

University of Dundee

Evaluation of the Universal Health Visiting Pathway in Scotland

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Evaluation of the Universal Health Visiting Pathway in Scotland - Phase 1 Report - Routine Data Analysis - Baseline Outcomes



CHILDREN, EDUCATION AND SKILLS

Evaluation of the Universal Health Visiting Pathway in Scotland Phase 1 Report – Routine Data Analysis – Outcomes

Authors: Margaret Horne, Louise Marryat, and Rachael Wood

Additional Reports:

- Phase 1 Report – Primary Research with Health Visitors and Parents and Case Note Review (published)
- Phase 1 Report – Routine Data Analysis – Workforce (published)
- Phase 1 Report – Routine Data Analysis – Implementation and Delivery (published)

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Introduction

The early years of life have a profound impact on an individual's long-term health and wellbeing. Children's emotional, cognitive, linguistic, social and physical development, including the bond they form with parents, can significantly affect their future health and wellbeing as adults.¹ Investing in early years therefore creates opportunities for the future lives of children.²

In 2013, the Chief Nursing Officer's Directorate, Scottish Government, undertook a scoping exercise of health visiting practice in Scotland. The findings demonstrated that there was a significant degree of variation across the service in terms of assessment, resources and visiting patterns being delivered by health visitors to families in Scotland. A refocused approach to health visiting was published by the Scottish Government in 2013. The changes took into account the changing policy landscape relating to the early years and children and families, and sought to ensure that workforce capability and capacity would be equipped to successfully deliver these policies. Following substantial investment in the service, the Universal Health Visiting Pathway (UHVP) was introduced in 2015.³

The Universal Health Visiting Pathway

The UHVP refocuses the role of the health visitor and includes changes to caseload weighting and management; intervention delivery; education, training and resources; and visiting patterns.

The UHVP sets out a structured home visit programme for all families, which includes an increased number of visits from what was previously delivered. All families are entitled to receive at least eleven routine visits from health visitors, eight within the first year of life and three child health reviews between 13 months and 4-5 years. Additional support is also provided according to the level of need in line with a proportionate universalism approach, where the service is provided to all families, but more of the service is provided to those with more need. The home visits begin from pre-birth until the child is five years old (or enters school).

The Evaluation of Health Visiting in Scotland

Following the review of health visiting and introduction of the health visiting pathway an evaluation of the service was commissioned by the Scottish Government in 2018. This evaluation of the Universal Health Visiting Pathway will be conducted in two phases. Phase one commenced in 2018 and will provide baseline outcomes data and early learning in regard to the processes of implementing the Health Visiting Pathway. Phase two will provide evidence in regard to the outcomes that health visiting is contributing towards and to provide further information for the development of the processes health visitors use.

The evaluation is comprised of five key components:

- Review of the health visiting logic model and associated desired outcomes¹
- Analysis of the routine data collected as part of the health visiting role
- Survey of parents and health visitors
- Case note review
- Qualitative research with parents, health visitors and stakeholders

Aims of the evaluation

The aim of this study is to examine the extent to which the UHVP is implemented and delivered across Scotland and to assess any associated impacts. To achieve this, a robust mixed-methods realist evaluation proposal has been developed to understand ‘what works for whom, why and in what circumstances’.

The key aims of the evaluation are:

1. to examine what elements of the UHVP are being implemented in which areas, when and how.
2. to determine the extent to which the UHVP is implemented and delivered across Scotland and assess any associated impacts over the longer term.
3. to identify and explain to what extent recommendations to fill gaps in the UHVP are delivered and their impacts on services, staff and children and families.

Reporting of the evaluation

The following four reports will be produced as part of the Phase 1 evaluation:

- [Phase 1 Report – Primary Research with Health Visitors and Parents and Case Note Review \(Published\)](#)
- [Phase 1 Report – Routine Data Analysis – Workforce \(Published\)](#)
- Phase 1 Report – Routine Data Analysis – Outcomes (this report)
- Phase 1 Report – Routine Data Analysis – Implementation and Delivery (Published)

¹ The revised logic model with desired outcomes is detailed in appendix 2 of the report - Phase 1 Report – Primary Research with Health Visitors and Parents and Case Note Review
[<https://www.gov.scot/publications/evaluation-universal-health-visiting-pathway-scotland-phase-1-main-report-primary-research-health-visitors-parents-case-note-review/>]

Analysis of the routine data

As a key part of their role health visitors are required to routinely collect data about the families and children they visit over the course of the first five years of the child's life. The routine data gathered provide an invaluable source of evidence about children in their earliest years in Scotland.

At present, national data are collected at the four formal assessment points via the Child Health Systems Programme (CHSP);² however, the only record of any further visits is within the clinical notes completed by the health visitor. Data for the 6-8 week and 27-30 month assessments have been collected since 2013, and data for the 13-15 month and pre-school assessments have been more recently added.

Alongside the CHSP data, other data sources, such as workforce data, are collected by health boards to monitor the health visiting workforce employed to deliver the Universal Health Visiting Pathway. Data collected in educational settings and by social work services in Scotland were also considered as part of this evaluation.

The routine data analysis component of the outcome evaluation focuses on addressing the following specific research questions:

1. What impact has implementation of the Universal Health Visiting Pathway (UHVP) had on outcomes of children aged up to 3 years relating to:
 - parental health-related behaviours;
 - child development;
 - child physical health; and
 - child safety
2. How does impact vary by child's deprivation level?

² Further information on the Child Health Surveillance Programme for Pre-school can be found in the Child Health Section of the Public Health Scotland website. [Child Health Systems Programme Pre School - PHS](#)

Methodology

Study design

In this outcome evaluation, routine clinical and administrative data have been used to examine 18 outcome measures agreed with the UHVP Research Advisory Group.⁴ The outcomes were agreed to enable investigation of the impact that the Universal Health Visiting Pathway has had on children's development and health. Over the course of Phases 1 and 2 of the evaluation, the results of two cohorts of children will be compared:

- those children who did not receive any part of the UHVP pathway (the fully **unexposed group**) and
- those children who were born on or after the date on which the UHVP was fully implemented in the health board in which the child was born (the fully **exposed group**).

The study design used to conduct this evaluation is known as an interrupted time-series (ITS) design, and is described in greater detail in the 'UHVP Outcome Evaluation Statistical Analysis Plan'.⁵ Briefly, ITS compares the rate of a particular outcome before and after implementation of the UHVP, using a counterfactual after the implementation of the UHVP. The counterfactual is an extrapolation of the trend in the fully unexposed group, continued after the intervention has been implemented, to demonstrate what might be expected to happen, had the intervention not occurred. The trend in the fully exposed group can then be compared with the counterfactual.⁶

In this current report, which forms part of the first phase of the evaluation, baseline information only is provided on each of the 18 outcome measures derived from the fully unexposed cohort of children. The aim of this report is to explore trends in outcome measures, prior to exposure to the pathway, which will be built into data models in the second phase of the evaluation. Alongside this, the quality of the data relating to the 18 outcomes has been assessed.

Outcome measures

After detailed discussion with the UHVP Research Advisory Group, wider members of the UHVP evaluation team, Information Services Division (ISD) (now Public Health Scotland) and Scottish Government (SG) analysts, the 18 outcome measures to be included in the UHVP outcome evaluation were agreed in February 2020. A full description of the process is included in the report 'Outcome measures to be included in the outcome evaluation'.⁴ The outcome measures are listed in Table 1.

Table 1 Outcome measures included in this report

Outcome number	Specific outcome measures
Infant feeding	
1a	Exclusive breast milk feeding at 6-8 weeks
1b	Any breast milk feeding at 6-8 weeks
Immunisations	
2	Complete coverage of universal primary and end infancy immunisations by 2 nd birthday
Dental care	
3	Any attendance at dentist by 2 nd birthday
Parental smoking	
4a	Primary carer current smoker at 27-30 months
4b	Child exposed to second hand smoke at 27-30 months
Developmental concerns	
5a	Any developmental concern at 27-30 months
5b	Any concern about speech, language and communication development at 27-30 months
5c	Any concern about social and emotional development at 27-30 months
Child BMI	
6a	Child at risk of overweight or obesity (BMI \geq 85 th centile) at 27-30 months
6b	Child clinically obese (BMI \geq 98 th centile) at 27-30 months
Unintentional injuries	
7a	Any hospital admission for unintentional injury by 3 rd birthday
7b	Any hospital admission for unintentional poisoning, burn or scald by 3 rd birthday
7c	Any hospital admission for unintentional long bone fracture or head injury by 3 rd birthday
Child safety	
8a	Placed on child protection register (CPR) at any point between birth and 3 rd birthday
8b	Placed on child protection register (CPR) for \geq 6 months between birth and 3 rd birthday
9a	Registered as having Looked After Child (LAC) status at any point between birth and 3 rd birthday
9b	Registered as having Looked After Child (LAC) status for \geq 6 months between birth and 3 rd birthday

Study population

As noted above, in this report our analyses are restricted to the pre-intervention (fully unexposed) cohort. These children were born between 1 January 2011 and 31 March 2016, and all were offered:

- the health visitor first visit,
- the 6-8 week child health review, and
- the 27-30 month child health review, which has been delivered across Scotland from April 2013.

No children are included who were partially exposed to the UHVP (i.e. children who received a 13-15 month review or selected additional contacts in infancy, but were born before the UHVP programme was fully implemented in the health board in which they live). To include partially exposed children in the analysis would potentially dilute the observed effect of the intervention, since these children would not have received the benefit of the intervention in its entirety. Thus for some health boards there is a group of fully unexposed or partially exposed children, born between 1 April 2016 and the day before the UHVP was implemented in that health board, who do not contribute data to the analysis.

In three health boards, some pathway infancy contacts were offered to families before the implementation date for the UHVP (see Table 2). As can be observed, the number of children born before 1 April 2016 who were partially exposed to the UHVP in these health boards is very small ($n = 4,256$), i.e. 1.4% of the number of live births between 1 January 2011 and 31 March 2016 ($n = 297,337$). These children have been excluded from the analysis in this report for Outcomes 1-7.

It was not possible to exclude children who might have been partially exposed to the UHVP for the child protection outcomes (Outcome groups 8-9). Where the number of children with a child protection episode was very small (i.e. less than 5) in a council area, the exact data were not released by the Scottish Government, in order to avoid the identification of children. This meant that when it came to grouping these cases by health board, a health board such as Tayside, which comprises three council areas, all of which had data suppressed due to low numbers, could in reality contain 0 to 12 children with a child protection episode. For this reason it was not possible to exclude these partially exposed children from the health board outcome data.

For clarity, inclusion and exclusion criteria for the fully unexposed cohort are specified below.

Inclusion criteria

All babies who were born in Scotland between 1 January 2011 and 31 March 2016 inclusively, and who have not been exposed to any of the additional visits that were newly introduced in the UHVP (i.e. the 13-15 month and 4-5 year visits) are included in the fully unexposed group.

Table 2 Children born between 1 January 2011 and 31 March 2016 who may have been offered elements of the UHVP at an early date

NHS Health Board	Date from which babies born in this HB were offered the full UHVP	Elements of the UHVP between birth and 27-30 month review offered to babies born between 1 Jan 2011 and 31 March 2016	Offered to babies born from	Estimated number of children partially exposed and excluded from analysis
Orkney	May 2016	Some UHVP infancy contacts	October 2015	73
Shetland	April 2015	Full UHVP	April 2015	231
Tayside	April 2017	Some UHVP infancy contacts	April 2015	3,952
Total				4,256

Exclusion criteria

The following groups of babies born in health boards where elements of the UHVP were implemented before April 2016 have been excluded (see Table 2):

- Babies born in Orkney, from 1 October 2015 to 31 March 2016 (i.e. the last two quarters);
- Babies born in Shetland, from 1 April 2015 to 31 March 2016 (the last four quarters);
- Babies born in Tayside, from 1 April 2015 to 31 March 2016 (the last four quarters).

Data sources

In Phase 1, analyses of the fully unexposed children have been undertaken solely using aggregate data. This means that unlinked numerator and denominator data were requested from the numerous data sources (see Table 3) (i.e. count data for (i) sequential quarters of the number of live births, and – separately – (ii) the number of children who have the outcome of interest).

There are a number of limitations associated with this approach. For example, children who moved into an area can subsequently appear in the numerator (but are excluded from the denominator); children who died or moved out of an area are not removed from the denominator; and children are assumed to remain in their birth board of residence until outcomes data are collected (i.e. up to their third birthday). However, it is probable that these numerator/denominator mismatches balance out, and the estimates generated using an unlinked approach are likely to be valid in their findings.

The number of live births in specified quarters of the year were taken from the National Records of Scotland (NRS) live birth registrations and were based on the date of birth, not the date of registration of the birth. However, for Outcome 2 (immunisation coverage), the number of live births was taken from the Scottish Immunisation Recall System (SIRS) as longitudinal data at individual child level were required to construct this outcome measure.

Data for the outcome measures were drawn from several sources, including the Child Health Surveillance Programme (pre-school) (CHSP-PS) May 2020 (Public Health Scotland); the Scottish Immunisation Recall System; Management Information and Dental Accounting (MIDAS), PHS; the Scottish Morbidity Record (SMR01), ISD; and the Scottish Exchange of Data (ScotXed); see Table 3 for specific details.

In order to try to align the live birth data with the child health data for the 27-30 month review, the postcode at birth was used to derive the NHS health board of residence, wherever possible. However, if this postcode was missing, then the postcode on the CHI in the quarter following birth was used instead.

Table 3 Sources for data informing analyses in Phase 1 of the outcome evaluation

Outcome number	Outcome measure	Source of data
1	Infant feeding at 6-8 week visit	Child Health Surveillance Programme (pre-school) (CHSP-PS)
2	Immunisation coverage by 2 nd birthday	Scottish Immunisation Recall System (SIRS)
3	Dental attendance by 2 nd birthday	Management Information & Dental Accounting System (MIDAS)
4	Parental smoking at 27-30 month review	CHSP-PS
5	Developmental concerns at 27-30 month review	CHSP-PS
6	Child BMI at 27-30 month review	CHSP-PS
7	Hospital admission for unintentional injury by 3 rd birthday	Scottish Morbidity Record (SMR01)
8	Child protection registration by 3 rd birthday	Scottish Exchange of Data (ScotXed)
9	Looked After Child status by 3 rd birthday	ScotXed

Analysis

Datasets

Data have been provided in sequential three-month units (i.e. quarters). A birth cohort is defined as the number of live births within a specified quarter. The fully unexposed group consists of 21 birth cohorts, and includes all live births in every quarter between 1 January 2011 and 31 March 2016.

Outcome groups 1-7 (14 outcomes in all) were analysed using data for the whole of Scotland, and data were also stratified according to Scottish Index of Multiple Deprivation (SIMD) quintiles, based on the child's home postcode. A set of supplementary data tables for each outcome are provided for transparency; in these, data are displayed for (i) the whole of Scotland, (ii) stratified by SIMD quintiles, and (iii) stratified by individual NHS health boards of child's residence.

It was not possible to examine Outcome groups 8 and 9 by level of area deprivation, since data stratified by SIMD quintile were not available for child safety and protection interventions, due to the potential risk of identification.

Scotland-level data

As was described earlier (also see Table 2), children born in Orkney in the final two quarters of the unexposed time period, and children born in Shetland and Tayside in the final four quarters of that period, may have been exposed to some elements of the UHVP; therefore these children were removed from the Scotland datafile for Outcome groups 1-7.

However, as explained above, data for Outcome groups 8 and 9, which relate to Child Protection and Looked after children, were supplied by councils rather than health boards. Only a very small number of children have positive outcomes for these outcome measures. If fewer than five children have been recorded as being on the Child Protection Register (CPR) or having Looked After Child (LAC) status in any council area, the actual data value is suppressed, due to the potential risk of disclosure and to help maintain patient confidentiality. For the boards where there may have been children partially exposed to the UHVP (Angus, Dundee, and Perth (that make up NHS Tayside) and NHS Shetland and NHS Orkney), the data for the potentially partially exposed children have been included in this part of the analysis, since it is not possible to ascertain the precise number of children who had a positive outcome. It is not anticipated that inclusion in this cohort will impact on the overall findings, due to the overall small sample size.

SIMD data

SIMD data stratified by health board were not available. Therefore, when examining SIMD graphs, a small number of children in the final year of follow-up (from April 2015 to March 2016) may have been exposed to some elements of the UHVP: that is, approximately 4,256 of the 55,258 children born during this period (7.7%) may have been partially exposed to the UHVP.

At a Scotland level, these data were stratified by SIMD into six groups: the SIMD quintiles, ranging from SIMD 1 (most deprived) to SIMD 5 (least deprived), and a group 'SIMD unknown'. The 'SIMD unknown' group consisted of children whose postcode was missing

and also children whose postcodes do not map to an SIMD quintile (for example, new housing developments). For outcomes recorded on a child health review form, it is possible that the child's postcode was missing from the form and thus the child's SIMD quintile is unknown. Unfortunately it is not possible to give a precise estimate of the number of children affected, since the data on live births have been accessed from a different source (NRS) to the data relating to the relevant child health review (CHSP-PS).

For Outcome 2 (Complete coverage of universal primary and end infancy immunisations by second birthday), longitudinal data have been provided and therefore it is possible to identify the number of children who have not been included in the deprivation analysis and the percentage of SIMD-unknown children who have received full immunisation by their second birthday.

For the other six outcome groups for which SIMD data are available, it is not possible to estimate the number of children with 'SIMD unknown' status. The dataset for each outcome group consists of the merging of unlinked data from two sources: a datafile containing NRS live births is merged with data requested from the CHSP-PS or MIDAS or SMR01 into a single datafile. For these six outcome groups, the number of children with unknown SIMD has been calculated as a percentage of the relevant data for the whole of Scotland. Taking developmental-concerns outcomes as an example, the following percentages have been calculated for Outcome 5a:

Percentage of 27-30 month reviews where child SIMD is unknown = (Number of 27-30 month reviews where child SIMD is unknown / Total number of 27-30 month reviews reported for Scotland) x 100%

Percentage with complete data for developmental domains, where child SIMD is unknown = (Number of SIMD-unknown children with complete data for developmental domains / Total number of children with complete data for developmental domains for Scotland) x 100%

Percentage without a developmental concern, but some domains incomplete or missing, where child SIMD is unknown = (Number of SIMD-unknown children without a developmental concern, but some domains incomplete or missing / Total number of children without a developmental concern, but some domains incomplete or missing, recorded for Scotland) x 100%

Percentage with any developmental concern (Outcome 5a), where child SIMD is unknown = (Number of SIMD-unknown children with any developmental concern / Total number of children with any developmental concern, recorded for Scotland) x 100%

Detail of the outcome measures used is included in Appendix 1. It was not possible to obtain data stratified by SIMD group for the two child protection outcome groups (Outcome group 8: child placed on the CPR by 3rd birthday, and Outcome 9: Looked after child status by 3rd birthday), due to the small numbers of children with a child protection or looked after child episode and the possibility of identification.

Results

Outcome results are grouped according to the research question to which they contribute evidence. The first research question explores the impact that the implementation of the UHVP has had on outcomes of children aged up to 3 years relating to parental health-related behaviours.

This Phase 1 report outlines the baseline data for these outcomes up until March 2016. The parental health-related behaviours examined, in chronological order, are:

- infant feeding (both exclusive breastfeeding and any breastfeeding);
- immunisations received up to the child's second birthday;
- any attendance at a dentist by the child's second birthday; and
- parental smoking.

These outcomes will be explored in turn at Scotland level and by SIMD.

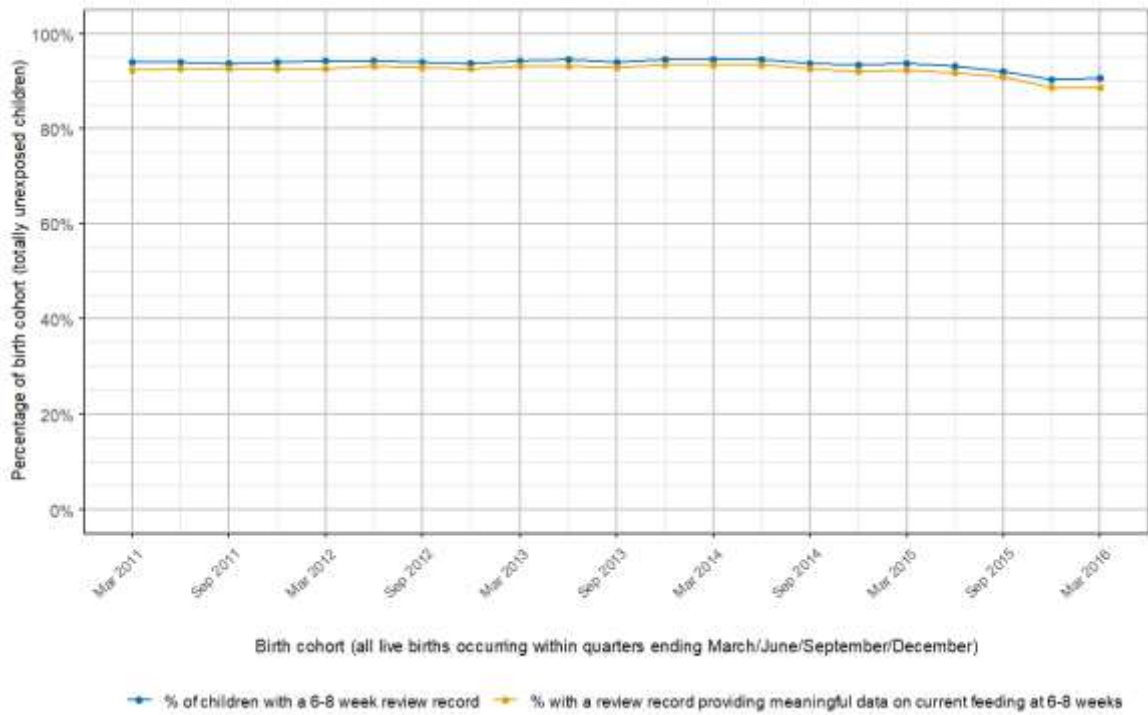
Infant feeding recorded in the 6-8 week review

(a) Scotland

Outcomes 1a and 1b: Data availability in the 6-8 week review

Coverage of the 6-8 week child health review was high, with 93.6% of children having a record of this visit (see Table 4 and Figure 1). The vast majority of these children (92.2%) also had 'meaningful' data available on infant feeding at this review: that is, in the 6-8 week review, the item 'current feeding' had a response of B (breast milk only), F (formula milk only), M (mixed breast and formula milk), O (other) or U (unknown) recorded. This figure was fairly consistent over time, although there was a very slight decrease in the percentage of children with a 6-8 review recorded from March 2015 onwards (from 93.7% to 90.5% in March 2016).

Figure 1 Data availability in the 6-8 week review for both 'current feeding' outcomes for the totally unexposed birth cohort



Outcome 1a: Exclusive breast milk feeding at 6-8 weeks

Of the babies who had meaningful data available on infant feeding, 26.8% were exclusively breastfed (Table 4). In Figure 2, a very slight gradual trend can be seen for babies born in the quarters ending March 2011 to March 2016, with the percentage of babies who were exclusively breastfed increasing from 25.5% for those born in the quarter ending March 2011 (i.e. 3,293 of the 12,929 children who had meaningful data on current feeding in the 6-8 week review) to 29.6% for those born in the quarter ending March 2016, although the percentage who were exclusively breast fed fluctuated over the time period.

