 (data published March 2023); mop-up clinics have been running to ensure catch-up for this group and a new pathway was implemented in February 2023.

Table 10: BCG uptake for at risk children turning 12 months, 2017 - 2021

	2017	2018	2019	2020	2021
Fife	70.3	72.3	70.6	75.0	48.3
Scotland	76.0	78.6	80.6	78.9	73.5

Vaccination of men who have sex with men (MSM)

4.19 Over a 5 year reporting period July 2017 to June 2022 (starting when the programme was introduced) a total of 47% of eligible individual's attending Fife sexual health services over the five year period have either completed HPV course (as previous policy) or are in progress; across Scotland this figure is 67%. The percentage uptake is based on number of physical attendances made by males, identified as men who have sex with men, aged up to and including 45 years old. Denominator data are based on an individual's most recent treatment location within the reported 5 year period (July 2017 to June 2022), rather than board of residence.

4.20 In 2021 15% of MSM attendees at Sexual Health received Hepatitis A & B Vaccine. In 2022 this figure was 16%. As with HPV vaccine it is likely that some eligible MSM will have received the Hep A and Hep B vaccine elsewhere. Further work is required to understand hepatitis A & B coverage among this cohort locally as currently it is unclear if the low rates reflect low uptake or incomplete recording of their vaccination status. No comparison with data at Scotland level is available.

4.21 An assessment of Fife patients within the MSM cohort in NASH was carried out against risk factors outlined in the guidance issued by Public Health Scotland guidance in response to the emerging public concerns about Mpox in 2022. This identified a priority cohort for mpox pre-exposure vaccination of 209 individuals. A series of vaccination clinics were set up and have run since July 2022. Of the at-risk cohort of 209 in Fife 78% have received first dose Mpox vaccine. Second dose offers and vaccination clinics are currently in progress. Those not on the priority list can request an assessment and those identified at high risk during sexual health appointments or contact tracing can be offered an appointment.

5 STRATEGIC FRAMEWORK REVIEW

5.1 NHS Fife and Fife HSCP worked collaboratively to develop a 3 year Immunisation Strategic framework 2021-2024. The vision is for 'A Fife where everyone, everywhere, has confidence in and equitable access to high-quality, safe, sustainable immunisation services throughout their life course'. Four high-level priorities for action were identified following an in-depth review process that took place in 2021. Priority 1 is to 'Optimise immunisation coverage ensuring equitable access for all eligible groups'; the performance measures identified for priority 1 are reviewed below.

Strategic Performance Measure	**Assessment May 2023**	**Progress 2022 - 2023**
Achieve childhood immunisation coverage rates of 95% or higher across all SIMD quintiles	Target not met; 2022 uptake <95% uptake at 12 months, with declining trend & growing deprivation gap. Whilst primary vaccines reach >95% by 24 months, those given at 1 year of age remain <95% with similar inequalities. By 5 years of age, the vaccines given at 1 yr are >95%, however, the pre-school vaccines given at 3yr 4 months are <90%.	A nurse-led QI group was established in September 2022 with a focus on improving MMR2 uptake by 5 years of age. Additional pre-school clinics scheduled in Spring 2022 to reduce appointment queue lengths. Driver diagram developed generating various actions that are being tested through a quality improvement approach. Public-health led strategic review of the delivery of children's immunisation programme commenced in March 2023. Telephone questionnaire for parents that did not bring their child to an appointment was initiated as part of the MMR2 quality improvement work and findings are also informing this work, along with multiple other sources of data intelligence. Initial findings and small-area uptake data presented at locality meetings June 23, and will inform prioritization exercise and final recommendations. Following the measles briefing issued by UKHSA in May 23, letters have been sent to all families with children with outstanding MMR vaccination prompting them to arrange appointment.
Achieve MenACWY & Td/IPV coverage of	Target not met; uptake <95% at S3 and S4 in 2021/22 school year. Uptake <70% in year first offered	Ongoing mop-up opportunities offered to S6. Quality improvement work required in most deprived areas, e.g. with those not attending school