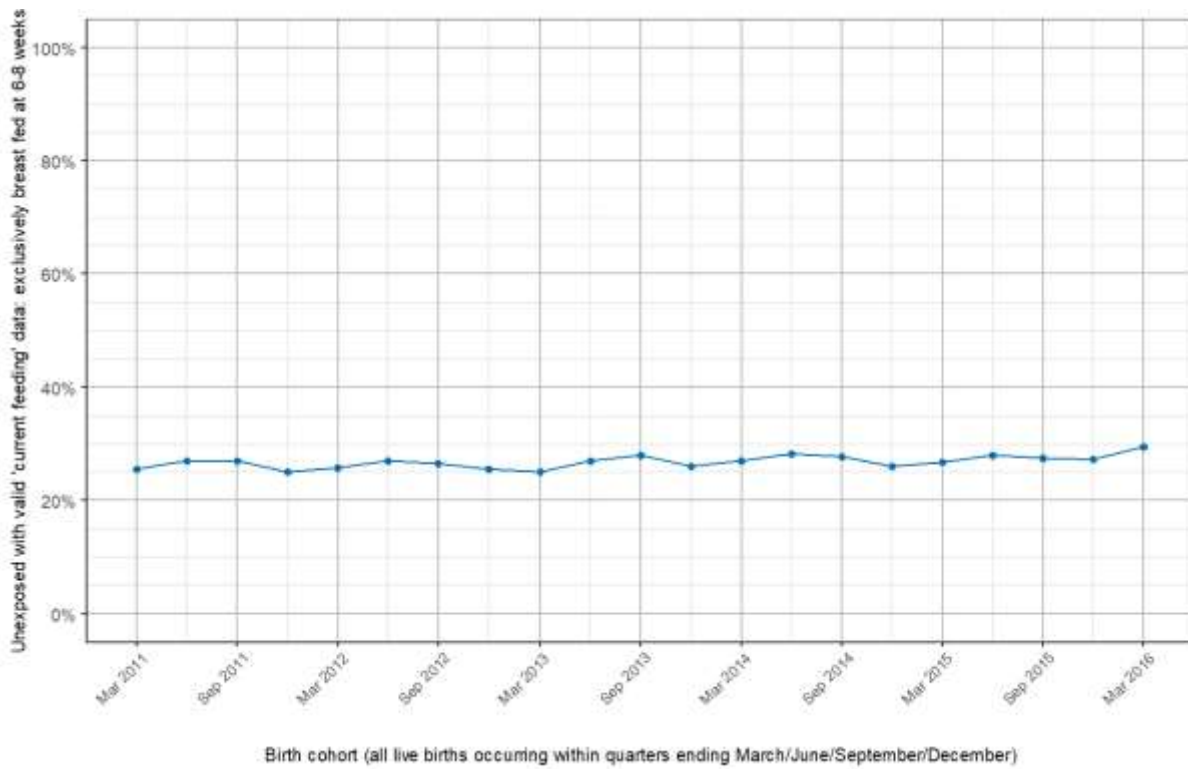
Table 4 Number of totally unexposed infants who had exclusive breast milk feeding at 6-8 weeks (Outcome 1a), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of infants in totally unexposed cohort	293,081	13,956
Number (%) of totally unexposed infants with subsequent record of 6-8 week review	274,311	13,062 (93.6%)
Number (%) of totally unexposed infants with meaningful data for 'current feeding' (B/F/M/O/U)	270,388	12,876 (92.3%)
Outcome 1a: Number (%) of totally unexposed infants with meaningful data who were exclusively breast fed at 6-8 weeks ('current feeding' = B)	72,508	3,453 (26.8%)

Notes

B	breast milk only
F	formula milk only
M	mixed breast and formula milk
O	other
U	unknown

Figure 2 Percentage of totally unexposed birth cohort with exclusive breast milk feeding at 6-8 weeks (Outcome 1a)



Outcome 1b: Any breast milk feeding at 6-8 weeks

The percentage of babies receiving any breast milk feeding at 6-8 weeks (including combined bottle feeding and breastfeeding) was 37.4% on average (Table 5). A similar trend can be seen to that for exclusive breastfeeding. The percentage of infants receiving any breast milk increased very slightly from 35.7% for children born in the quarter ending March 2011 to 39.6% for those born in the quarter ending March 2016 (Figure 3).

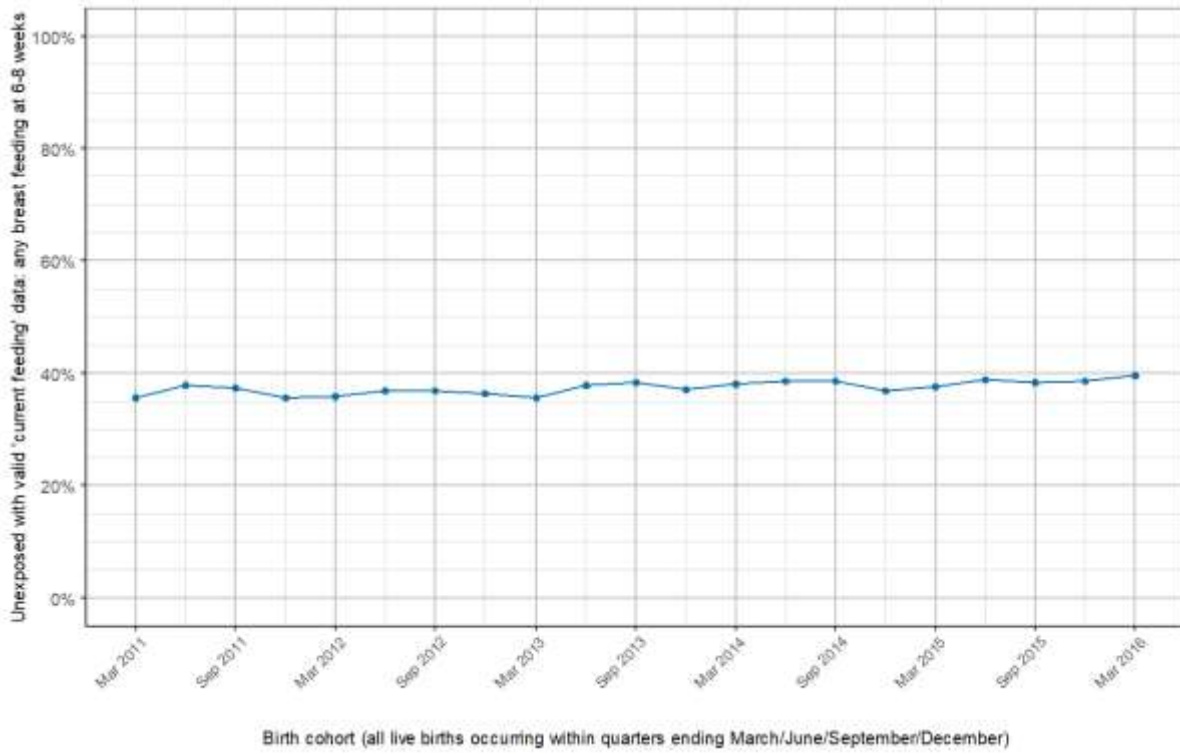
Table 5 Number of totally unexposed infants who had any breast milk feeding at 6-8 weeks (Outcome 1b), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of infants in totally unexposed cohort	293,081	13,956
Number (%) of totally unexposed infants with subsequent record of 6-8 w review	274,311	13,062 (93.6%)
Number (%) of totally unexposed infants with meaningful data for 'current feeding' (B/F/M/O/U)	270,388	12,876 (92.2%)
Outcome 1b: Number (%) of totally unexposed infants with meaningful data with any breast milk feeding at 6-8 weeks ('current feeding' = B or M)	101,147	4,817 (37.4%)

Notes

- B breast milk only
- F formula milk only
- M mixed breast and formula milk
- O other
- U unknown

Figure 3 Percentage of totally unexposed birth cohort with any breast milk feeding at 6-8 weeks (Outcome 1b)



(b) Scotland, stratified by SIMD quintile

Outcomes 1a and 1b: Data availability in the 6-8 week review

Patterns of outcomes were explored by level of area deprivation (SIMD quintiles). As described in the Methodology section (SIMD data subsection), to give an approximation of the number of children who have been excluded from the deprivation analysis, the total number of children with unknown SIMD has been calculated as a percentage of the total number of children in Scotland for:

- review coverage,
- data availability and
- Outcomes 1a and 1b.

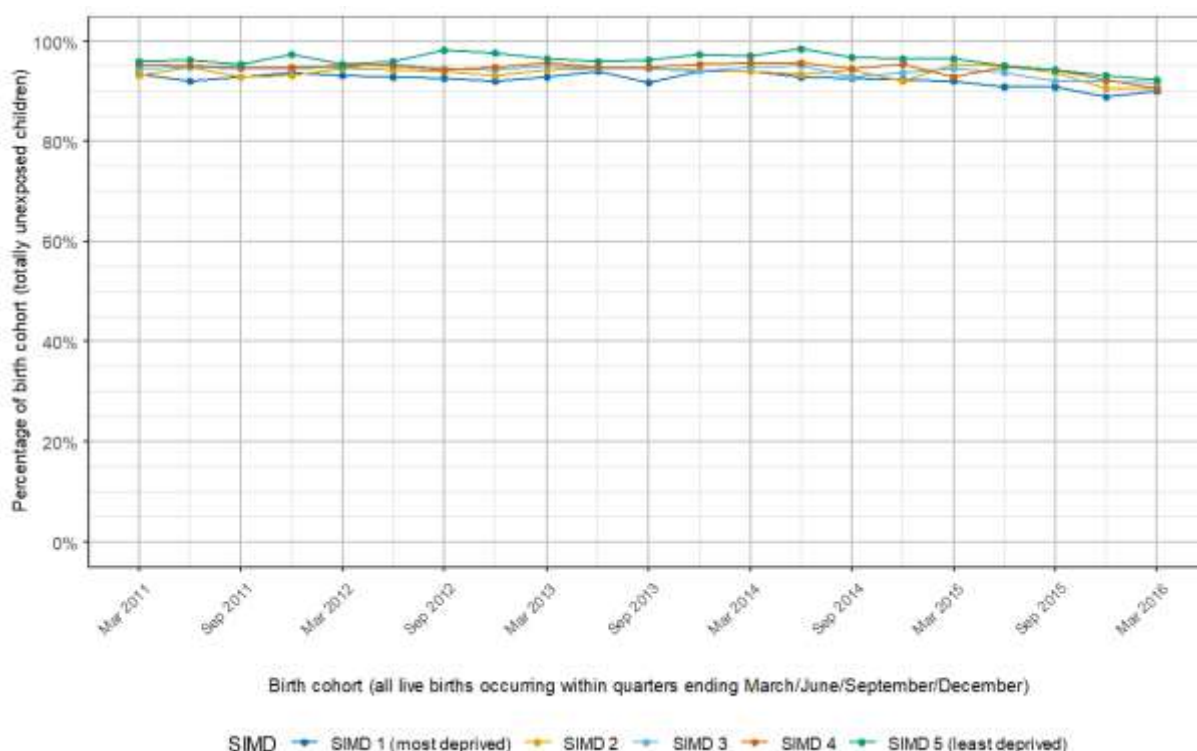
As can be observed (Table 6), a negligible number of children have unknown deprivation level for this outcome.

Coverage for the 6-8 week review varies by SIMD fairly consistently over time, with babies living in the least deprived areas more likely to receive a 6-8 week review (an average of 96.0% in the least deprived areas receiving this review for children born between 1 January 2011 and 31 March 2016), and areas with higher levels of deprivation having correspondingly lower levels of coverage (an average of 92.4% from the most deprived areas having received a 6-8 week review for children born between 1 January 2011 and 31 March 2016) (see Table 7). This was seen to fluctuate a little for all quintiles over time (see Figure 4).

Table 6 Investigation of totally unexposed infants with unknown SIMD for current feeding outcomes (1a and 1b)

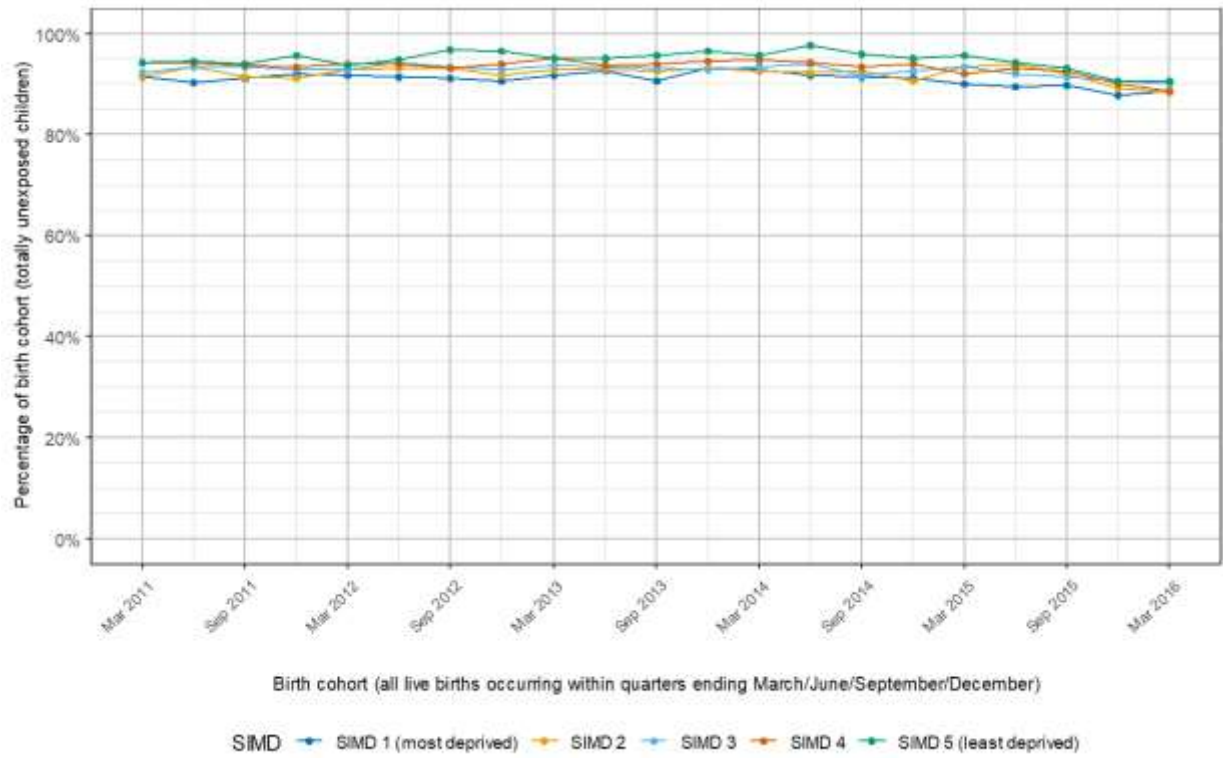
Description	
Number of 6-8 week reviews where SIMD is unknown	202
Number of 6-8 week reviews with meaningful data where infant SIMD is unknown	194
Outcome 1a: Number of totally unexposed babies exclusively breast fed at 6-8 weeks where SIMD is unknown	50
Of totally unexposed babies who were exclusively breast fed at 6-8 weeks, percentage where SIMD is unknown	0.07%
Outcome 1b: Number of totally unexposed babies with any breast feeding at 6-8 weeks, where SIMD is unknown	73
Of totally unexposed babies with any breast feeding at 6-8 weeks, percentage where SIMD is unknown	0.07%

Figure 4 Availability of the 6-8 week review for both 'current feeding' outcomes, stratified by SIMD



In line with this, the percentage of babies with meaningful data on infant feeding also varied by level of deprivation, with babies living in the least deprived areas being more likely to have these data recorded than those living in more deprived areas (an average of 94.8% of babies having infant feeding data available in the least deprived areas compared with 91.0% in the most deprived areas) (Table 7). Fluctuation in the percentage with meaningful data available could be seen in all deprivation groups, with a slight downwards trend across the quintiles between quarters ending March 2015 and March 2016 (see Figure 5).

Figure 5 Data availability in the 6-8 week review for both 'current feeding' outcomes, stratified by SIMD



Outcome 1a: Exclusive breast milk feeding at 6-8 weeks by SIMD

The percentage of infants who received breast milk exclusively at 6-8 weeks varies substantially by SIMD quintile. Overall, 41.8% children in the least deprived areas were receiving exclusive breast milk at this stage, compared with 14.8% in the most deprived areas (Table 7). Patterns across the years were fairly similar across SIMD quintiles, with a slight increase overall in exclusive breast milk feeding across all SIMD quintiles (Figure 6). However, the gap between the least and most deprived quintiles widened slightly over the five years, from a 26.2 percentage-point difference in exclusive breast feeding level for children born in the quarter ending March 2011 to a 28.7 percentage-point difference for children born in the quarter ending March 2016.

Table 7 Number of totally unexposed infants who had exclusive breast milk feeding at 6-8 weeks (Outcome 1a), stratified by SIMD

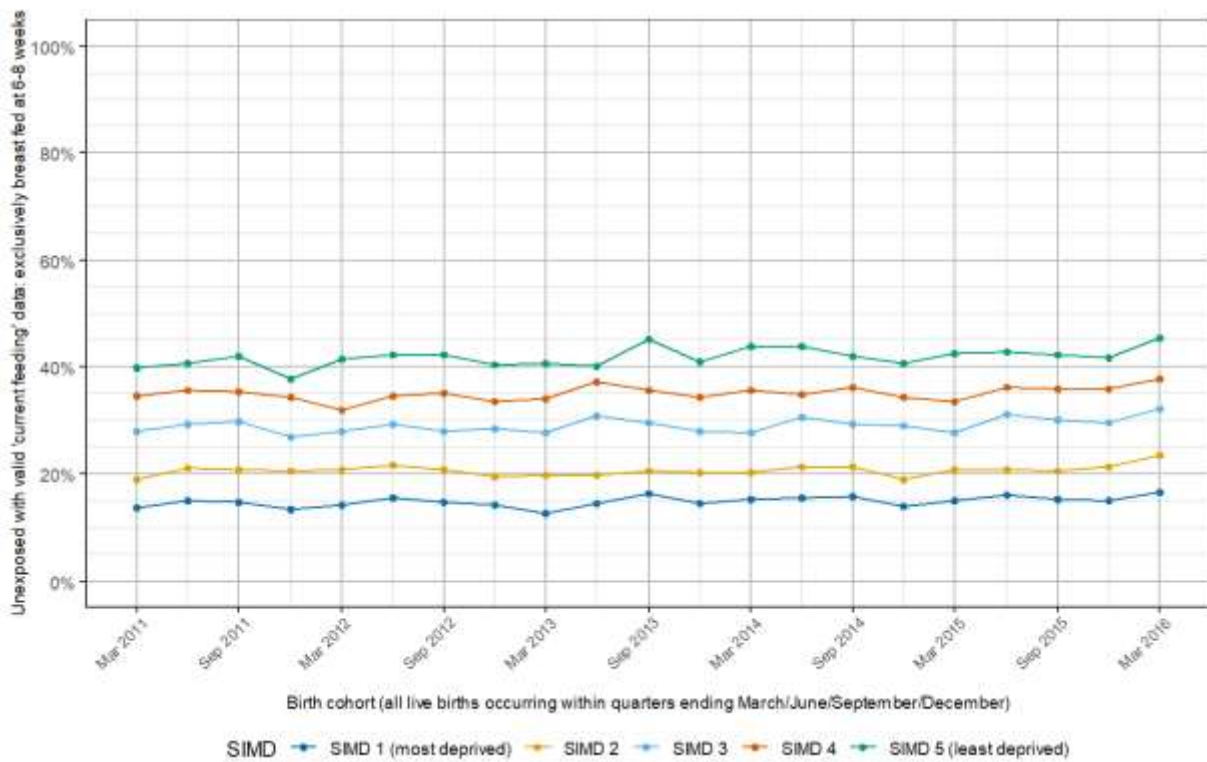
Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed infants ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed infants with subsequent record of 6-8 week review ¹	<i>n</i>	70,599	58,402	52,734	50,275	46,230
	%	92.4	93.6	94.1	94.5	96.0
Number (%) of totally unexposed infants with meaningful data for 'current feeding' (B/F/M/O/U) ¹	<i>n</i>	69,521	57,475	51,982	49,651	45,645
	%	91.0	92.1	92.8	93.4	94.8
Outcome 1a: Number (%) of totally unexposed infants with meaningful data who were exclusively breast fed at 6-8 weeks ('current feeding' = B) ¹	<i>n</i>	10,274	11,832	15,087	17,403	19,094
	%	14.8	20.6	29.0	35.1	41.8

Notes

B breast milk only
 F formula milk only
 M mixed breast and formula milk
 O other
 U unknown

¹ Total number for quarters ending March 2011 to March 2016.

Figure 6 Percentage of totally unexposed birth cohort with exclusive breast milk feeding at 6-8 weeks (Outcome 1a), stratified by SIMD



Outcome 1b: Any breast milk feeding at 6-8 weeks by SIMD

The percentage of babies receiving any breast milk feeding at 6-8 weeks followed similar patterns by SIMD to those with exclusive breast milk feeding. More than half of infants living in the least deprived areas were receiving any breast milk feeding at 6-8 weeks (56.8%), compared with less than a quarter (22.6%) from the most deprived areas (Table 8). There is a very slight upward trend across all SIMD quintiles over time (Figure 7). For children born in the quarter ending March 2011, the gap between the percentage of babies in SIMD 5 receiving any breast milk feeding and those in SIMD 1 was 34.4 percentage points, whereas for those born in the quarter ending March 2016 this had decreased very slightly to 33.9 percentage points.

Table 8 Number of totally unexposed infants who had any breast milk feeding at 6-8 weeks (Outcome 1b), stratified by SIMD

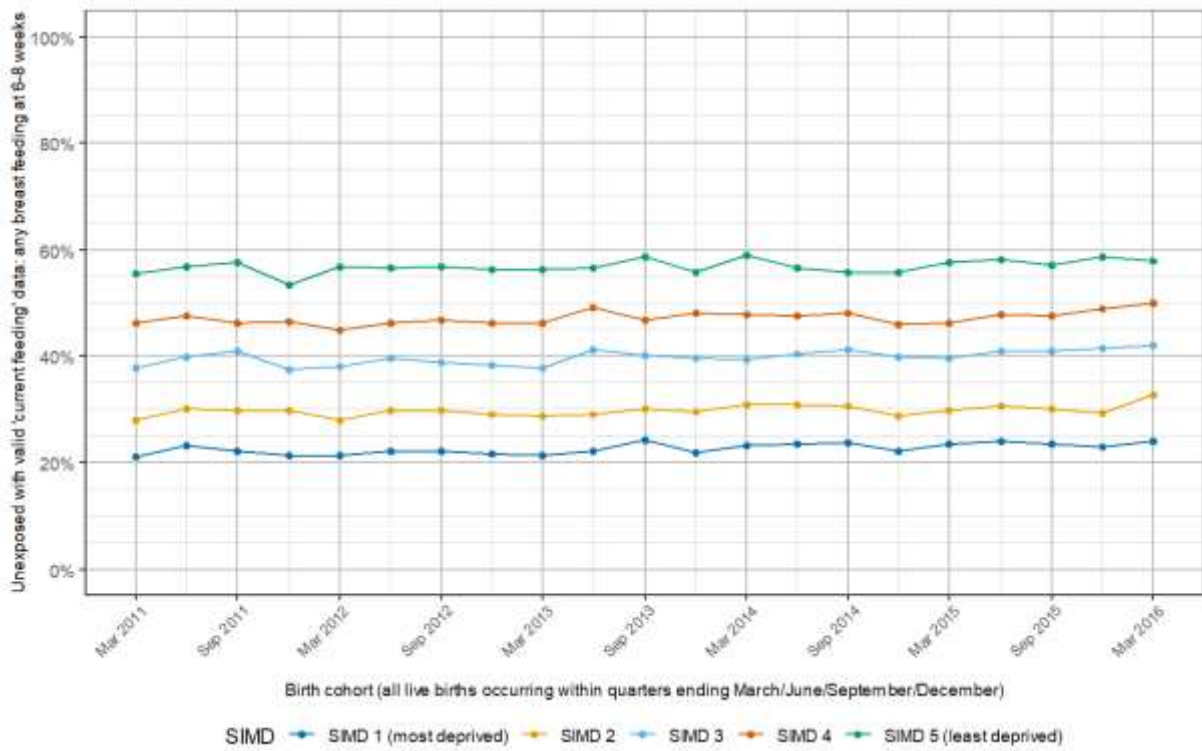
Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed infants ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed infants with subsequent record of 6-8 week review ¹	<i>n</i> %	70,599 92.4	58,402 93.6	52,734 94.1	50,275 94.5	46,230 96.0
Number (%) of totally unexposed infants with meaningful data for 'current feeding' (B/F/M/O/U) ¹	<i>n</i> %	69,521 91.0	57,475 92.1	51,982 92.8	49,651 93.4	45,645 94.8
Outcome 1a: Number (%) of totally unexposed infants with meaningful data who were exclusively breast fed at 6-8 weeks ('current feeding' = B) ¹	<i>n</i> %	15,677 22.6	17,078 29.7	20,630 39.7	23,391 47.1	25,914 56.8

Notes

- B breast milk only
- F formula milk only
- M mixed breast and formula milk
- O other
- U unknown

¹ Total number for quarters ending March 2011 to March 2016.

Figure 7 Percentage of totally unexposed birth cohort with any breast milk feeding at 6-8 weeks (Outcome 1b), stratified by SIMD



Immunisations

(a) Scotland

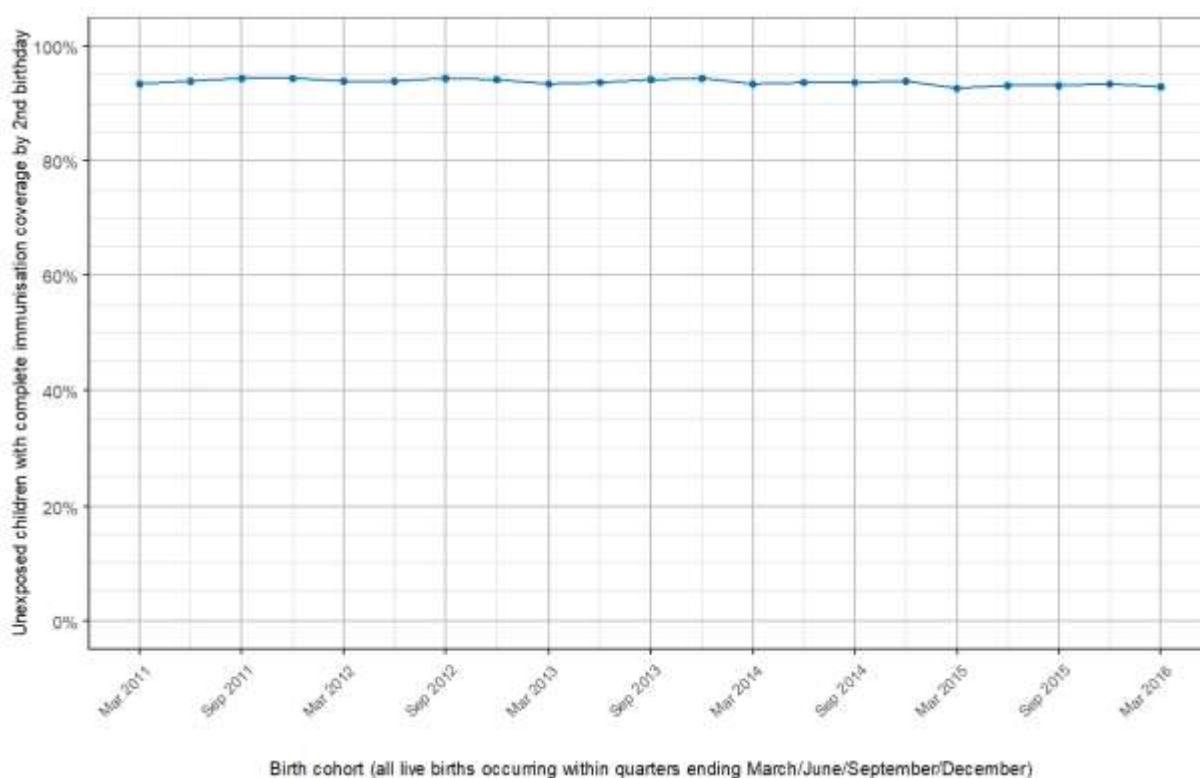
Outcome 2: Complete coverage of universal primary and end infancy immunisations by 2nd birthday

The majority of children had received all of their universal immunisations by their second birthday (93.6%) (Table 9), with essentially no change in coverage between 2011 and 2016 (Figure 8).

Table 9 Number of totally unexposed children with complete immunisation coverage recorded on SIRS by second birthday (Outcome 2), for Scotland level data

Variable	Children born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of children in totally unexposed cohort	296,817	14,134
Outcome 2: Number (%) of totally unexposed children with complete immunisation coverage recorded on SIRS by 2 nd birthday	278,023	13,239 (93.6%)

Figure 8 Percentage of totally unexposed birth cohort in which complete coverage of universal primary and end infancy immunisations by 2nd birthday have been recorded on SIRS (Outcome 2)



Note

Complete coverage of universal primary and end infancy immunisations by second birthday (Outcome 2) is defined as the child having received all of the following vaccines:

- 3 doses of the 5-in-1 (DOB up to 31 July 2017) or 6-in-1 (DOB from 1 August 2017) vaccine (provided at any point);
- 1 dose of pneumococcal (provided on or after 1st birthday);
- 1 dose of HiB/MenC booster (provided on or after 1st birthday); and
- 1 dose of MMR (provided on or after 1st birthday).

(b) Scotland, stratified by SIMD quintile

As described above (SIMD data), a number of children have been excluded from the deprivation analysis because their postcode was missing, and as a consequence they have been categorised as SIMD unknown. Unlike the other outcomes, all of the data for Outcome 2 have been accessed from SIRS and are longitudinal. Therefore for this outcome, 294 children were excluded from the deprivation analysis: that is, <0.1% of babies born between 1 January 2011 and 31 March 2016. Of these 294 children, 258 were recorded as having complete immunisation coverage by their second birthday (i.e. 87.8%).

Outcome 2: Complete coverage of universal primary and end infancy immunisations by 2nd birthday by SIMD

Very little difference could be seen by SIMD quintile, with children from the least deprived areas very slightly more likely to receive their full set of immunisations (94.2% in the least deprived areas), compared with children living in the most deprived areas (93.0%) (Table 10). Inequalities appeared to widen slightly over time: for children born in the quarter ending March 2011, there was a 0.39 percentage-point difference between the least and most deprived quintiles; however, this difference had increased slightly to 2.36 percentage points by the quarter ending March 2016 (Figure 9).

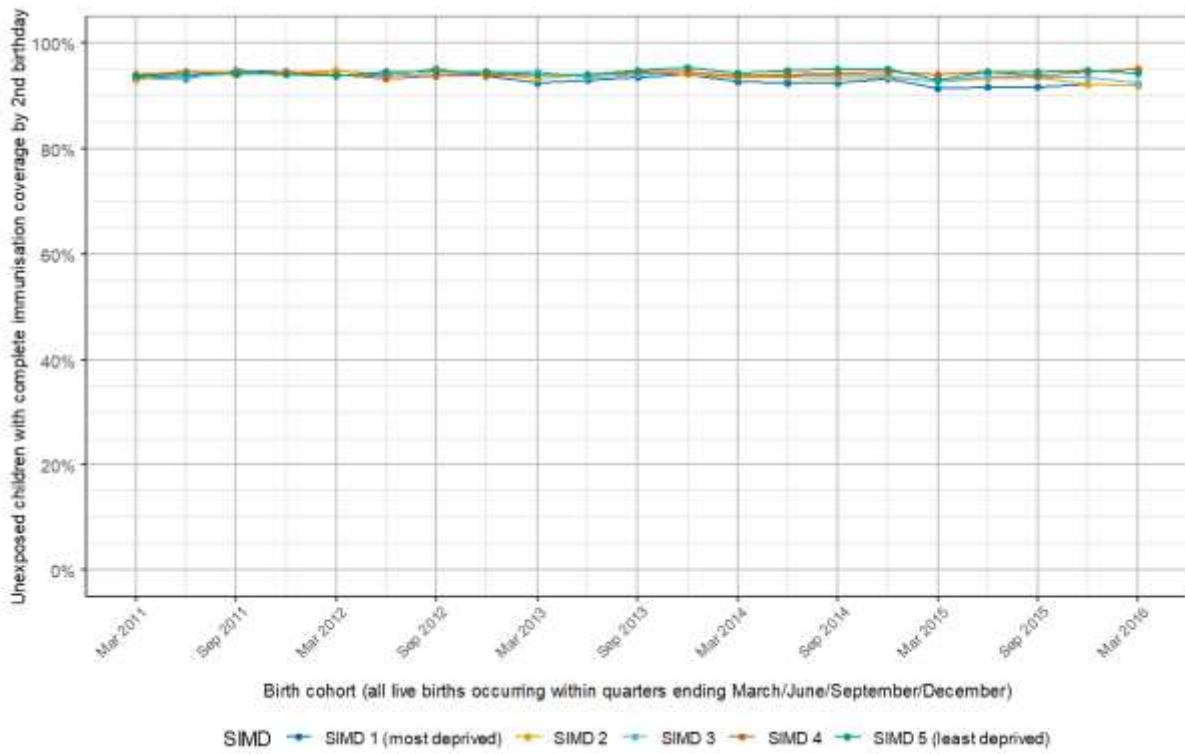
Table 10 Number of totally unexposed children who had complete coverage of universal primary and end infancy immunisations, by 2nd birthday (Outcome 2), stratified by SIMD

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	74,340	61,206	54,906	55,974	54,420
Outcome 2: Number (%) of totally unexposed children who had complete coverage of universal primary and end infancy immunisations by 2 nd birthday ¹	<i>n</i> %	69,170 93.0	57,248 93.5	51,428 93.7	52,647 94.1	51,292 94.2

Note

¹Mean number for quarters ending March 2011 to March 2016.

Figure 9 Percentage of totally unexposed birth cohort in which complete coverage of universal primary and end infancy immunisations by 2nd birthday have been recorded on SIRS (Outcome 2), stratified by SIMD



Dental care

(a) Scotland

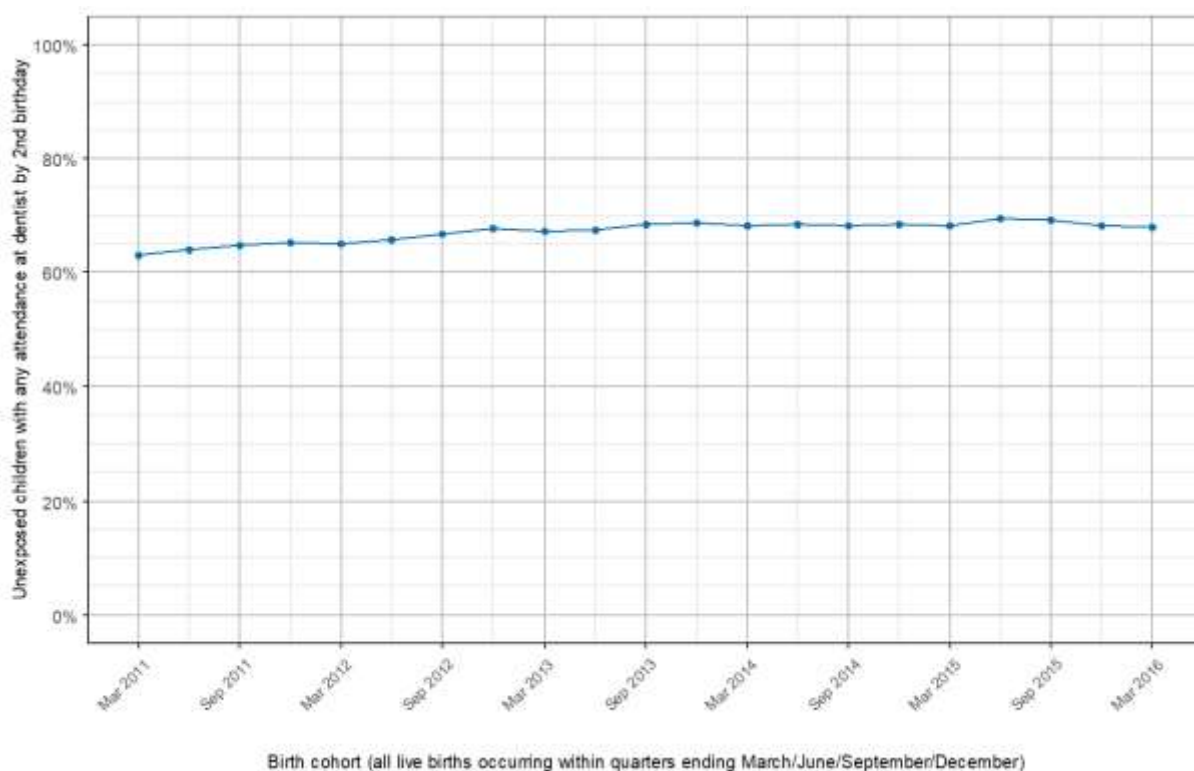
Outcome 3: Any attendance at dentist by 2nd birthday

For outcome 3, an average of 67.1% of children were found to have attended a dentist at least once by their second birthday (Table 11). This has risen from 63.0% for children born in the quarter ending March 2011 to 69.4% for children born in the quarter ending June 2015, before decreasing slightly to 68.0% for children born in the quarter ending March 2016 (Figure 10).

Table 11 Number of totally unexposed children for whom any dental attendance before second birthday was recorded (Outcome 3), for Scotland level data

Variable	Children born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Outcome 3: Number (%) of totally unexposed children for whom any dental attendance before second birthday was recorded	196,694	9,366 (67.1%)

Figure 10 Percentage of totally unexposed birth cohort with any attendance at dentist by 2nd birthday (Outcome 3)



(b) Scotland, stratified by SIMD quintile

Outcome 3: Any attendance at dentist by 2nd birthday by SIMD

Relatively large differences could be seen in dental attendance by the child’s second birthday when explored by SIMD quintile. Children from the least deprived areas were substantially more likely to have attended the dentist at least once by their second birthday (76.3%), compared with children from the most deprived areas (61.2% of whom had attended the dentist by their second birthday) (Table 12). Fluctuations in attendance by SIMD quintile were indicated over time, with inequalities reducing more recently, primarily due to increases in attendance by children in the most deprived group, from 56.9% to 60.2% (Figure 11).

For this outcome, the SIMD quintile for 294 children was unknown, and they are therefore excluded from the analysis. However, 258 (87.8%) of these children have been recorded as having attended a dentist before their second birthday.

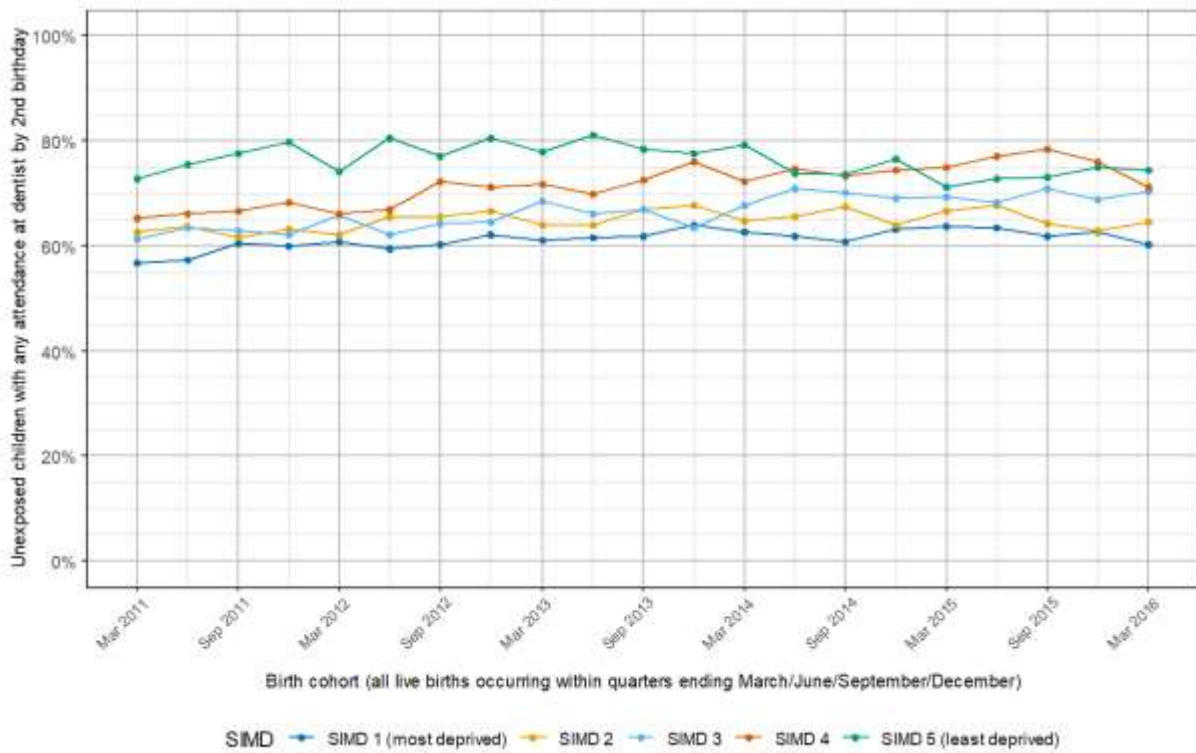
Table 12 Number of totally unexposed children for whom any dental attendance before second birthday was recorded, stratified by SIMD

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Outcome 3: Number (%) of totally unexposed children who had any attendance at dentist by 2 nd birthday ¹	<i>n</i> %	46,771 61.2	40,443 64.8	37,210 66.4	38,113 71.7	36,728 76.3

Note

¹Total number for quarters ending March 2011 to March 2016.

Figure 11 Percentage of totally unexposed birth cohort with any attendance at dentist by second birthday (Outcome 3), stratified by SIMD



Parental smoking recorded in the 27-30 month review

The final parental health-related behaviour outcomes include smoking in the household. These have been split into two parts: first, the percentage of primary carers who are current smokers (recorded at the 27-30 month review) are examined, and then whether the child was reported as being exposed to second-hand smoke. The latter is important, as a health visitor might be able to affect behaviour change in terms of encouraging parents to smoke outside the home, thus lessening the impact on the child, even where a primary carer continues to smoke.

(a) Scotland

Outcome 4a: Primary carer current smoker at 27-30 months

Data coverage for the 27-30 month child health review is high (90.5%), although a little lower than coverage of the 6-8 week review (93.6%). It should be noted that this is a little higher than the coverage reported by Public Health Scotland (90.7% for the 6-8 week review and 87.5% for the 27-30 month review), due to the differences in the denominator used, as explained in the Methodology section. Within the data recorded at the 27-30 month review, 88.0% of children have meaningful data on primary carer smoking at this stage (i.e. a yes/no response) (Table 13). Coverage for both the 27-30 month review data and the specific data on primary carer smoking can be seen to increase for children born between the quarters ending March 2011 and March 2016 (Figure 12). Over the five-year period, the percentage of children whose primary carer smokes was 18.6%; this can be seen to decrease over time, from 21.5% in 2011 to 16.0% in 2016 (Figure 13). This is in line with general trends in the adult population, where smoking rates for over 16s fell from 23.8% in 2012 to 19.6% in 2016.⁷

Table 13 1Number of totally unexposed children whose primary carer is a current smoker at 27-30 months (Outcome 4a), for Scotland level data

Variable	Children born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Number (%) of totally unexposed children with subsequent record of 27-30 month review	265,094	12,624 (90.5%)
Number (%) of totally unexposed children with meaningful data for 'primary carer current smoker at 27-30 months' outcome	257,563	12,265 (87.9%)
Outcome 4a: Number (%) of totally unexposed children with meaningful data whose primary carer is a current smoker at 27-30 months	48,013	2,286 (18.6%)

Figure 12 Data availability in the 27-30 month review for Outcome 4a: Primary carer current smoker at 27-30 months

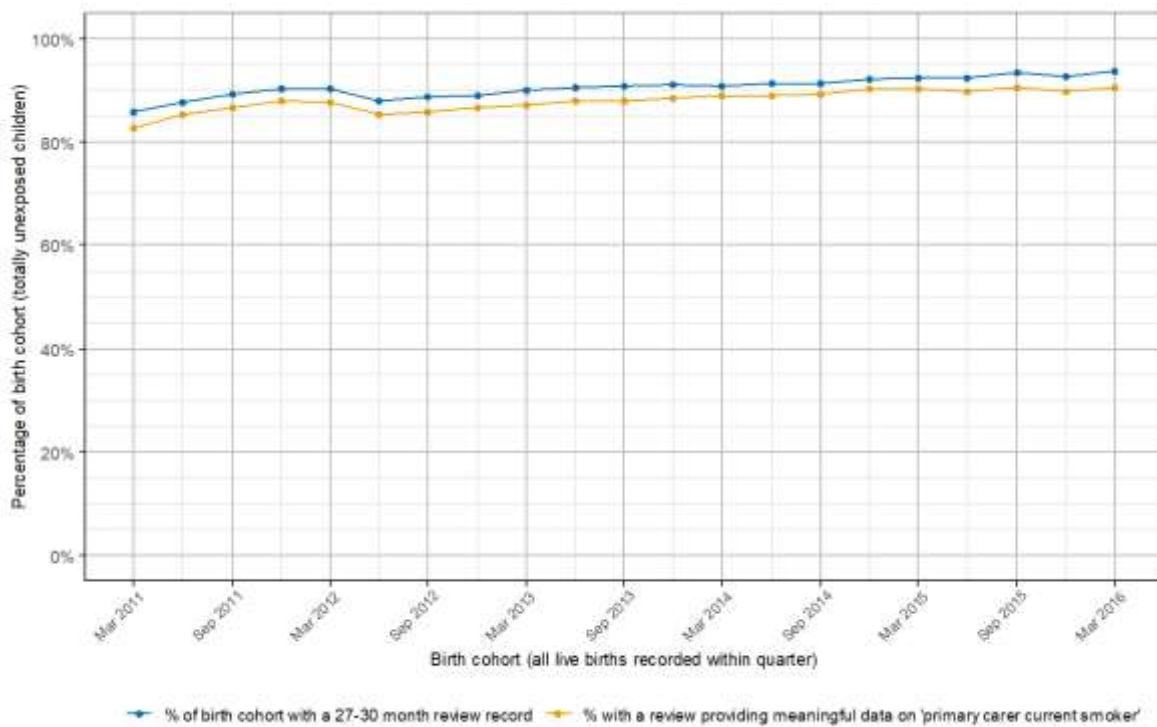
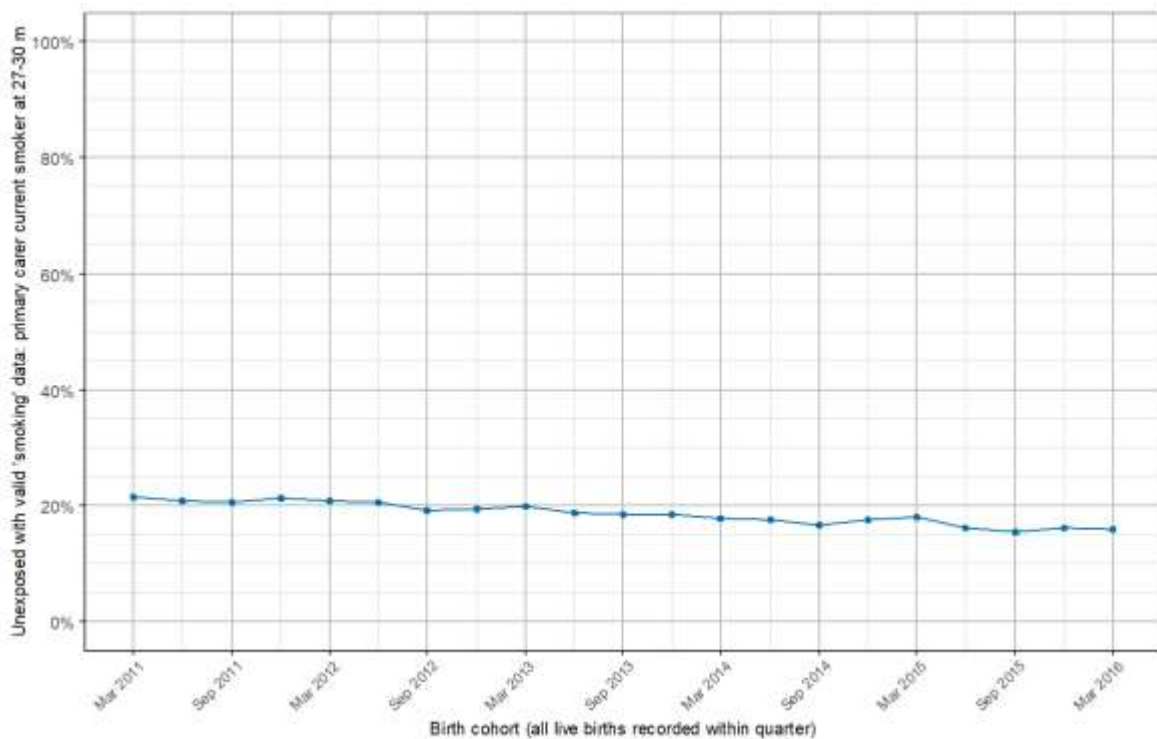


Figure 13 Percentage of totally unexposed birth cohort where the primary carer is a current smoker at 27-30 month review (Outcome 4a)



Outcome 4b: Child exposed to second hand smoke at 27-30 months

Data availability for child exposure to second hand smoke was similar to primary carer smoking, at 87.4% (Table 14 and Figure 14); again, data availability increased over time. The percentage of children exposed to second hand smoke at 27-30 months, however, was much lower: over the five-year period, a mean of 10.5% of children with meaningful data were reported to be exposed to second hand smoke at home. The actual percentage had almost halved for children born in the quarters ending March 2011 and March 2016, from 14.4% to 7.4% (Figure 15).