95% by end S4 across all SIMD quintiles	(S3) and >85% by S4. Gradual improvement in uptake evaluated at S4 seen over five year period. Significant inequalities with S3 uptake <60% in most deprived quintile in Fife.	National schedule change to moving the first offer in S2 (rather than S3) anticipated to support improvements uptake and reduce inequalities due to lower absence rates in younger school cohort (implementation date tbc)
Achieve HPV immunisation coverage of 80% for both females and males by end S3 across all SIMD quintiles *(WHO target 90% dose 1 by 15 years)*	Target met; >90% dose 1 uptake achieved by S4 among girls in 2021/22 school year; >80% dose 1 uptake achieved by boys & girls by S3. Uptake of dose 1 in most deprived quintile at S3 just below 80% in 2021/22 with widening of inequalities from 2020/21.	National programme change from two-dose to one-dose schedule in 2023 based on JCVI advice as 1 dose shown to be effective in cancer prevention. Using dose 1 as completion marker we achieved the Strategic Framework uptake target of 80% in both girls & boys be end of S3. S4 data not yet available for boys as programme running 3 years, however, WHO target of 90% also met by S4 for girls in Fife. Further work required to understand fall in uptake between 2020-21 and 2021-22 for most deprived quintile girls at S3, and to understand fall in uptake in boys at S1.
Local target for Shingles programme to be confirmed	No national or local target; shingles uptake for newly eligible 70 yr old cohort in 2021-22 at 46% (29% in 2020-21). Uptake among mop up cohort (age 71 – 79 years) also improved from 2020-21 and slightly higher than rest of Scotland.	Delivery transferred to NHS Fife in April 2022 (part-way through assessment year Sept 21 – Aug 22). Change in eligibility and vaccine schedule from September 23 (universal 2 dose Shingrix, plus expanded age eligibility) - no current national or local uptake target set as yet.
Local Target for Pneumococcal programme to be confirmed	No local or national target; no uptake data available for 2021-22 at either national or local level.	Delivery transferred to NHS Fife in April 2022. Routine cohort (65+ years) uptake data for 2021-22 awaited.
Achieve seasonal flu coverage as set out in annual CMO letter	Target met; 86% flu vaccination uptake among 65+ cohort for 2022-23 season exceeded WHO uptake target of 75%.	Delivery of 2022-23 seasonal flu programme with co-administration through community clinics, staff clinics, care home visits & home visits. Limited flu-only delivery via community pharmacies. No national or local target set for 18-64 year at-risk group, and no comparable trend data due to universal 50-64 yr offer.

Achieve national COVID-19 targets as they emerge across JCVI priority groups	No national target; 86% COVID vaccination uptake among 65+ cohort for autumn/winter 2022-23 booster programme. 64% uptake among 5 to 64 at risk group.	Delivery of 2022-23 seasonal flu programme with co-administration through community clinics, staff clinics, care home visits & home visits. Mop-up outreach visits to areas of lower uptake in most deprived areas had limited impact. Inequaliites in uptake by deprivation and ethnicity similar to previous phases of COVID vaccination programme and similar to those seen elsewhere in Scotland.
Achieve 85% BCG uptake rates for eligible children by 12 months for those at risk of Tuberculosis	Target not met by 12 months; >12 months catch-up clinics ran 2022-23.	Disruption of delivery pathway led to fall in uptake 2021 (latest data available). New delivery pathway developed for newborn at-risk cohort with delivery from February 2023 with enhanced local monitoring progamme.
Achieve 100% uptake of Hepatitis B for babies at risk within the recommended schedule for this cohort	Target met for uptake of dose 1 (given at birth); target not met for delivery of all scheduled doses by 12 months.	Small numbers per year. Ongoing monitoring of pathway; all children offered vaccinations within first 12 months and varied reasons why this is not always achieved.
Achieve Pertussis coverage of 75% for pregnant women	Target met.	Ongoing successful delivery of pertussis vaccination through maternity services. Learning from programme to be considered in delivery of seasonal vaccination programme for pregnant women.
Achieve HPV coverage of 80% for men who have sex with men up to and including age 45 years attending sexual health services	Target not met.	Uptake data reviewed at Area Immunisation Steering Group meeting February 2023; ongoing work required by service to understand causes of lower uptake data in those attending Fife sexual health clinics and identify opportunities for improvement work.
Establish Hepatitis A&B uptake rates within sexual health services	Target not met; analysis of NaSH data, but ongoing data issues limiting interpretation.	Vaccination data from NaSH database reviewed at Area Immunisation Steering Group meeting February 2023; ongoing work required by service to investigate how hepatitis A & B vaccination records are recorded and identify opportunities for improvement work.

6 CONCLUSIONS

6.1 This report has highlighted the findings from surveillance data on vaccine preventable disease in Fife, as well as vaccine uptake rates across childhood, teenage and adult immunisation programmes. Surveillance data demonstrate ongoing low incidence rates of most vaccine preventable diseases during 2022 in Scotland and in Fife. Whilst Scotland continues to perform strongly for vaccination uptake rates of the childhood programme compared to the rest of the UK, there are growing concerns regarding the declining trend in the infant, pre-school and teenage programmes across Scotland in 2022, and also seen in Fife. In Fife, uptake is below the Scottish average, and declining uptake in the most deprived parts of the population is an ongoing concern. Data availability for the adult vaccination and selective immunisation programmes is variable, but is anticipated to improve under the transition to the 'Scottish Vaccination & Immunisation Programme' (SVIP).

6.2 Actions progressed against the priorities and measures set out in the Fife Strategic Framework have provided the platform for ongoing close monitoring of uptake rates and established governance structures to support for the improvement work required to ensure our immunisation services are as accessible and flexible as possible, and that inequalities are addressed. Review of the Strategic Framework priorities is underway in 2023, with a strengthened focus on improving delivery in the context of the findings of this report.

7 Acknowledgements

7.1 The provision of immunisation programmes in Fife is dependent on the combined continued efforts of:

- Fife Community Immunisation Service
- Child Health Department, Children's Services
- Pharmacy, Community Services
- Public Health Department, NHS Fife
- Immunisation and Vaccine Preventable Diseases Team at Public Health Scotland
- Population Health Analytics and Intelligence, NHS National Services Scotland
- Scottish Immunisation Programme, Scottish Health Protection Network

8 Vaccine Abbreviations

DTP/Pol/Hib = the 5-in-1 vaccine which protects against diphtheria, tetanus, pertussis, polio and Haemophilus influenzae type b (Hib) [replaced by 6-in-1 as below]

DTP/Pol/Hib/Hep B = the 6-in-1 vaccine which protects against diphtheria, tetanus, pertussis, polio, Haemophilus influenzae type b (Hib) and Hepatitis B.

MenC = Meningococcal serogroup C conjugate vaccine

PCV13 = Pneumococcal conjugate vaccine (protects against 13 serotypes of pneumococcal)

PCVB = Pneumococcal conjugate vaccine booster

MenB = Meningococcal Group B

MenB (Booster) = Meningococcal Group B booster

MMR1 = Measles, mumps, and rubella vaccine (1st dose)

MMR2 = Measles, mumps, and rubella vaccine (2nd dose)

Hib/MenC = Hib/MenC booster vaccine

DTP/Pol = 4-in-1 booster vaccine which protects against diphtheria, tetanus, pertussis and polio

Td/IPV – Protects against Tetanus, Diptheria and polio (teenage booster)

HPV – Human Papilloma Virus – protects against cancers and genital warts caused by HPV, including cervical cancer

MenACWY – Protects against Meningococaal Group A, C, W & Y

LAIV – Live Attenuated Influenza Vaccine

BCG -

PPV23 – Pneumococcal polysaccharide Vaccine (protects against 23 serotypes of pneumococcal)