Table 14 Number of totally unexposed children who are exposed to second hand smoke at 27-30 months (Outcome 4b), for Scotland level data

Variable	Children born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Number (%) of totally unexposed children with subsequent record of 27-30 month review	265,094	12,624 (90.5%)
Number (%) of totally unexposed children with meaningful data for 'child exposed to second hand smoke at 27-30 months'	255,988	12,190 (87.3%)
Outcome 4b: Number (%) of totally unexposed children with meaningful data who are exposed to second hand smoke at 27-30 months	26,864	1,279 (10.5%)

Figure 14 Data availability in the 27-30 month review for Outcome 4b: child exposed to second hand smoke at 27-30 months

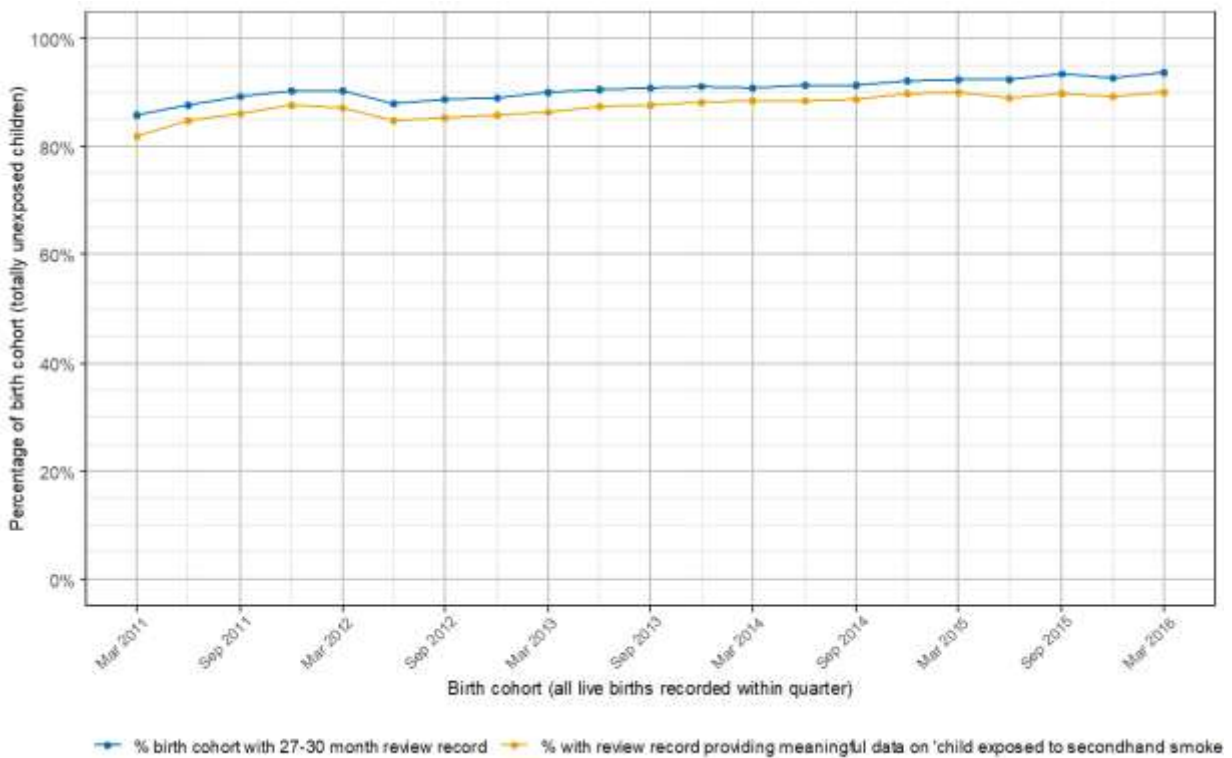
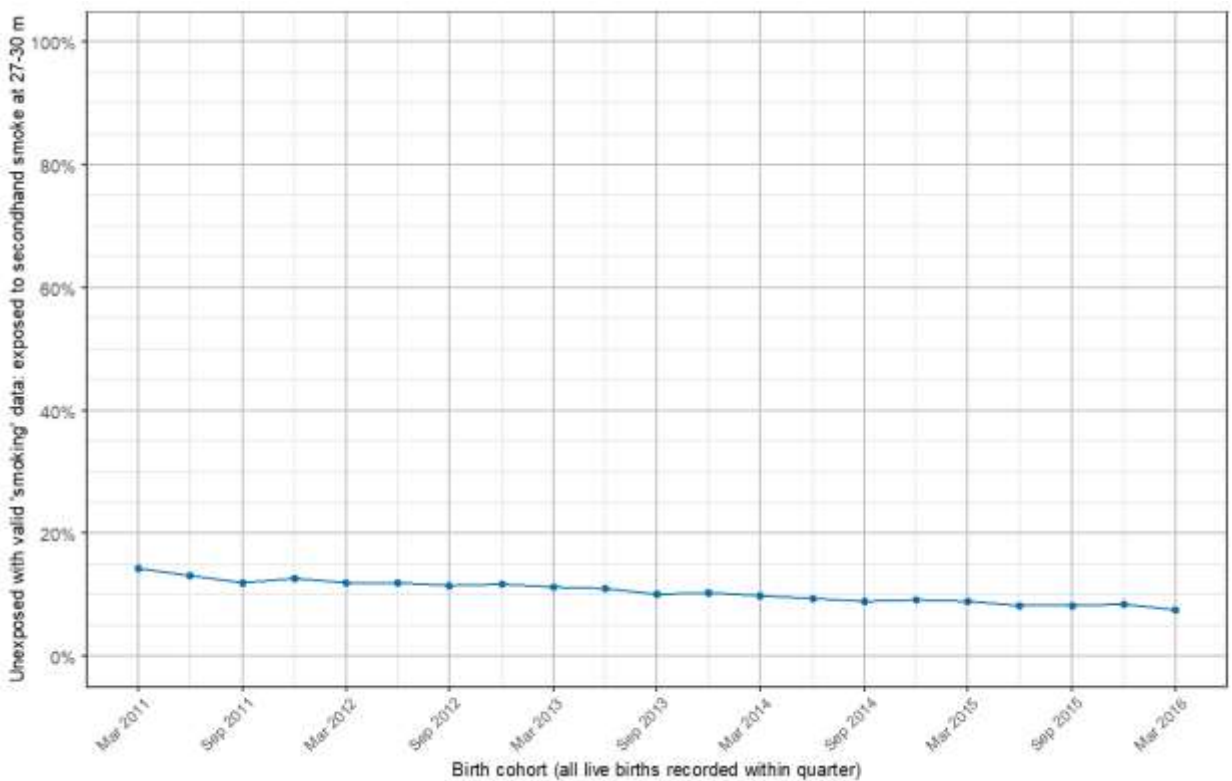


Figure 15 Percentage of totally unexposed birth cohort in which the child is exposed to second hand smoke at 27-30 months (Outcome 4b)



(b) Scotland, stratified by SIMD quintile

Patterns of outcomes were explored by level of deprivation (SIMD quintiles). As described in the Methodology section (SIMD data), postcodes were not available for some children, resulting in these children being categorised as 'SIMD unknown' and not included in the deprivation analyses.

To offer an approximation of the number of children who have been excluded from the deprivation analysis, the total number of children with unknown SIMD has been calculated as a percentage of the total number of children in Scotland for:

- review coverage,
- data availability and
- Outcomes 4a and 4b.

These percentages are presented in Table 15.

Table 15 Investigation of children with unknown SIMD for parental smoking Outcomes 4a and 4b

Description	
Number of 27-30 month reviews where SIMD is unknown	12,167
Number of 27-30 month reviews with meaningful data where SIMD is unknown	11,674
Outcome 4a: Number of totally unexposed children whose primary carer is a current smoker at 27-30 months, where SIMD is unknown	1,488
Of totally unexposed children whose primary carer is a current smoker at 27-30 months, percentage where child SIMD is unknown	3.1%
Outcome 4b: Number of totally unexposed children exposed to second-hand smoke at 27-30 months, where child SIMD is unknown	869
Of totally unexposed children exposed to second-hand smoke at 27-30 months, percentage where child SIMD is unknown	3.2%

Outcome 4a: Primary carer current smoker at 27-30 months by SIMD

As reported above with respect to the 6-8 week review, some variation could be seen in the coverage of the 27-30 month review when explored by SIMD quintile: those in the least deprived areas were more likely to have had a 27-30 month review than those in the most deprived areas (90.2% vs 85.8%, respectively) (see Table 16 and Figure 16Figure).

For children born in the quarter ending March 2011, the difference between the quintiles with the highest coverage (SIMD 5) and the lowest coverage (SIMD 1) was 3.61 percentage points. Quintile positions fluctuated and the gap between those with highest and lowest coverage increased, so that among children born in the quarter ending December 2011 the gap between the highest (SIMD 5) and lowest coverage (SIMD 3) was 13.2 percentage points. This wide gap was maintained over the course of 2.5 years; the quintiles for children born in the quarter ending June 2014 clustered together, but interestingly, the positions had reversed, and SIMD 3 had the highest coverage (89.0%) and SIMD 5 the lowest (86.1%). The gap widened again for children born in the quarter ending June 2015, with SIMD 4 having the highest coverage (93.0%) and SIMD 5 the lowest (84.8%), but for children born in the quarter ending March 2016 the quintiles were closely clustered, with SIMD 2 having the highest coverage (89.7%) and SIMD 4 the lowest (87.9%).

There was also a similar pattern of disparity and fluctuation among SIMD quintiles in terms of data availability, with 87.3% of those from the least deprived areas having meaningful data on primary carer smoking, compared with 84.1% from the most deprived areas (Table 16 and Figure 17).

Patterns of primary carer current smoking by SIMD quintile were striking: 6.4% of children living in the least deprived areas had a parent who was a current smoker at the 27-30 month review, compared with 30.4% of those in the most deprived areas (Table 16). All quintiles demonstrated a decrease in rates over time (Figure 18); however, this was most apparent for children in the most deprived areas, where rates of primary carer smoking have fallen from 35.2% for children born in the quarter ending in March 2011 to 25.8% for children born in the quarter ending in March 2016.

Figure 16 Availability of 27-30 month review for smoking outcomes for totally unexposed cohort, stratified by SIMD quintile

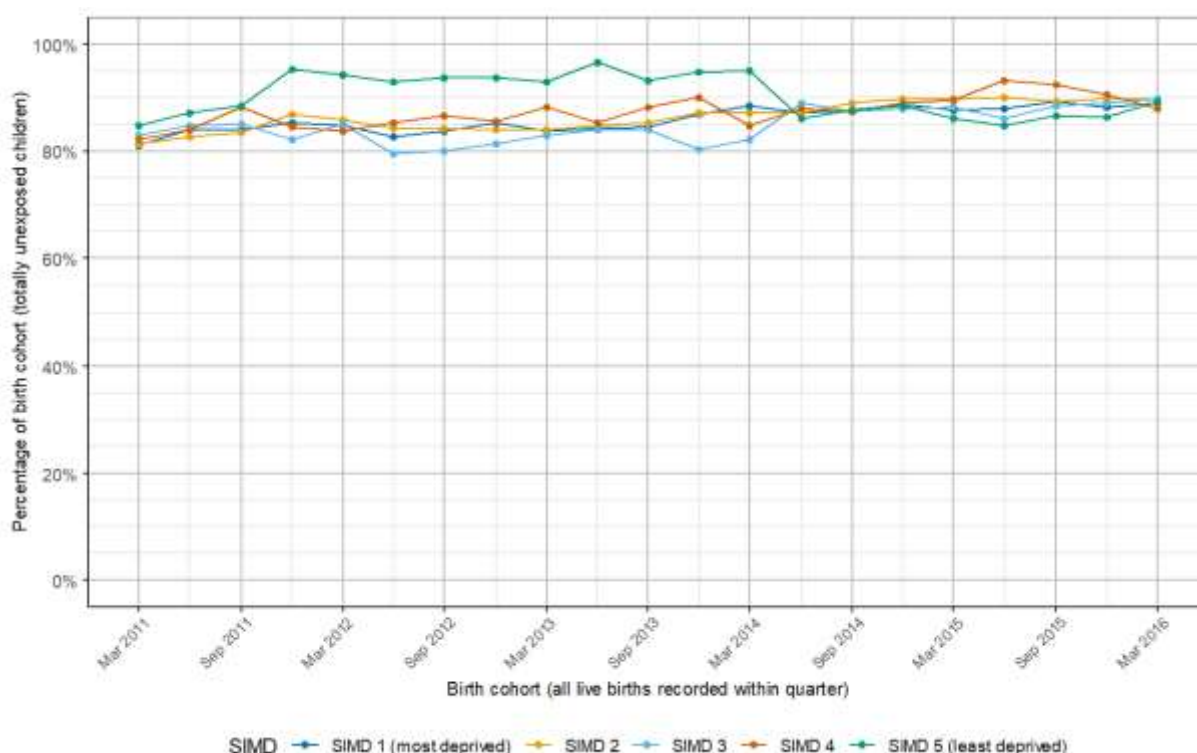


Table 16 Number of totally unexposed children whose primary carer is a current smoker at 27-30 months (Outcome 4a), stratified by SIMD quintile

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed children with subsequent record of 27-30 month review ¹	<i>n</i>	65,568	53,890	47,416	46,424	43,435
	%	85.8	86.4	84.6	87.3	90.2
Number (%) of totally unexposed children with meaningful data for 'primary carer current smoker at 27-30 months' outcome ¹	<i>n</i>	64,288	52,446	46,081	44,815	42,015
	%	84.1	84.0	82.2	84.3	87.3
Outcome 4a: Number (%) of totally unexposed children with meaningful data whose primary carer is a current smoker at 27-30 months ¹	<i>n</i>	19,538	12,220	7,821	4,955	2,690
	%	30.4	23.3	17.0	11.1	6.4

Note

¹Total number for quarters ending March 2011 to March 2016.

Figure 17 Availability of meaningful data for Outcome 4a, primary carer current smoker, in 27-30 month review for totally unexposed cohort, stratified by SIMD quintile

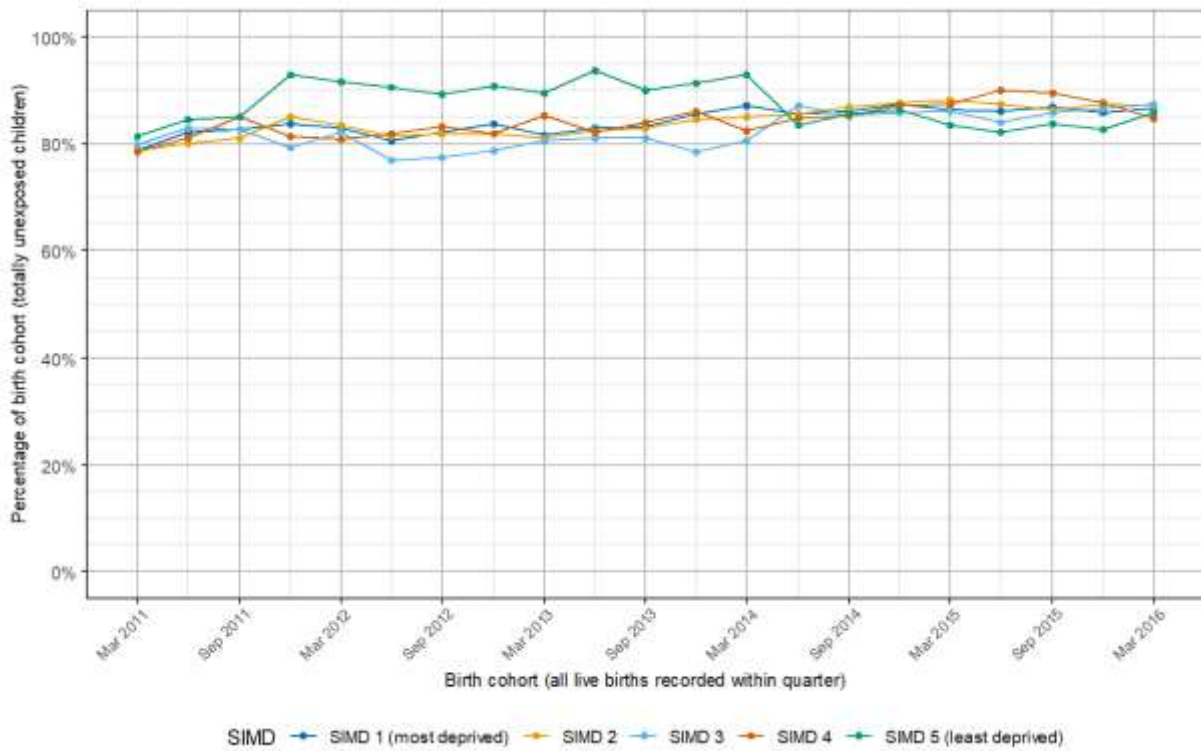
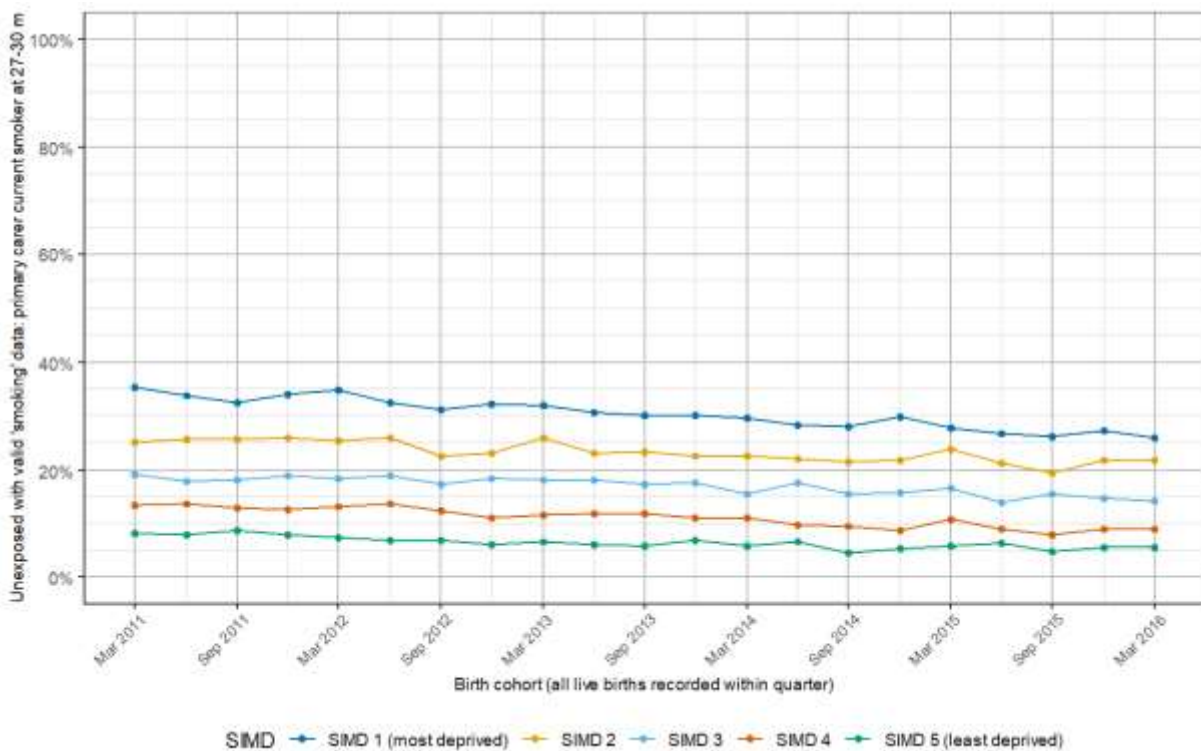


Figure 18 Percentage of totally unexposed birth cohort in which the primary carer currently smokes at 27-30 months (Outcome 4a), stratified by SIMD quintile



Outcome 4b: Child exposed to second hand smoke at 27-30 months by SIMD

Patterns for child exposure to second hand smoke were similar to those for Outcome 4a described above: data availability was marginally higher in the least deprived areas (86.9%) than the most deprived areas (83.7%) (Table 17), with increases in data availability across all groups over time (Figure 19).

As with primary carer smoking, a substantial difference could be observed between SIMD quintiles in terms of child exposure to second hand smoke, with those in more deprived areas having higher levels of children exposed: overall, 3.7% children in the least deprived areas were exposed to second hand smoke, in contrast to 17.4% children in the most deprived areas (Table 17). Across all SIMD quintiles, a decrease in the percentage of children exposed to second hand smoke could be observed over time (Figure 20), and this was again particularly notable in the most deprived quintile, where levels decreased from 24.2% for children born in the quarter ending March 2011 to 12.4% for those born in the quarter ending March 2016. This compares with a decrease from 5.4% to 2.2% in the least deprived quintile.