9 Appendices

9.1 Appendix 1: Routine childhood & adult immunisation schedule

The routine immunisation schedule from February 2022

Age due	Diseases protected against	Vaccine given and trade name		Usual site[1]
Eight weeks old	Diphtheria, tetanus, pertussis (whooping cough), polio, *Haemophilus influenzae* type b (Hib) and hepatitis B	DTaP/IPV/Hib/HepB	Infanrix hexa or Vaxelis	Thigh
	Meningococcal group B (MenB)	MenB	Bexsero	Left thigh
	Rotavirus gastroenteritis	Rotavirus[2]	Rotarix[2]	By mouth
Twelve weeks old	Diphtheria, tetanus, pertussis, polio, Hib and hepatitis B	DTaP/IPV/Hib/HepB	Infanrix hexa or Vaxelis	Thigh
	Pneumococcal (13 serotypes)	Pneumococcal conjugate vaccine (PCV)	Prevenar 13	Thigh
	Rotavirus	Rotavirus[2]	Rotarix[2]	By mouth
Sixteen weeks old	Diphtheria, tetanus, pertussis, polio, Hib and hepatitis B	DTaP/IPV/Hib/HepB	Infanrix hexa or Vaxelis	Thigh
	MenB	MenB	Bexsero	Left thigh
One year old (on or after the child's first birthday)	Hib and MenC	Hib/MenC	Menitorix	Upper arm/thigh
	Pneumococcal	PCV booster	Prevenar 13	Upper arm/thigh
	Measles, mumps and rubella (German measles)	MMR	MMRvaxPro[3] or Priorix	Upper arm/thigh
	MenB	MenB booster	Bexsero	Left thigh
Eligible paediatric age groups[4]	Influenza (each year from September)	Live attenuated influenza vaccine LAIV[3,5]	Fluenz Tetra[3,5]	Both nostrils
Three years four months old or soon after	Diphtheria, tetanus, pertussis and polio	dTaP/IPV	Boostrix-IPV	Upper arm
	Measles, mumps and rubella	MMR (check first dose given)	MMRvaxPro[3] or Priorix	Upper arm
Boys and girls aged twelve to thirteen years	Cancers and genital warts caused by specific human papillomavirus (HPV) types	HPV (two doses 6-24 months apart)	Gardasil	Upper arm
Fourteen years old (school Year 9)	Tetanus, diphtheria and polio	Td/IPV (check MMR status)	Revaxis	Upper arm
	Meningococcal groups A, C, W and Y	MenACWY	Nimenrix	Upper arm
65 years old	Pneumococcal (23 serotypes)	Pneumococcal Polysaccharide Vaccine (PPV)	Pneumovax 23	Upper arm
65 years of age and older	Influenza (each year from September)	Inactivated influenza vaccine	Multiple	Upper arm
70 to 79 years of age	Shingles	Shingles	Zostavax[3] (or Shingrix if Zostavax contraindicated)	Upper arm

Source: https://www.gov.uk/government/publications/the-complete-routine-immunisation-schedule

Appendix 2: Childhood and teenage vaccine uptake inequalities – Slope Index & Relative Index measures 2017, 2018, 2021, 2022

Vaccination	Age	Absolute range				Relative range				Slope Index of Inequality				Relative Index of Inequality			
		2017	2018	2021	2022	2017	2018	2021	2022	2017	2018	2021	2022	2017	2018	2021	2022
6-in-1*	12 months	4.15	4.67	5.66	6.4	0.96	0.95	0.94	0.9	5.2	6.0	5.7	9.1	0.05	0.06	0.06	0.10
MenB	12 months	3.96	4.11	4.95	5.81	0.96	0.96	0.95	0.94	4.7	4.9	5.1	7.9	0.05	0.05	0.05	0.08
PCV	12 months	4.58	3.99	3.86	3.06	0.95	0.96	0.96	0.97	5.6	5.1	3.9	4.8	0.06	0.05	0.04	0.05
Rotavirus	12 months	3.93	4.70	6.04	6.35	0.96	0.95	0.94	0.93	4.9	5.8	5.9	10.0	0.05	0.06	0.06	0.11
MMR1	24 months	6.35	8.34	7.34	6.44	0.93	0.91	0.92	0.93	8.3	10.8	10.8	7.5	0.09	0.12	0.12	0.08
Hib/MenC	24 months	6.19	7.30	7.16	7.27	0.94	0.92	0.93	0.93	8.3	9.3	10.4	8.6	0.09	0.10	0.11	0.09
PCV booster	24 months	6.68	6.88	6.05	6.03	0.93	0.93	0.94	0.94	8.6	8.9	8.9	7.2	0.09	0.10	0.10	0.08
Men B Booster	24 months		7.85	7.40	7.44		0.92	0.92	0.92		9.8	10.9	8.5		0.11	0.12	0.09
4-in-1	5 years				8.72				0.91				10.1				0.11
MMR2	5 years				9.21				0.90				10.9				0.12
HPV Dose1**	Teenage (S3)	8.26	0.43	3.68	13.25	0.91	1.00	0.96	0.86	10.3	2.6	4.0	16.5	0.11	0.03	0.04	0.19
Td/IPV booster	Teenage (S4)	10.59	19.07	15.49	12.80	0.88	0.78	0.83	0.86	15.8	24.2	18.2	16.1	0.19	0.31	0.21	0.19
MenACWY	Teenage (S4)	10.84	19.09	15.05	13.33	0.88	0.78	0.84	0.85	16.1	24.0	17.6	16.7	0.19	0.31	0.21	0.19

**DTP/Pol/Hib (5-in-1) only in 2017*

*** Girls only 2017-2022; all 2022*