Table 17 Number of totally unexposed children who were exposed to second hand smoke at 27-30 months (Outcome 4b), stratified by SIMD quintile

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed with subsequent record of 27-30 month review ¹	<i>n</i>	65,568	53,890	47,416	46,424	43,435
	%	85.8	86.4	84.6	87.3	90.2
Number (%) of totally unexposed children with meaningful data for 'primary carer current smoker at 27-30 months' outcome ¹	<i>n</i>	63,944	52,127	45,736	44,491	41,827
	%	83.7	83.5	81.6	83.7	86.9
Outcome 4b: Number (%) of totally unexposed children with meaningful data who are exposed to second hand smoke at 27-30 months ¹	<i>n</i>	11,103	6,535	4,257	2,826	1,563
	%	17.4	12.5	9.3	6.4	3.7

Note

¹ Total number for quarters ending March 2011 to March 2016.

Figure 19 Availability of meaningful data for Outcome 4b, child exposed to second hand smoke, in 27-30 month review for totally unexposed cohort, stratified by SIMD quintile

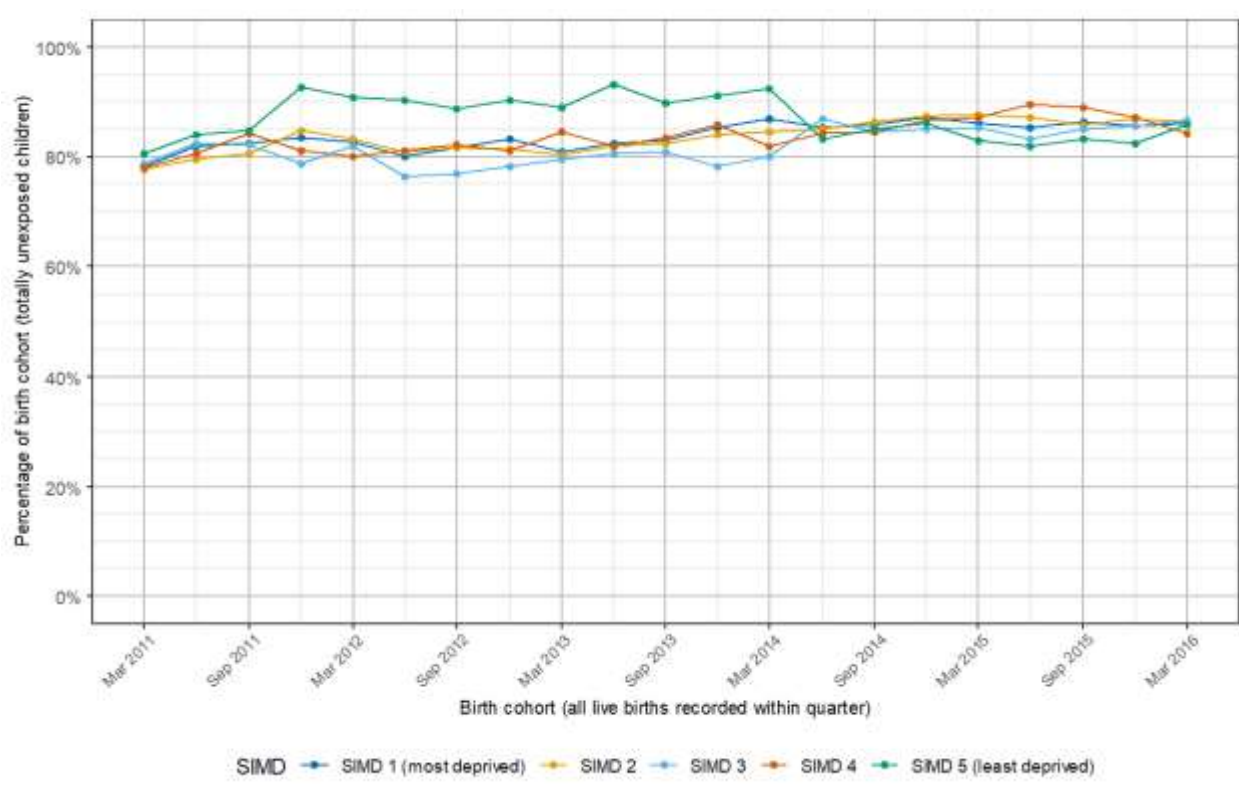
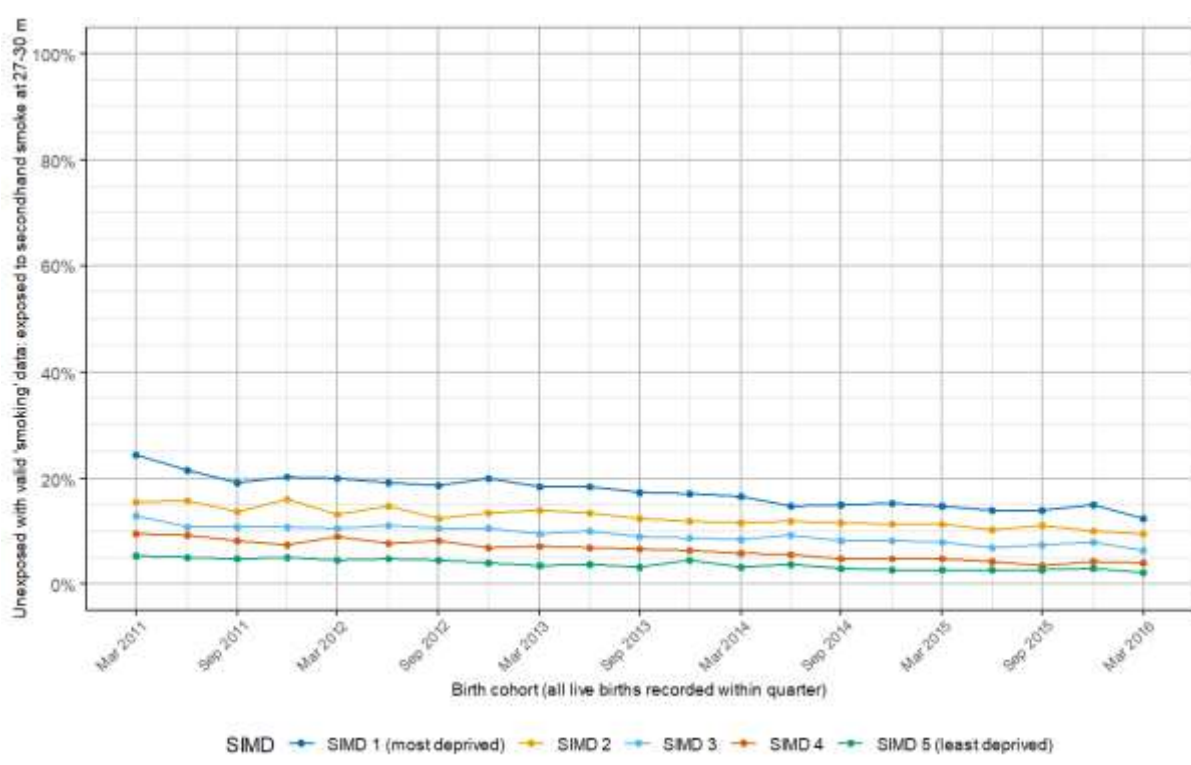


Figure 20 Percentage of totally unexposed birth cohort in which the child is exposed to second hand smoke at 27-30 months (Outcome 4b), stratified by SIMD quintile



Developmental concerns

The second group of outcomes explored was that of developmental concerns relating to children. These data were all captured at the 27-30 month review (see Appendix 1 for more information about the various domains explored). For each domain, the health visitor should record one of the following letters:

- N no concern
- C concern newly suspected
- P concern/disorder previously identified
- X assessment incomplete.

Between April 2013, when the 27-30 month review was first introduced, and April 2019, four versions of the child health review form used to record the review have evolved. In April 2017, the number of developmental domains changed: the social domain of 2013 became personal/social in 2017; the previously separate emotional, behavioural and attention domains (three) merged into a single emotional/behavioural domain; and a new problem solving domain was created.

It should also be noted that when the 27-20 month review was introduced, several validated questionnaires (for example, Ages and Stages Questionnaire 3 (ASQ 3), Schedule of Growing Skills II (SOGS II), Strengths and Difficulties Questionnaire (SDQ)) were recommended. However, when the UHVP was published in 2015, it was recommended that the ASQ 3 be used for all children undergoing 13-15 month, 27-30 month and 4-5 year reviews. Since the UHVP was adopted at different times by different health boards, some health boards took longer to begin to use ASQ 3.

(a) Scotland

Outcome 5a: Any developmental concern at 27-30 months

There is a clear upward trend in coverage of the 27-30 month review over the time period. However, the percentage of children with complete developmental data is somewhat lower than for some other outcomes: 73.5% of children had complete data for development (Table 18). Data completeness changed substantially for children born from October 2014 onwards; this relates to when the new developmental domains and assessments (primarily ASQ) were introduced on a revised version of the form. For children born in the quarter ending December 2014, there was a 20.5 percentage point decrease in the fully completed data recorded and a similar increase in partially completed data (Figure 21). This is in part related to NHS Greater Glasgow and Clyde using a different assessment tool, and therefore not being included in the complete developmental data, but a decrease in complete data for development can be seen in other health boards among children born in the two quarters ending December 2014 and March 2015, and it is likely to be related to changes in the forms, as described above.

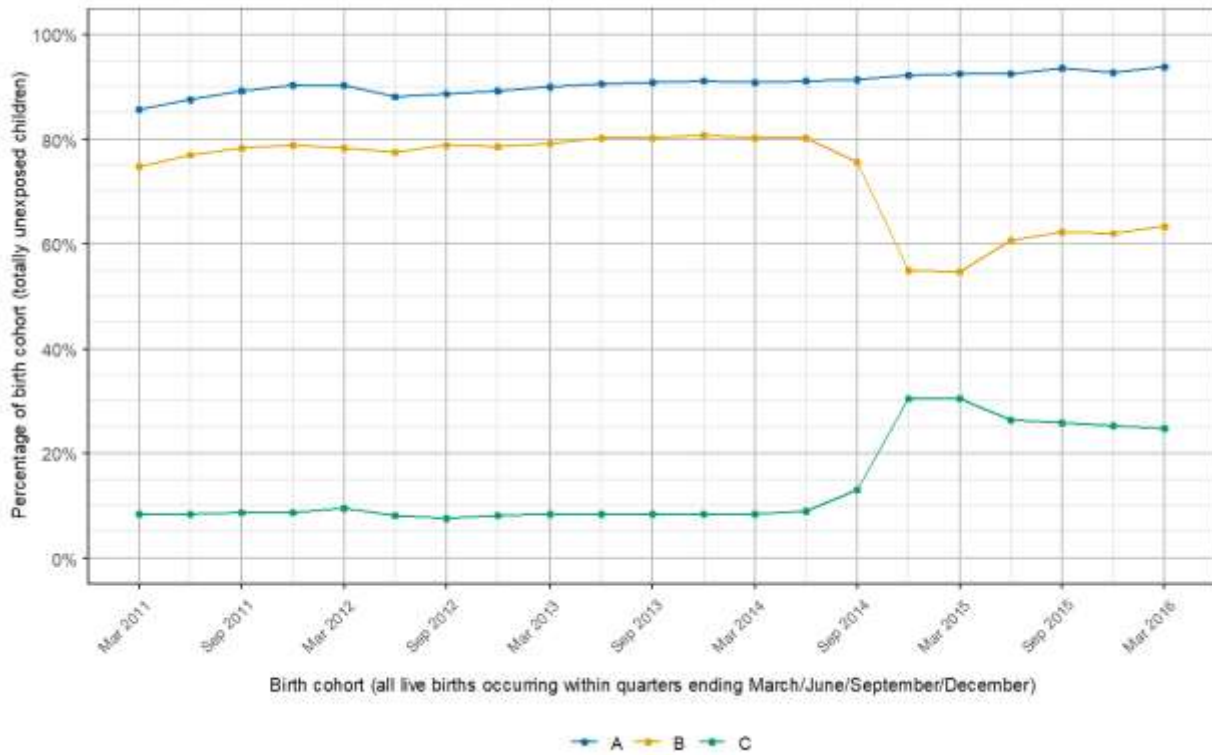
Table 18 Number of totally unexposed children with any developmental concern at 27-30 months (Outcome 5a), for Scotland level data

Variable	Children born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Number (%) of totally unexposed children with subsequent record of 27-30 month review	265,094	12,624 (90.5%)
Number (%) of totally unexposed children with complete data for 'development' (N/C/P for each domain) at 27-30 months'	215,270	10,251 (73.5%)
Number (%) of totally unexposed children without a concern, but some domains incomplete/missing	39,892	1,900 (13.6%)
Outcome 5a: Number (%) of totally unexposed children with a 27-30 month review who have C or P recorded against any domain at 27-30 months	47,438	2,259 (17.9%)

Overall, 17.9% of children had any developmental concern noted at 27-30 months. The percentage of children with a developmental concern recorded in any domain has remained fairly static over time, with the exception of a slight rise following the change in data recording (Figure 22).

The results for the individual domains are now explored.

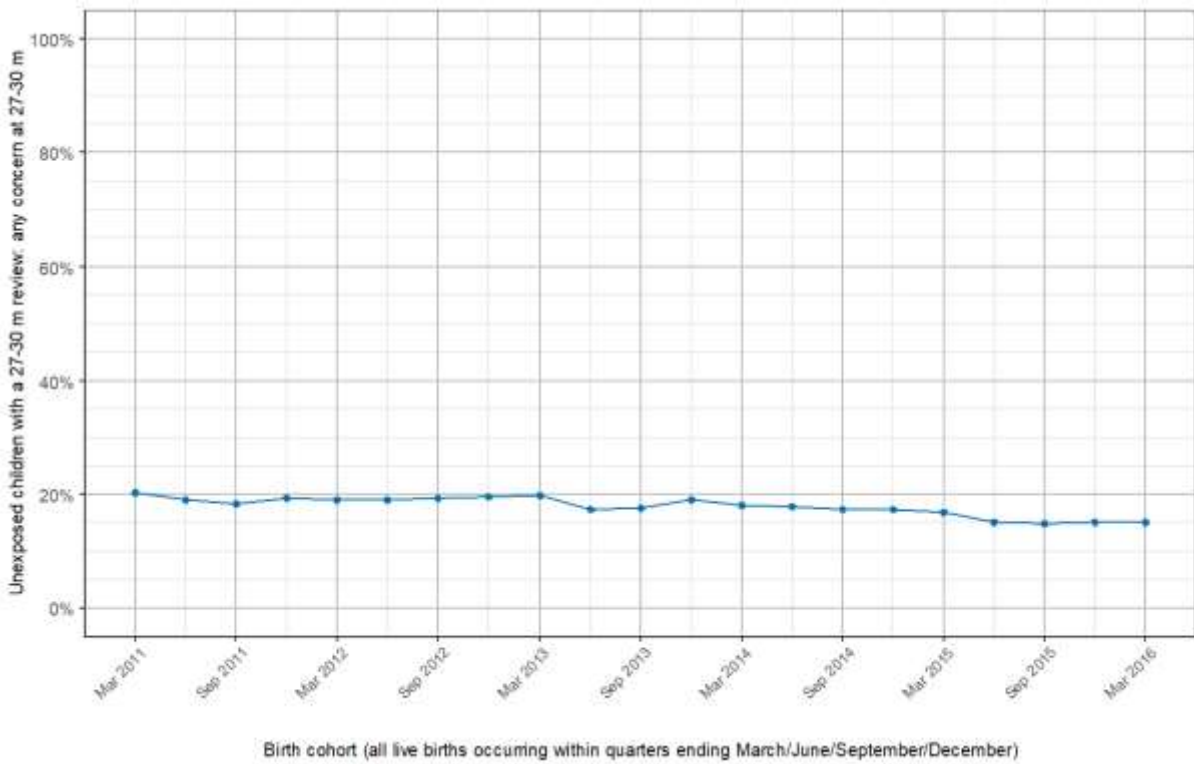
Figure 21 Data availability in the 27-30 month review for Outcome 5a: any developmental concern at 27-30 months



Notes

- A Percentage of children in this birth cohort with subsequent record of 27-30 month review
- B Percentage of children in this birth cohort with complete data for 'development' (N/C/P for each domain) recorded in 27-30 month review
- C Percentage of children in this birth cohort without a concern recorded, but with some domains of 27-30 month review incomplete/missing

Figure 22 Percentage of totally unexposed birth cohort in which any developmental concern has been recorded at 27-30 months (Outcome 5a)



Outcome 5b: Any concern about speech, language and communication development at 27-30 months

The speech, language and communication domain was particularly well recorded, with 86.3% children having meaningful data at 27-30 months, increasing over time in line with increases in the percentage of children having their 27-30 month review (Table 19 and Figure 23).

The percentage of children with concerns noted in the speech, language and communication domain was 12.5%. This was seen to gradually fall from 12.8% to 10.3% for children born in the quarters ending between March 2011 and March 2016 (see Figure 24).

Table 19 Number of totally unexposed children with any concern about Speech, language and communication development at 27-30 months (Outcome 5b), for Scotland level data

Variable	Children born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Number (%) of totally unexposed children with subsequent record of 27-30 month review	265,094	12,624 (90.5%)
Number (%) of totally unexposed children with meaningful data for 'Speech, language & communication development' (N/C/P) at 27-30 months'	252,922	12,044 (86.3%)
Number (%) of totally unexposed children without a concern, but some domains incomplete/missing	39,892	1,900 (13.6%)
Outcome 5b: Number (%) of totally unexposed children with meaningful data who have C or P recorded against Speech, language & communication domain at 27-30 months	33,161	1,579 (12.5%)

Figure 23 Data availability in the 27-30 month review for Outcome 5b: Speech, language and communication (S, L & C) development at 27-30 months

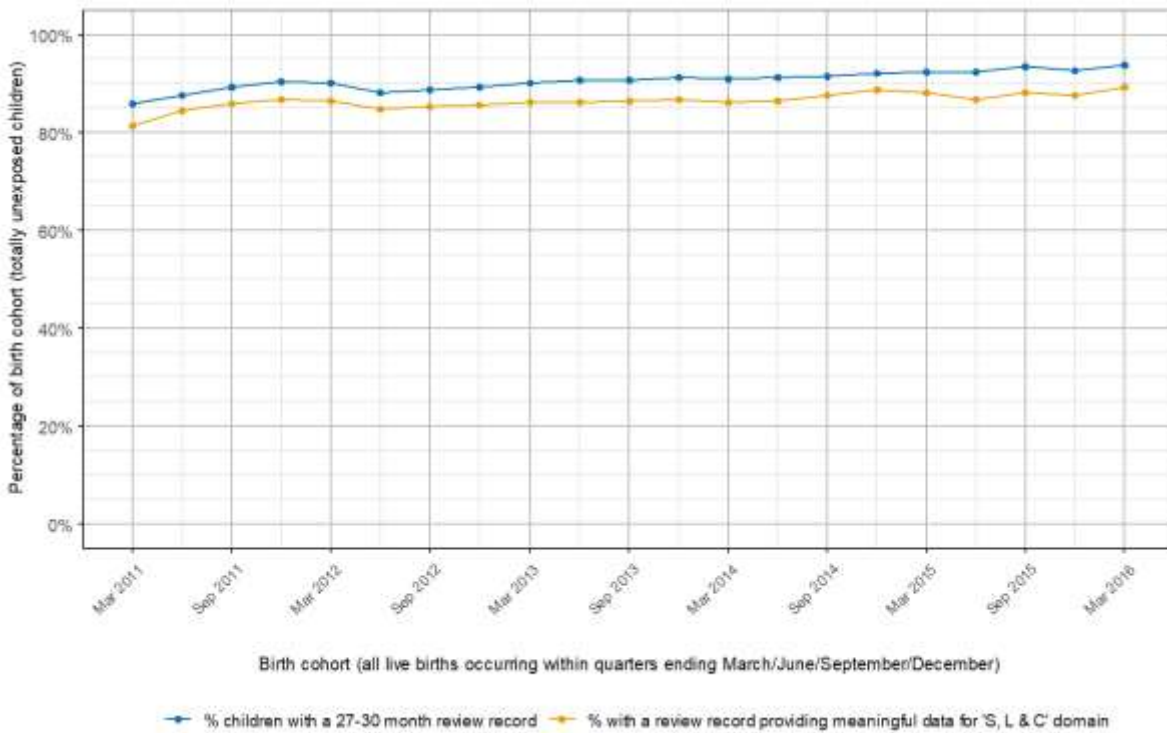
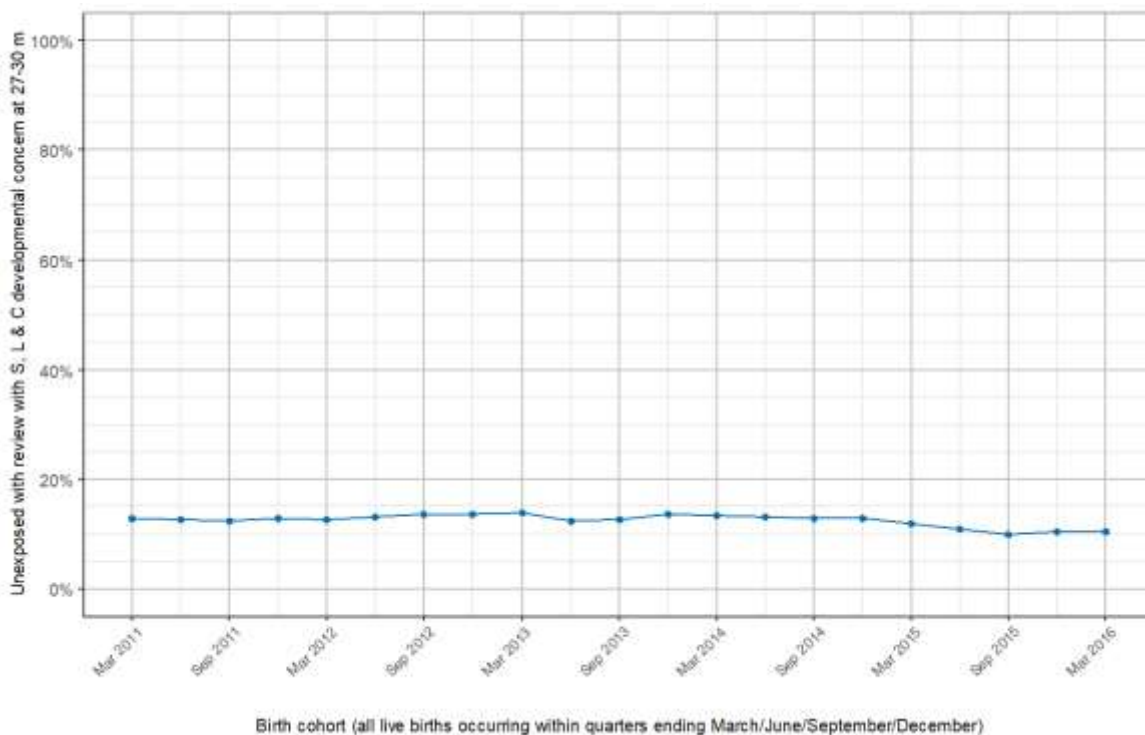


Figure 24 Percentage of totally unexposed birth cohort in which any concern about speech, language or communication (S, L & C) development has been recorded at 27-30 months (Outcome 5b)



Outcome 5c: Any concern about social and emotional development

Similarly to the speech and language domain, 85.9% children had meaningful data recorded on the social and emotional development domain (Table 20). Again, the percentage with data recorded in this domain increased as the coverage for the overall review increased (Figure 25).

The percentage of children with a concern noted on the social and emotional domain was 8.2%, with a slight decrease seen over time, from 9.9% for children born in the quarter ending in March 2011 to 7.3% for children born in the quarter ending March 2016 (Figure 26).

Table 20 Number of totally unexposed children with any concern about Social and emotional development at 27-30 months (Outcome 5c), for Scotland level data

Variable	Children born January 2011 to March 2016		
	Total	Mean for quarters ending March 2011 to March 2016	
Number of totally unexposed children	293,081	13,956	
Number (%) of totally unexposed with subsequent record of 27-30 month review	265,094	12,624	(90.5%)
Number (%) of totally unexposed children with meaningful data for 'Social and emotional development' (N/C/P) (each relevant domain) at 27-30 months'	251,646	11,983	(85.9%)
Number (%) of totally unexposed children without a concern, but some domains incomplete/missing	39,892	1,900	(13.6%)
Outcome 5c: Number of totally unexposed children (% with meaningful data) with C or P recorded against any Social & emotional domain at 27-30 months	21,745	1,035	(8.2%)

Figure 25 Data availability in the 27-30 month review for Outcome 5c: Social and emotional (S & E) development at 27-30 months

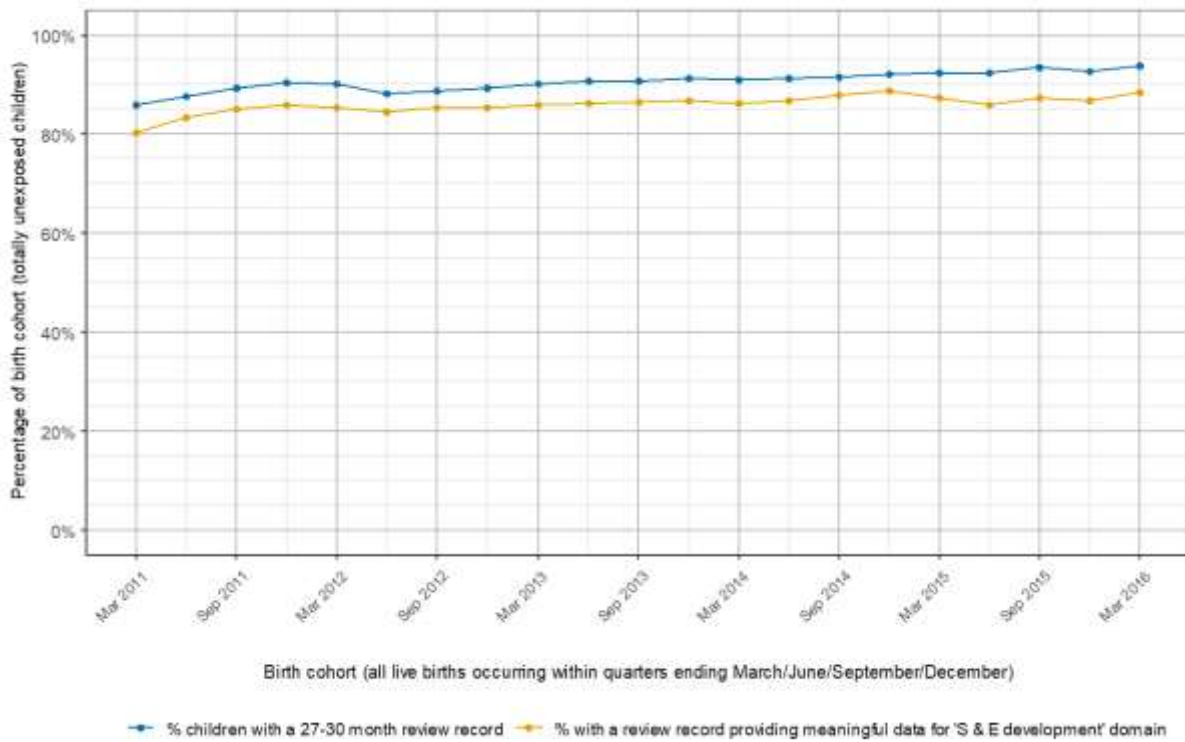
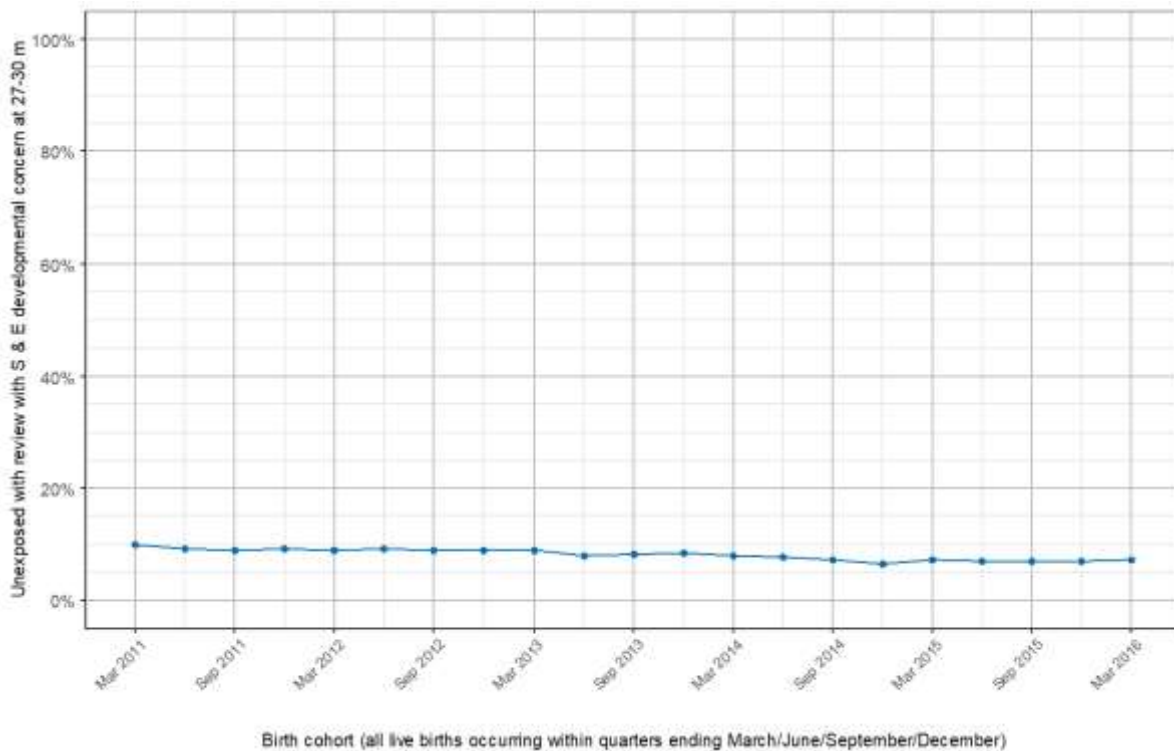


Figure 26 Percentage of totally unexposed birth cohort in which any concern about social and emotional (S & E) development has been recorded at 27-30 months (Outcome 5c)



(b) Scotland, stratified by SIMD quintile

As previously, the three developmental-concern outcomes were explored by level of area deprivation (SIMD quintiles). As described in the Methodology section above (SIMD data), postcodes were not available for some children, resulting in these children being categorised as 'SIMD unknown' and not included in the deprivation-level analyses. Unfortunately it is not possible to give a precise estimate of the number of children affected, since the data on live births have been accessed from a different source (NRS) to the data relating to the 27-30 month child health review (CHSP-PS).

To offer an approximation of the number of children who have been excluded from the deprivation analysis the total number of children with unknown SIMD has been calculated as a percentage of the total number of children in Scotland for:

- review coverage,
- data availability, and
- Outcomes 5a, 5b and 5c.

These percentages are presented in Table 21, where it can be seen that the percentage whose SIMD quintile was unknown was in the region of 4.5%.

Outcome 5a: Any developmental concern at 27-30 months by SIMD

As outlined for Outcome 4a: Primary Carer current smoker at 27-30 months by SIMD, above, the pattern of coverage of the 27-30 month review varies by SIMD quintile, with those in the most deprived groups slightly less likely to receive their review than those in the least deprived group, although this fluctuates considerably over time (Figure 27), as has been described for Figure 16.

The percentage of children with complete developmental data recorded at the 27-30 month review follows a similar pattern: 65.5% children in the most deprived quintile had a complete set of developmental data, compared with 74.1% in the least deprived quintile (Table 22). A substantial decrease in the percentage of children with complete developmental data occurs in the quarters for children born after September 2014, relating to when the data collection changed, and levels across all quintiles are lower following this change (Figure 28).

For data relating to children born after September 2014, inequalities in complete developmental data coverage are widened, with those in the most deprived quintile substantially less likely to have a complete set of data (52.4% for children born in the quarter ending in March 2016) compared with those in the four other quintiles (ranging from 62.4% in the least deprived quintile to 69.7% in SIMD 3 in the same quarter) (Figure 28). As noted above, this is in part related to NHS Greater Glasgow and Clyde not using the ASQ as a measure following the change of assessment, and these areas accounting for large proportions of children in the lower SIMD quintiles.

Table 21 Investigation of children with unknown SIMD for developmental-concern Outcomes 5a, 5b and 5c

Description	
Number of 27-30 month reviews, where child SIMD is unknown	12,167
Number of totally unexposed children with complete data for developmental domains, where child SIMD is unknown	9,478
Number of totally unexposed children without a concern, but some domains incomplete or missing, where child SIMD is unknown	2,192
Outcome 5a: Number of totally unexposed children with any developmental concern at 27-30 months, where child SIMD is unknown	2,148
Of totally unexposed children with any developmental concern at 27-30 months, percentage where child SIMD is unknown	4.5%
<hr/>	
Number of totally unexposed children with meaningful data for Speech, language & communication development, where child SIMD is unknown	11,389
Outcome 5b: Number of totally unexposed children with any concern about Speech, language & communication development at 27-30 months, where child SIMD is unknown	1,565
Of totally unexposed children with any developmental concern about Speech, language & communication development at 27-30 months, percentage where child SIMD is unknown	4.7%
<hr/>	
Number of totally unexposed children with meaningful data for Social & emotional development, where SIMD is unknown	11,333
Outcome 5c: Number of totally unexposed children with any concern about Social & emotional development at 27-30 months, where child SIMD is unknown	979
Of totally unexposed children with any concern about Social & emotional development at 27-30 months, percentage where child SIMD is unknown	4.4%

Over the five-year period, a quarter of children (25.1%) in the most deprived quintile had a concern noted in at least one developmental domain, compared with 10.5% in the least deprived quintile (Table 22); a linear pattern by SIMD was apparent. These differences between SIMD quintiles were maintained over time, although a slight narrowing of inequalities could be observed among children born in the quarter ending in March 2016: there was a difference of 15.8 percentage points between the most and least deprived quintiles born in the quarter ending in March 2011 compared with a difference of 13.5 percentage points among the two quintiles born in the quarter ending in March 2016. The percentage of children for whom a concern in any developmental domain was recorded was 21.9% in the most deprived quintile, born in the quarter ending in March 2016, in contrast to 8.4% in the least deprived quintile at the same time point (Figure 29).

Table 22 Number of totally unexposed children with any developmental concern at 27-30 months (Outcome 5a), stratified by SIMD quintile

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed with subsequent record of 27-30 month review ¹	<i>n</i>	65,568	53,890	47,416	46,424	43,435
	%	85.8	86.4	84.6	87.3	90.2
Number (%) of totally unexposed with complete data for 'development at 27-30 months' outcome (N/C/P for each domain) ¹	<i>n</i>	50,049	44,502	40,045	39,163	35,653
	%	65.5	71.3	71.5	73.7	74.1
Number (%) of totally unexposed children without a concern, but some domains incomplete/missing ¹	<i>n</i>	11,336	7,363	6,069	6,185	6,911
	%	14.8	11.8	10.8	11.6	14.4
Outcome 5a: Number (%) of totally unexposed children with 27-30 month review, for whom a C or P was recorded against any domain at 27-30 months ¹	<i>n</i>	16,454	10,761	7,859	6,220	4,545
	%	25.1	20.0	16.6	13.4	10.5

Note

¹ Total number for quarters ending March 2011 to March 2016.

Figure 27 Availability of 27-30 month review for totally unexposed cohort, stratified by SIMD

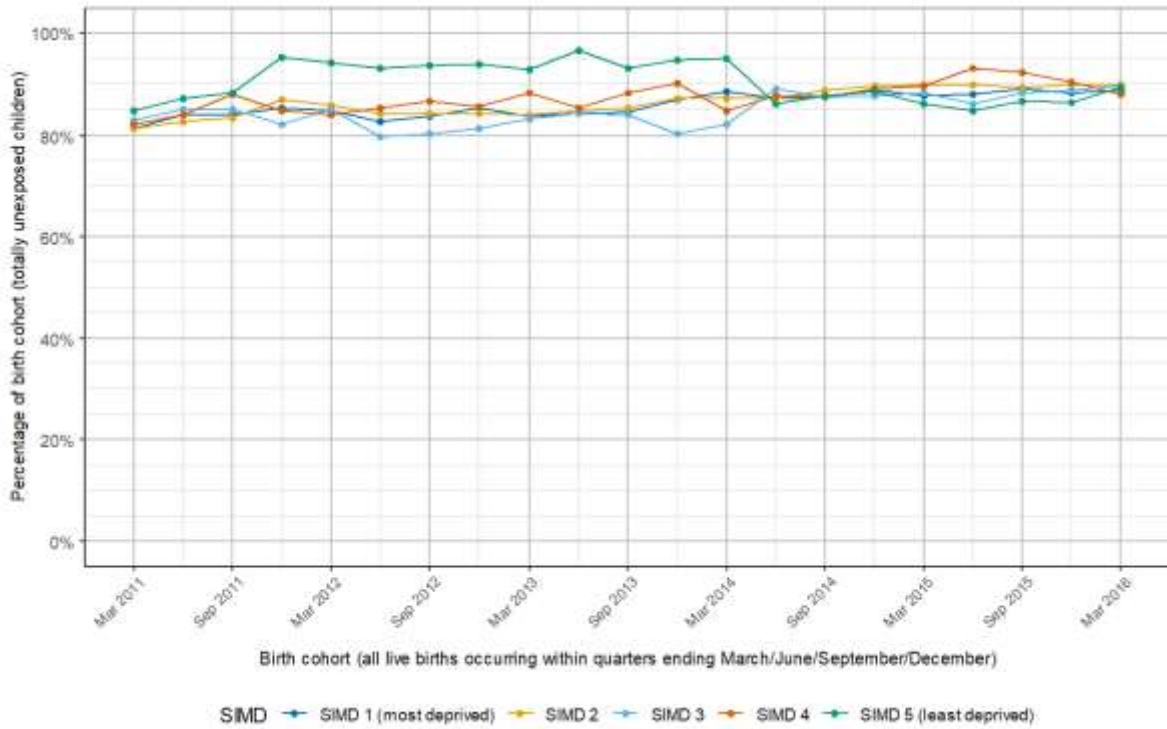


Figure 28 Availability of complete data for all 'development' domains recorded in 27-30 month review for totally unexposed cohort, stratified by SIMD

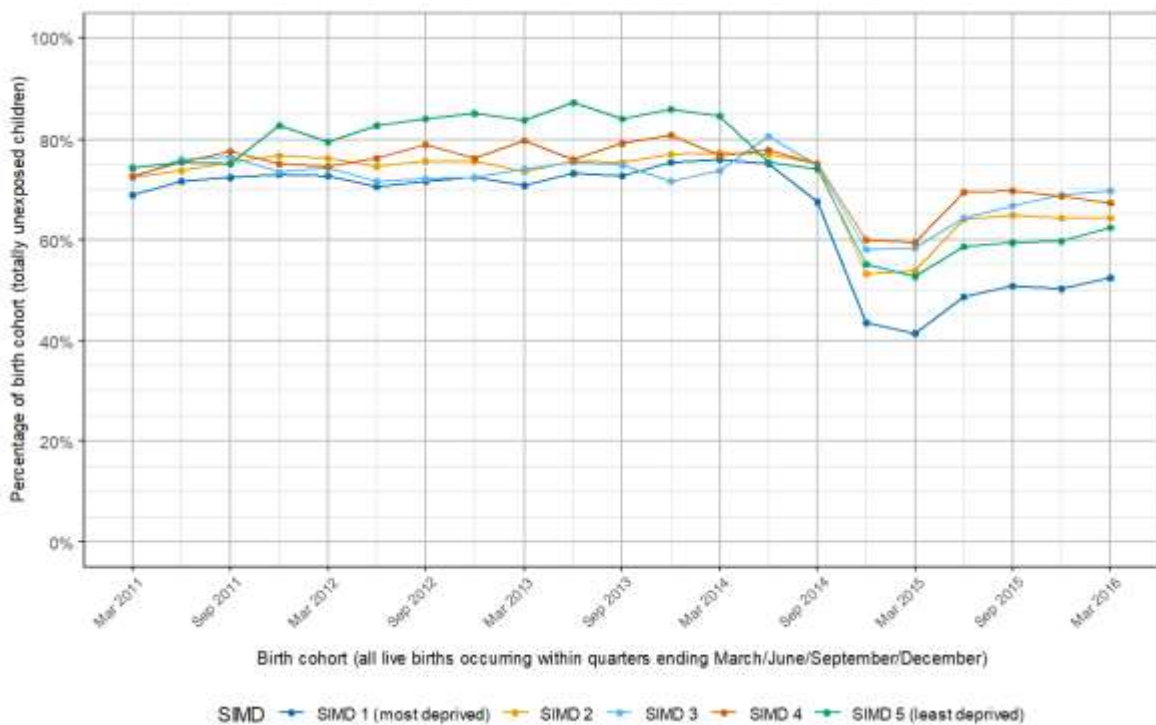
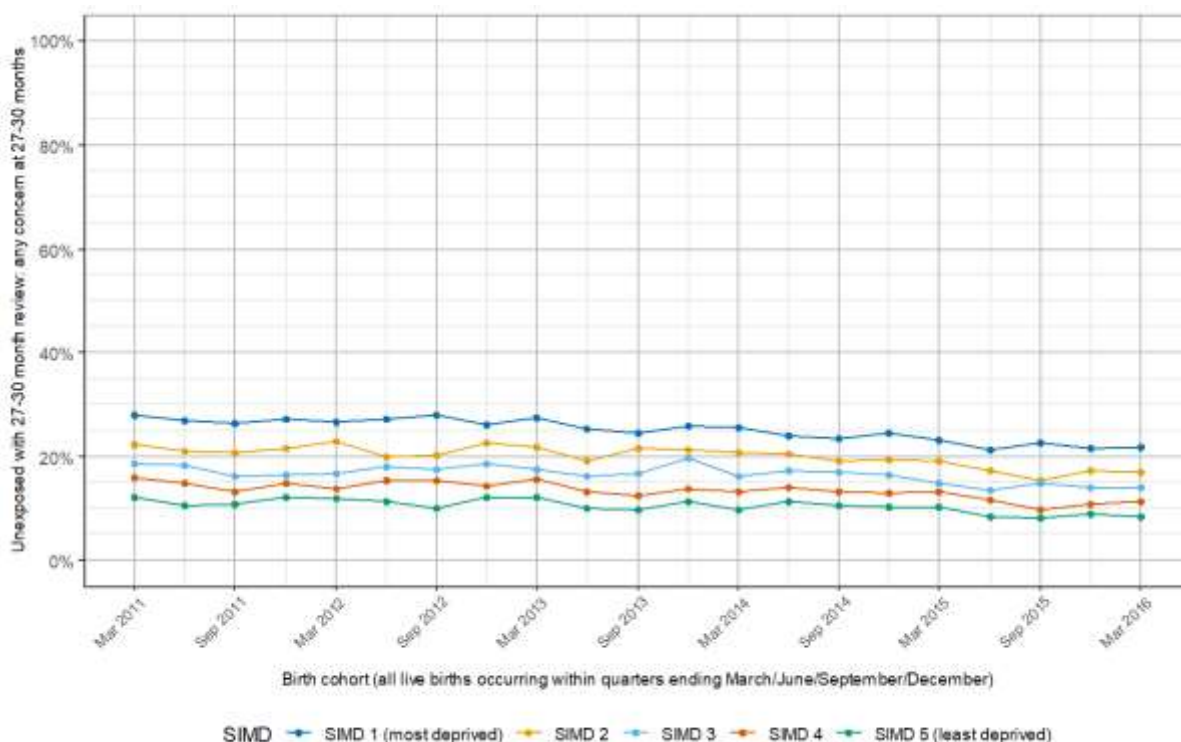


Figure 29 Percentage of totally unexposed birth cohort for which any developmental concern has been recorded at 27-30 months (Outcome 5a), stratified by SIMD



Outcome 5b: Any concern about speech, language and communication development at 27-30 months by SIMD

In terms of individual domain recording by SIMD, data for the speech, language and communication domain was recorded for 82.7% of children in the most deprived SIMD quintile, compared with 86.0% in the least deprived quintile (Table 23). The pattern is similar to the one described for Figure 16, in the section above entitled Outcome 4a: Primary carer current smoker at 27-30 months by SIMD. Despite fluctuations, especially in SIMD 3 and 5 quintiles, a slight increase in data availability in the domain could be discerned across all SIMD groups for children born in the quarters ending March 2011 and March 2016 (Figure 30).

More than twice the percentage of children in the most deprived quintile (17.0%) had a concern noted with speech, language and communication, compared with 7.2% in the least deprived quintile (Table 23). This pattern was consistent across time, with all SIMD quintiles seeing a slight decrease in the percentage of children with a speech, language and communication concern noted: for example, children in the most deprived quintile saw a decrease in levels of concerns in this field from 16.8% for children born in the quarter ending March 2011 to 15.2% for those born in the quarter ending March 2016 (Figure 31).

Table 23 Number of totally unexposed children with any concern about Speech, language and communication development at 27-30 months (Outcome 5b), stratified by SIMD quintile

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed with subsequent record of 27-30 month review ¹	<i>n</i>	65,568	53,890	47,416	46,424	43,435
	%	85.8	86.4	84.6	87.3	90.2
Number (%) of totally unexposed with complete data for 'development at 27-30 months' outcome (N/C/P for each domain) ¹	<i>n</i>	50,049	44,502	40,045	39,163	35,653
	%	65.5	71.3	71.5	73.7	74.1
Number (%) of totally unexposed without a concern, but some domains incomplete/missing ¹	<i>n</i>	11,336	7,363	6,069	6,185	6,911
	%	14.8	11.8	10.8	11.6	14.4
Number (%) of totally unexposed with meaningful data recorded in Speech, language & communication domain at 27-30 months (N/C/P) ¹	<i>n</i>	63,204	51,527	45,093	44,026	41,383
	%	82.7	82.6	80.5	82.8	86.0
Outcome 5b: Number (%) of totally unexposed children with 27-30 month review, for whom a C or P was recorded against Speech, language & communication domain at 27-30 months ¹	<i>n</i>	11,134	7,707	5,643	4,382	3,113
	%	17.0	14.3	11.9	9.4	7.2

Note

¹ Total number for quarters ending March 2011 to March 2016.

Figure 30 Availability of meaningful data for speech, language & communication developmental domain recorded in 27-30 month review (Outcome 5b) for totally unexposed cohort, by SIMD

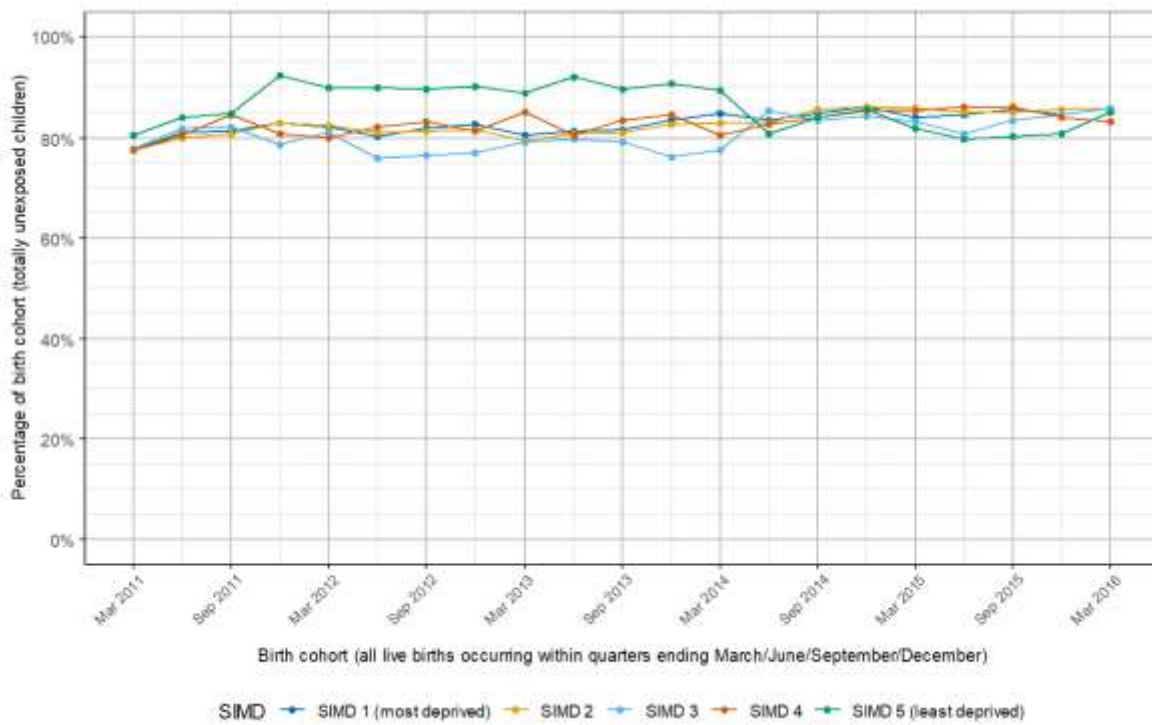
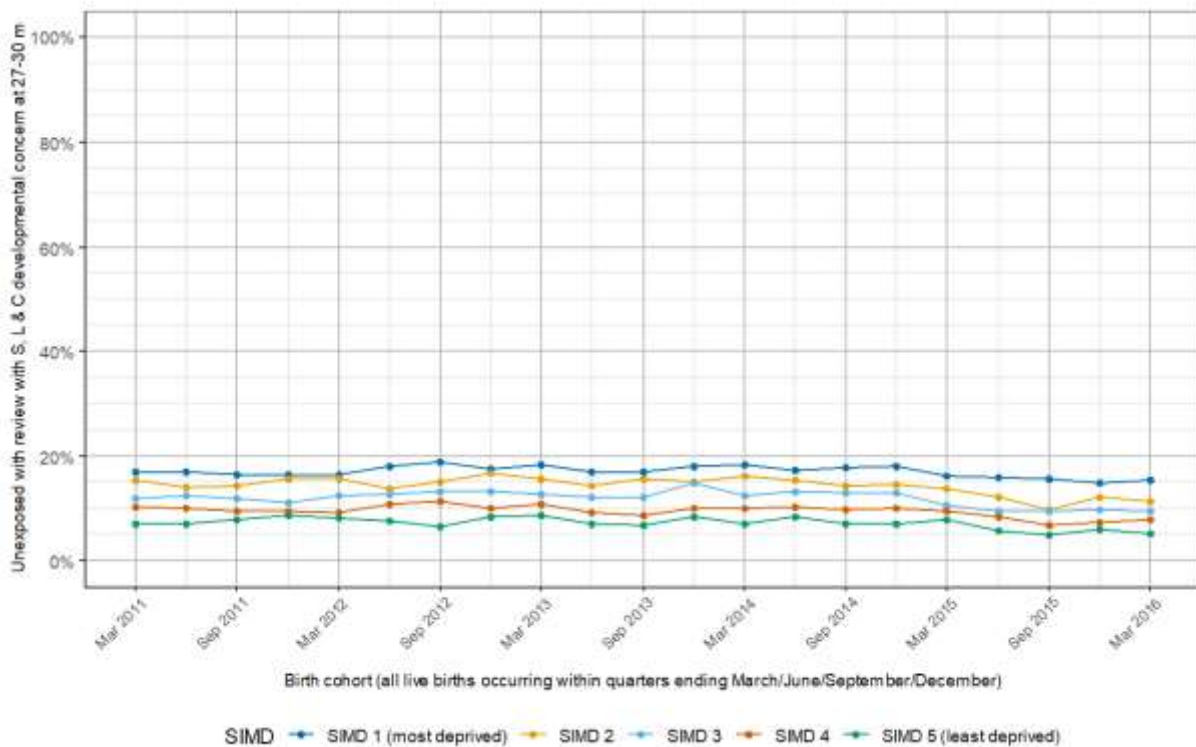


Figure 31 Percentage of totally unexposed birth cohort for which any concern about speech, language & communication development has been recorded at 27-30 months (Outcome 5b), stratified by SIMD



Outcome 5c: Any concern about social and emotional development at 27-30 months by SIMD

The percentages of children with data available for the social and emotional domain(s) varied very slightly by SIMD quintile at the beginning and end of the time period: for children born in the quarter ending in March 2011 percentages ranged from 76.2% (SIMD 4) to 78.9% (SIMD 5), and for children born in the quarter ending in March 2016 from 82.8% (SIMD 4) to 85.0% (SIMD 2). For children born in the quarters ending from September 2012 to March 2014, those living in the least deprived areas (SIMD 5) had considerably more data available for this domain (around 90%); however, children born in the quarter ending June 2014 living in least deprived areas (Figure 32) had the lowest percentage of meaningful data available. This pattern was similar to that for data availability for speech, language and communication domain (see Figure 30 above).

Children in the most deprived quintile (SIMD 1) were more likely to have a concern noted in a social or emotional development domain, compared with children from other groups (13.2% children in the most deprived quintile compared with 3.9% children in the least deprived quintile) (Table 24). This pattern was consistent across time (Figure 33); however, all groups saw a decrease in levels of concerns in the social or emotional sphere, with children in the most deprived group showing the largest reduction, from 16.4% for children born in the quarter ending March 2011 to 11.9% in the quarter ending March 2016, thus reducing inequalities.

Table 24 Number of totally unexposed children with any concern about Social and emotional development at 27-30 months (Outcome 5c), stratified by SIMD quintile

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed children with subsequent record of 27-30 month review ¹	<i>n</i>	65,568	53,890	47,416	46,424	43,435
	%	85.8	86.4	84.6	87.3	90.2
Number (%) of totally unexposed children with complete data for 'development at 27-30 months' outcome (N/C/P for each domain) ¹	<i>n</i>	50,049	44,502	40,045	39,163	35,653
	%	65.5	71.3	71.5	73.7	74.1
Number (%) of totally unexposed children without a concern, but some domains incomplete/missing ¹	<i>n</i>	11,336	7,363	6,069	6,185	6,911
	%	14.8	11.8	10.8	11.6	14.4
Number (%) of totally unexposed children with meaningful data recorded in Social & emotional domain at 27-30 months (N/C/P) ¹	<i>n</i>	62,994	51,318	44,848	43,805	41,021
	%	82.4	82.2	80.0	82.4	85.2
Outcome 5b: Number (%) of totally unexposed children with 27-30 month review, for whom a C or P was recorded against Social & emotional domain at 27-30 months ¹	<i>n</i>	8,652	4,920	3,270	2,506	1,684
	%	13.2	9.1	6.9	5.4	3.9

Note

¹ Total number for quarters ending March 2011 to March 2016.

Figure 32 Availability of meaningful data for social and emotional developmental domain recorded in 27-30 month review (Outcome 5c) for totally unexposed cohort, stratified by SIMD

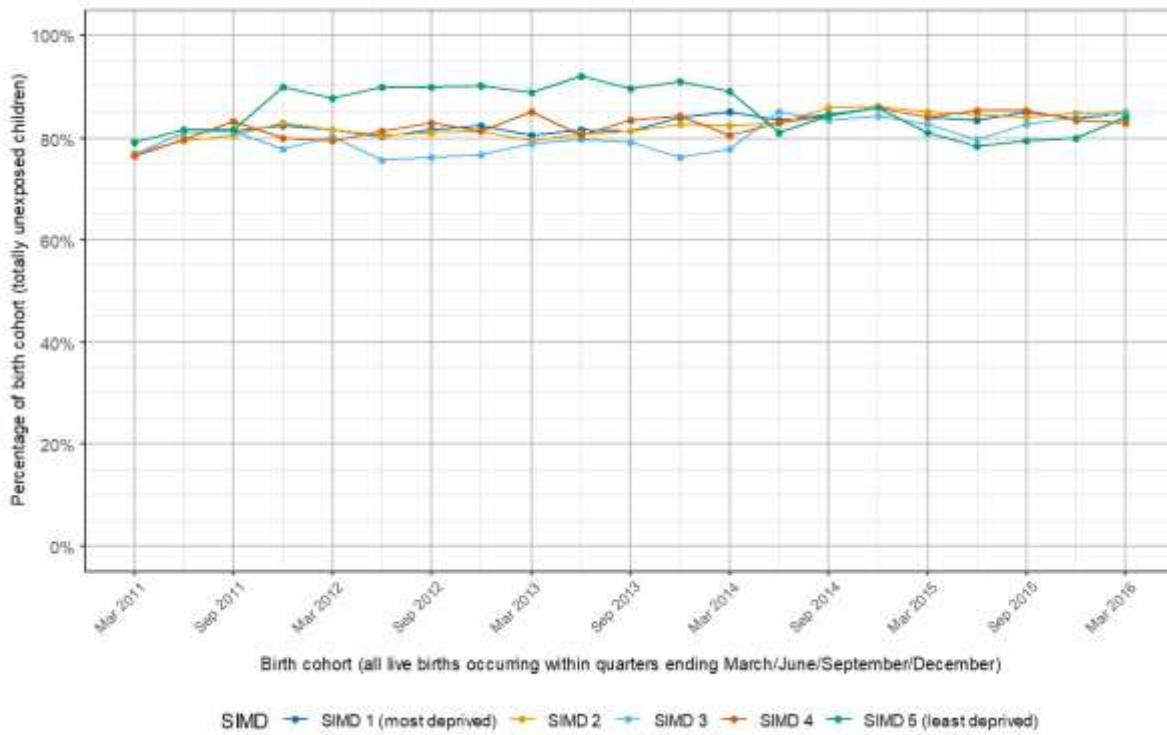
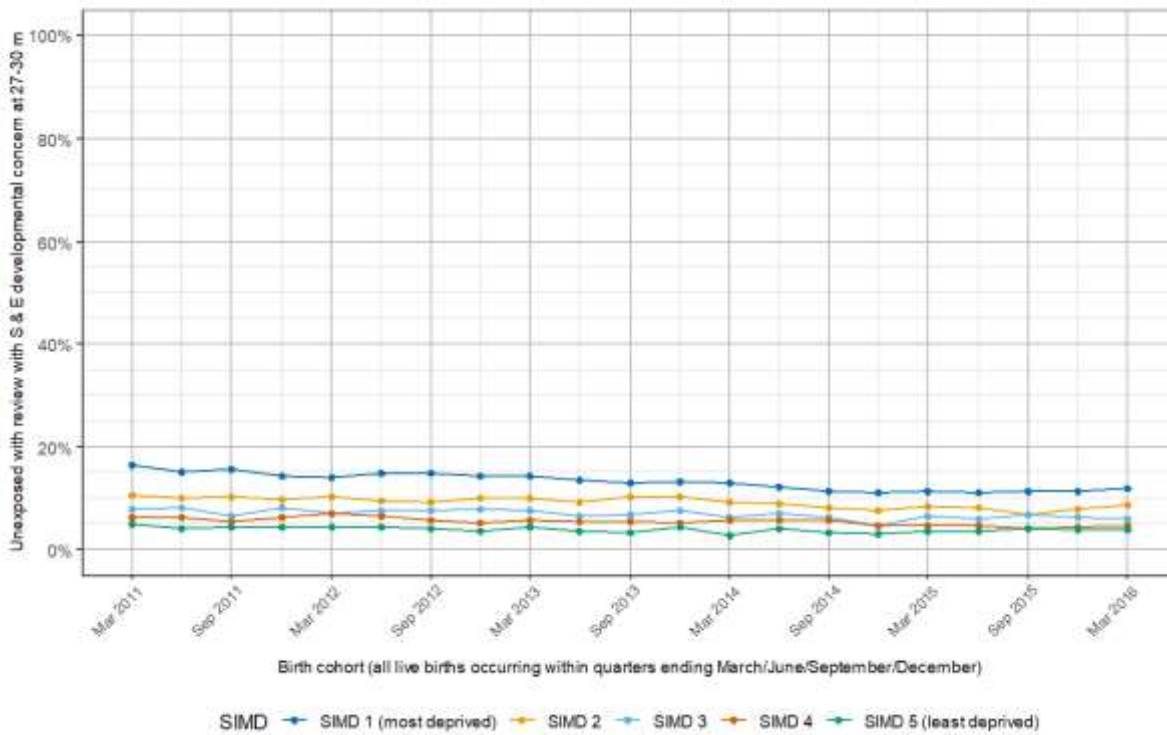


Figure 33 Percentage of totally unexposed birth cohort in which any concern about social and emotional development has been recorded at 27-30 months (Outcome 5c), stratified by SIMD



The third group of outcomes to be explored in the Phase 1 outcome evaluation report contribute baseline evidence to the research question: What impact has the implementation of the UHVP had on outcomes relating to child physical health for children aged up to three years? Child BMI and hospital admission for serious unintentional injuries are investigated in turn below.

Child BMI

(a) Scotland

Outcome 6a: Child at risk of overweight or obesity (BMI \geq 85th centile) at 27-30 months

Less than two-thirds (63.2%) of children had valid height and weight data that could be used to calculate their BMI recorded at the 27-30 month review (Table 25). This has increased over time, from 58.5% for children born in the quarter ending in March 2011 to 64.3% for children born in the quarter ending in March 2016, following a similar pattern to overall 27-30 month coverage (Figure 34).

Of those with valid data, 40.3% of children were at risk of overweight or obesity at 27-30 months (Table 25). Despite some fluctuation, this percentage remained reasonably constant for children born in the quarters ending between March 2011 and March 2016 (Figure 35). This proportion appears to be very high compared to levels of overweight and obesity in the P1 Scottish data, where 23% children in P1 (aged 4-5 years) were overweight or obese.⁸ This may reflect both use of the WHO growth standard (rather than the UK90 growth reference)⁹ for this age group, which is based on 'healthy breast-fed children in optimal conditions', and has a tendency to have higher levels of children falling into the overweight and obese categories,¹⁰ and possibly selective weighing of heavier children by health visitors.

Table 25 Number of totally unexposed children who were at risk of overweight or obesity (BMI \geq 85th centile) at 27-30 months (Outcome 6a), for Scotland level data

Variable	Children born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Number (%) of totally unexposed children with subsequent record of 27-30 month review	265,094	12,624 (90.5%)
Number (%) of totally unexposed children with valid height and weight data recorded	185,135	8,816 (63.2%)
Outcome 6a: Number (%) of totally unexposed children with valid data who are at risk of overweight or obesity (BMI \geq 85 th centile) at 27-30 months	74,644	3,554 (40.3%)

Figure 34 Coverage of 27-30 month review and percentage of those with valid data recorded on BMI at 27-30 months

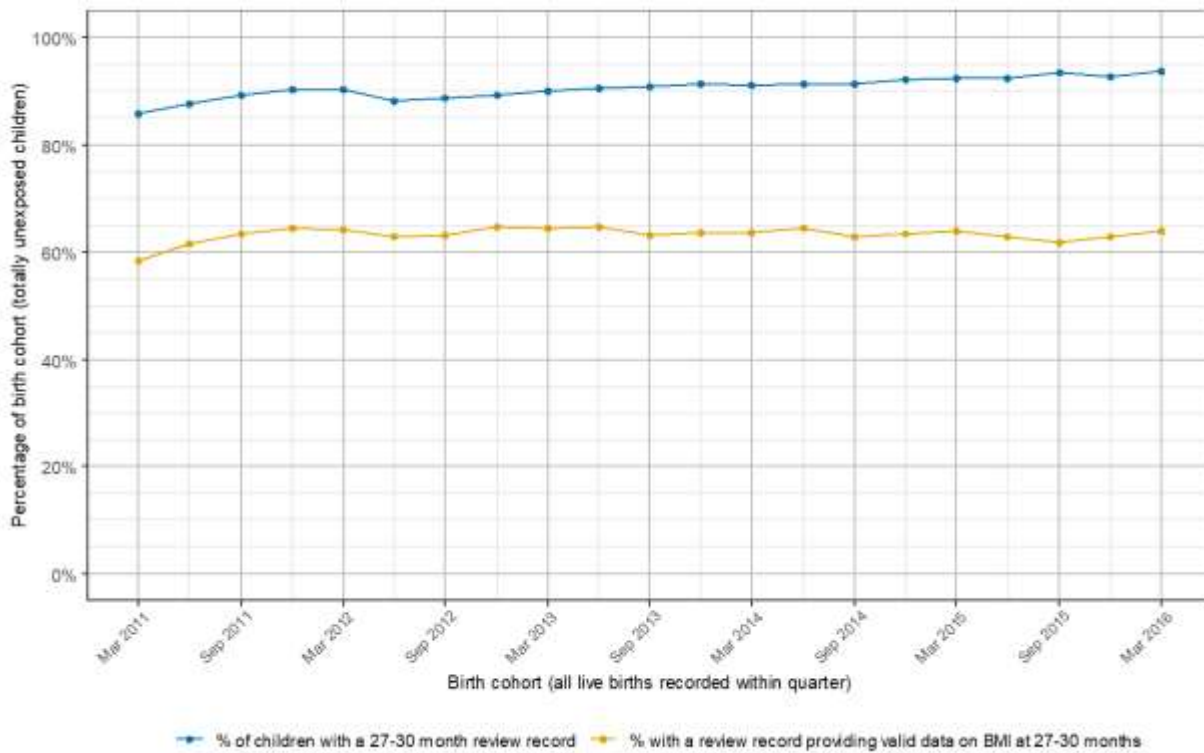
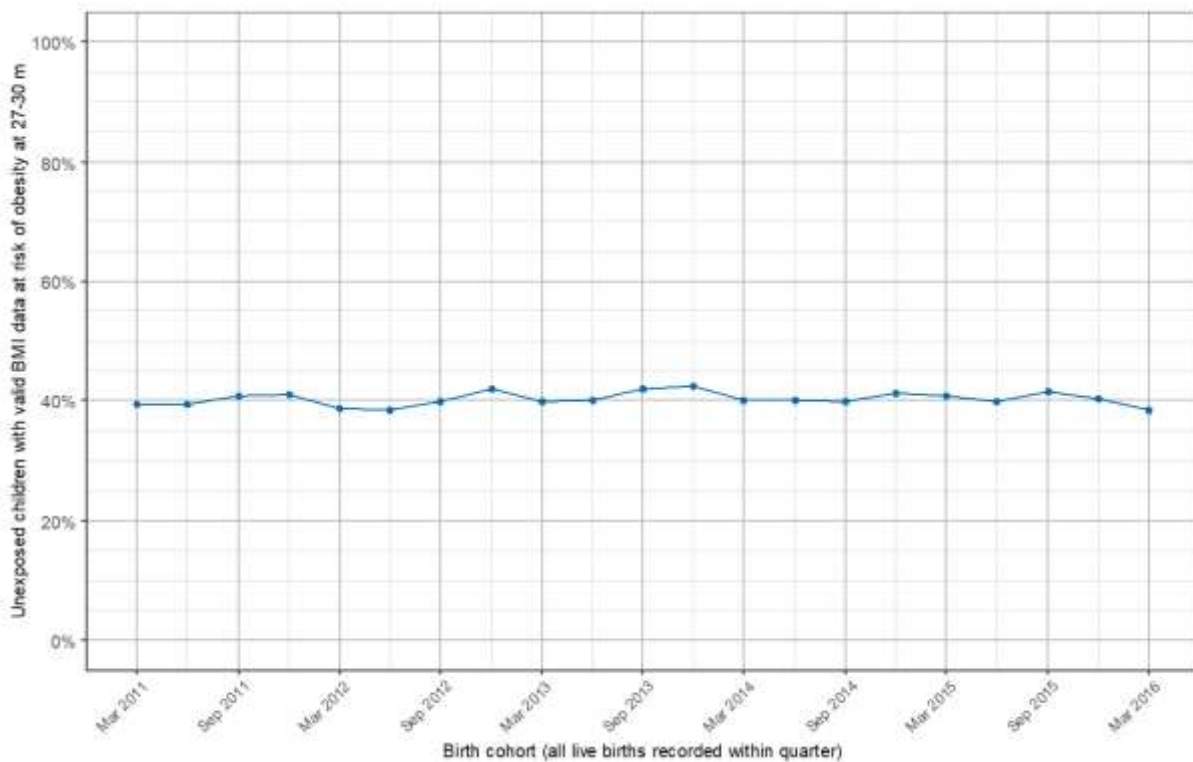


Figure 35 Percentage of totally unexposed birth cohort at risk of being overweight or obese (BMI \geq 85th centile) at 27-30 months (Outcome 6a)



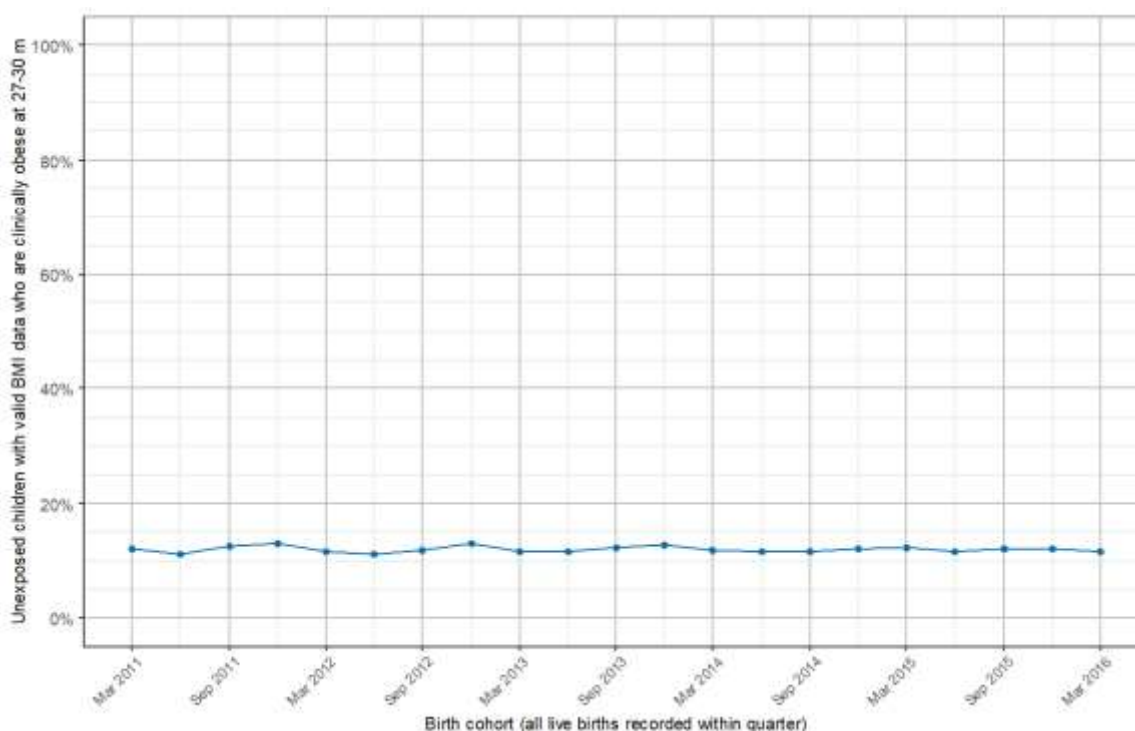
Outcome 6b: Child clinically obese (BMI $\geq 98^{\text{th}}$ centile) at 27-30 months

In terms of the percentage of children who are clinically obese (BMI $\geq 98^{\text{th}}$ centile) at 27-30 months, 11.9% children fell into this category overall (Table 26). Over the five-year period, the percentage of children who were clinically obese remained between 11.1% and 13.0% (Figure 36).

Table 26 Number of totally unexposed children who were clinically obese (BMI $\geq 98^{\text{th}}$ centile) at 27-30 months (Outcome 6b), for Scotland level data

Variable	Children born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Number (%) of totally unexposed children with subsequent record of 27-30 month review	265,094	12,624 (90.5%)
Number (%) of totally unexposed children with valid height and weight data recorded	185,135	8,816 (63.2%)
Outcome 6b: Number (%) of totally unexposed children with valid data who are clinically obese (BMI $\geq 98^{\text{th}}$ centile) at 27-30 months	22,095	1,052 (11.9%)

Figure 36 Percentage of totally unexposed birth cohort who are clinically obese (BMI $\geq 98^{\text{th}}$ centile) at 27-30 months (Outcome 6b)



(b) Scotland, stratified by SIMD

As with Outcomes 1, 4 and 5, a number of children were categorised as SIMD unknown because their postcode was missing. Again, the total number of children with a review whose SIMD is not known has been calculated as a percentage of the total number of children in Scotland. Similar percentages have been calculated for the numbers of children whose SIMD is not known with valid data, and with each outcome. The percentages are presented in Table 27 below. Once more, about 4% of the unexposed cohort were unable to contribute data to the SIMD analyses.

Table 27 Investigation of children with unknown SIMD for outcomes 6a and 6b

Description	Percentage with SIMD unknown
Number of 27-30 month reviews, where child SIMD is unknown	12,167
Number of children with valid height & weight data, where child SIMD is unknown	8,212
Outcome 6a: Number of totally unexposed children at risk of overweight or obesity (BMI \geq 85 th centile) at 27-30 months, where child SIMD is unknown	2,947
Of totally unexposed children at risk of overweight or obesity (BMI \geq 85 th centile) at 27-30 months, percentage where child SIMD is unknown	3.9%
Outcome 6b: Number of totally unexposed children clinically obese (BMI \geq 98 th centile) at 27-30 months, where child SIMD is unknown	841
Of totally unexposed children clinically obese (BMI \geq 98 th centile) at 27-30 months, percentage where child SIMD is unknown	3.8%

Outcome 6a: Child at risk of overweight or obesity (BMI \geq 85th centile) at 27-30 months by SIMD

Coverage of the 27-30 month review varies slightly by SIMD quintile, with those in the most deprived groups slightly less likely to receive their review than those in the least deprived group, although this fluctuates considerably over time (Figure 37). For a fuller description, see Outcome 4a: Primary carer current smoker at 27-30 months by SIMD above.

Children in the highest deprivation quintile were less likely to have valid height and weight data available (54.0% in the most deprived quintile, compared with 68.5% in the lowest deprivation quintile) (Table 28). Availability of BMI data by SIMD quintile was seen to fluctuate over time; however, an increase in levels of available data could be seen for all quintiles (Figure 38).

Interestingly, and varying from most other measures, there were no differences in the percentage of children at risk of overweight or obesity (BMI \geq 85th centile) at 27-30 months by SIMD quintile (Figure 39).

Table 28 Number of totally unexposed children who were at risk of overweight or obesity (BMI \geq 85th centile) at 27-30 months in the fully unexposed cohort (Outcome 6a), stratified by SIMD

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed children with subsequent record of 27-30 month review ¹	<i>n</i> %	65,568 85.8	53,890 86.4	47,416 84.6	46,424 87.3	43,435 90.2
Number (%) of totally unexposed children with valid height and weight, and hence BMI, recorded in 27-30 month review ¹	<i>n</i> %	41,302 54.0	36,952 59.2	34,230 61.1	34,482 64.8	32,957 68.5
Outcome 6a: Number (%) of totally unexposed children with valid data who are at risk of overweight or obesity (BMI \geq 85 th centile) at 27-30 months ¹	<i>n</i> %	16,626 40.3	15,130 40.9	14,029 41.0	13,897 40.3	13,303 40.4

Note

¹ Total number for quarters ending March 2011 to March 2016.

Figure 37 Availability of 27-30 month review for totally unexposed cohort, stratified by SIMD

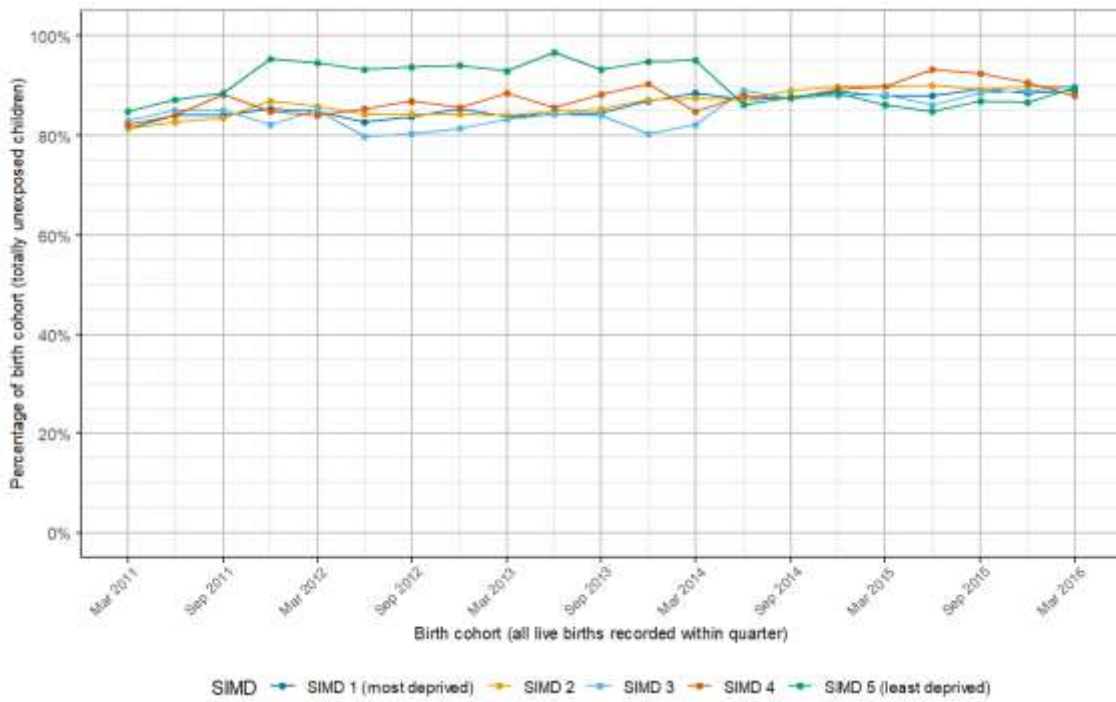


Figure 38 Availability of valid height and weight data recorded in 27-30 month review for totally unexposed cohort, stratified by SIMD

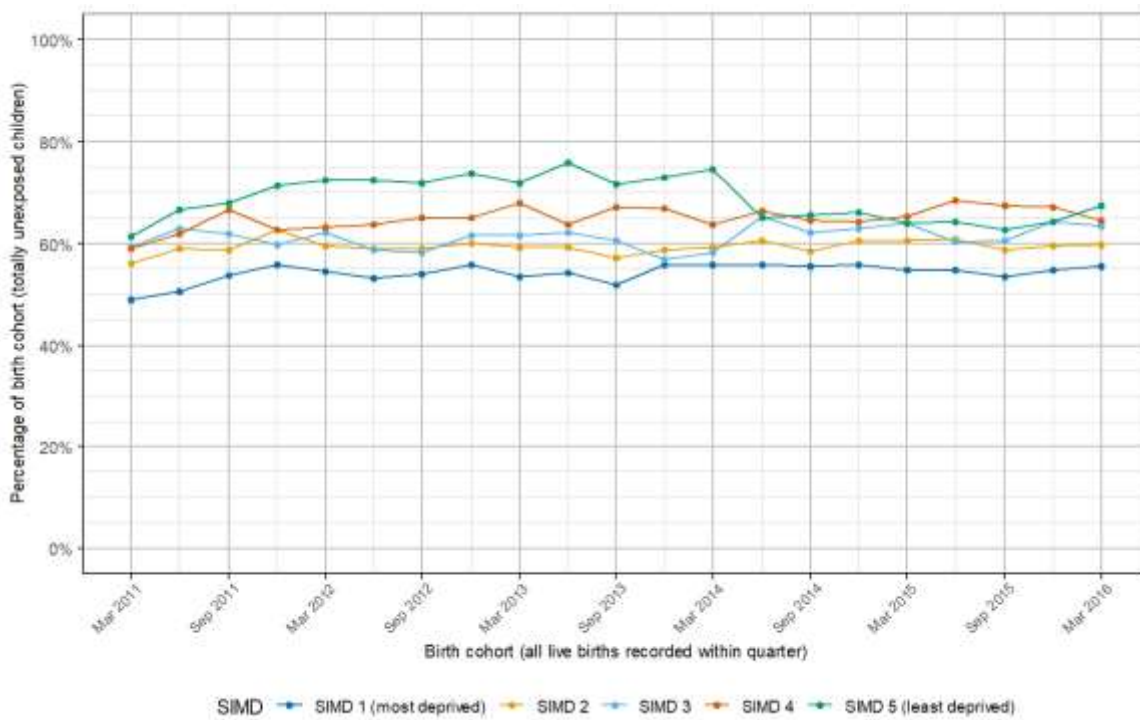
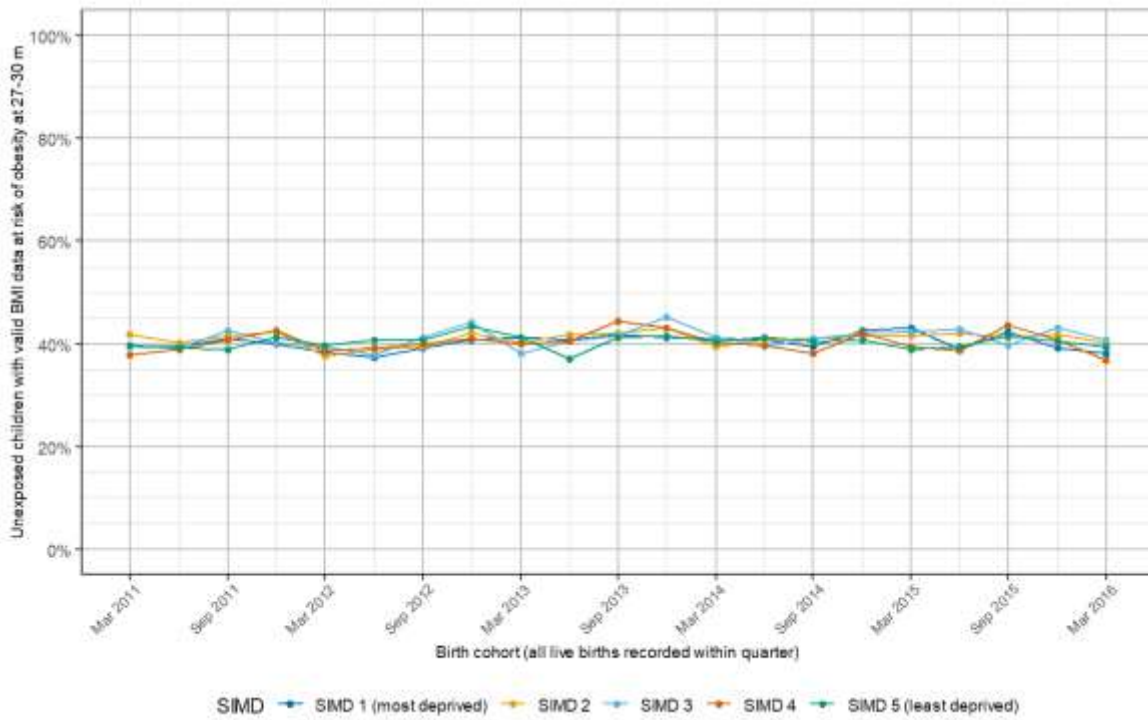


Figure 39 Percentage of totally unexposed birth cohort in which child at risk of being overweight or obese (BMI \geq 85th centile) at 27-30 months (Outcome 6a), stratified by SIMD



Outcome 6b: Child clinically obese (BMI ≥98th centile) at 27-30 months by SIMD

A slightly different picture emerged in relation to children who were clinically obese (BMI ≥ 98th centile) at 27-30 months, with children living in the most deprived quintiles being slightly more likely to be clinically obese (13.3%) than children in the least deprived quintiles (10.7%) (Table 29), a pattern also seen to a greater extent within the P1 obesity report.⁸ As Figure 40 demonstrates, despite some minor fluctuations, there was little difference seen in this outcome between children born in the quarters ending March 2011 and March 2016; the SIMD quintiles were generally intertwined, with a minimum value of 9.1% and a maximum of 14.5% across the quintiles.

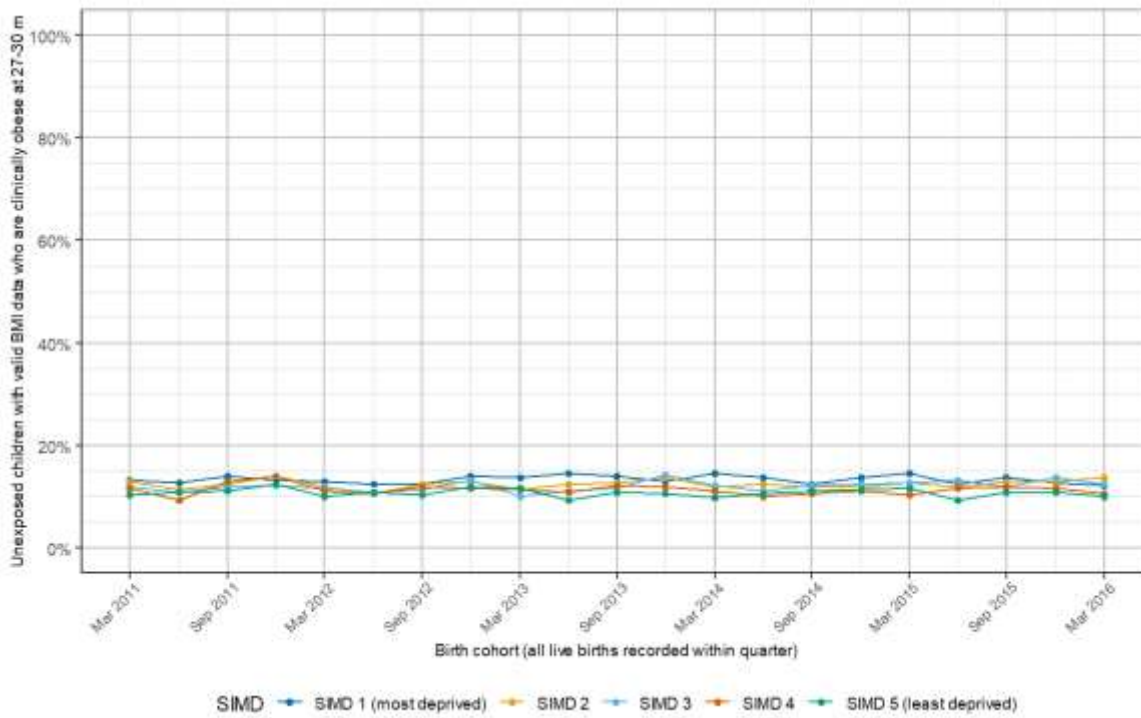
Table 29 Number of totally unexposed children who were clinically obese (BMI ≥ 98th centile) at 27-30 months in the fully unexposed cohort (Outcome 6b), stratified by SIMD

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Number (%) of totally unexposed children with subsequent record of 27-30 month review	<i>n</i>	65,568	53,890	47,416	46,424	43,435
	%	85.8	86.4	84.6	87.3	90.2
Number (%) of totally unexposed with valid height and weight, and hence BMI, recorded in 27-30 month review	<i>n</i>	41,302	36,952	34,230	34,482	32,957
	%	54.0	59.2	61.1	64.8	68.5
Outcome 6b: Number (%) of totally unexposed children with valid data who are clinically obese (BMI ≥ 98 th centile) at 27-30 months	<i>n</i>	5,502	4,590	4,108	3,919	3,533
	%	13.3	12.4	12.0	11.4	10.7

Note

¹ Total number for quarters ending March 2011 to March 2016.

Figure 40 Percentage of totally unexposed birth cohort in which child is clinically obese (BMI \geq 98th centile) at 27-30 months (Outcome 6b), stratified by SIMD



Unintentional injuries

(a) Scotland

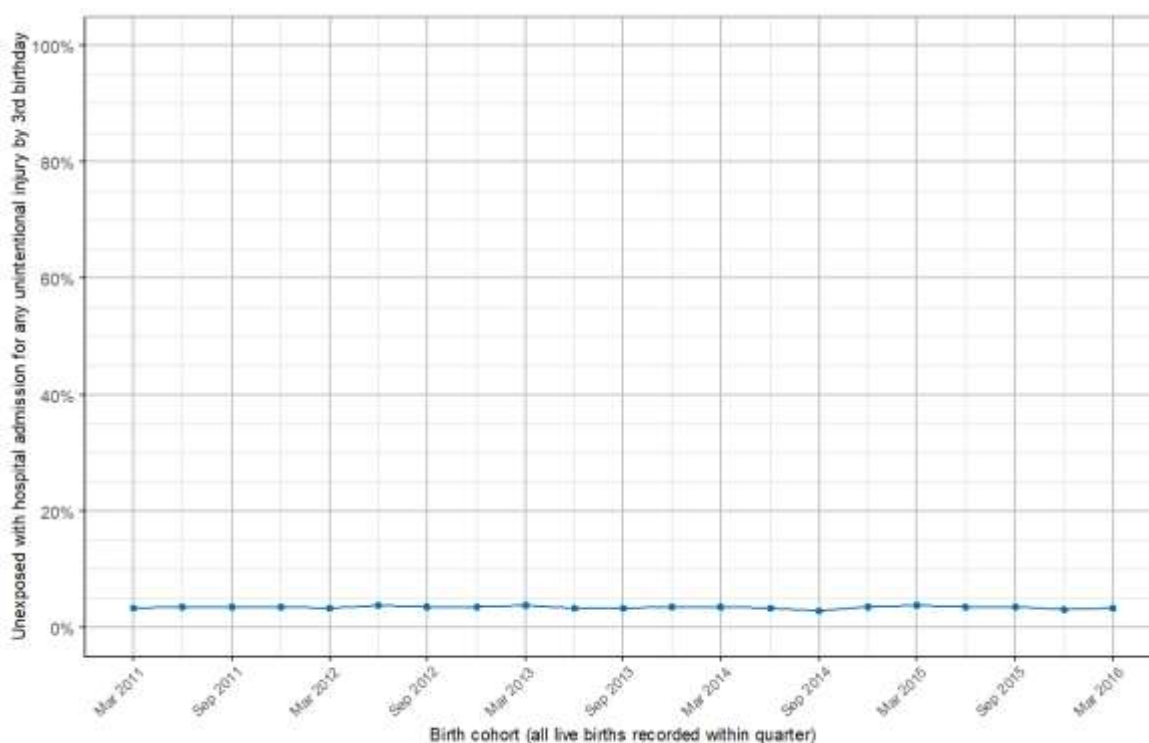
Outcome 7a: Any hospital admission for unintentional injury by 3rd birthday

Hospital admissions were explored using routinely collected hospital admissions data. Overall, 3.4% children had a hospital admission for any unintentional injury recorded by their third birthday (Table 30). There has been no change in this percentage for children born in the quarters ending March 2011 and March 2016 (Figure 41).

Table 30 Number of totally unexposed children who had any hospital admission for unintentional injury by third birthday (Outcome 7a), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Outcome 7a: Number (%) of totally unexposed children with any hospital admission for unintentional injury by 3 rd birthday	10,056	479 3.4%

Figure 41 Percentage of totally unexposed children who were admitted to hospital for any unintentional injury before 3rd birthday (Outcome 7a)



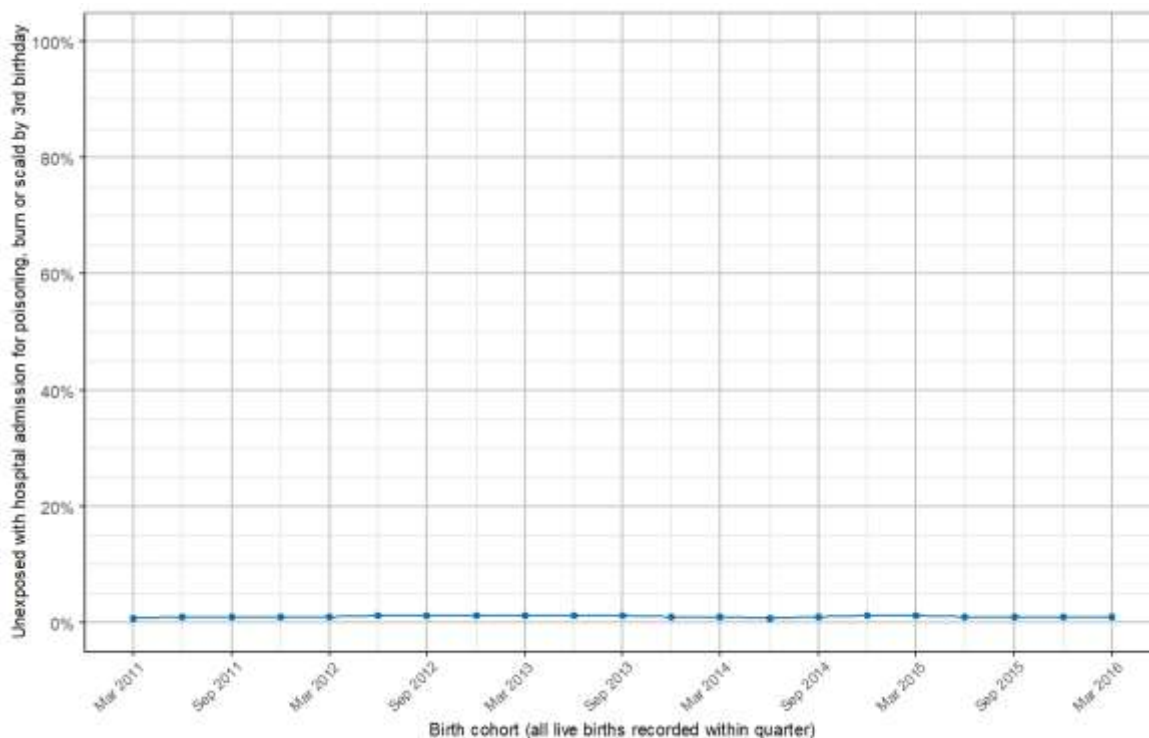
Outcome 7b: Any hospital admission for unintentional poisoning, burn or scald by 3rd birthday

When looking explicitly at the percentage of children admitted to hospital for unintentional poisoning, burn or scald by their 3rd birthday, data indicate that 1.0% of children experience this (Table 31). Again, there was no change demonstrated over time (Figure 42).

Table 31 Number of totally unexposed children who had any hospital admission for unintentional poisoning, burn or scald by third birthday (Outcome 7b), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Outcome 7b: Number (%) of totally unexposed children with any hospital admission for unintentional poisoning, burn or scald by 3 rd birthday	2,964	141 (1.0%)

Figure 42 Percentage of totally unexposed children who were admitted to hospital for any unintentional poisoning, burn or scald before 3rd birthday (Outcome 7b)



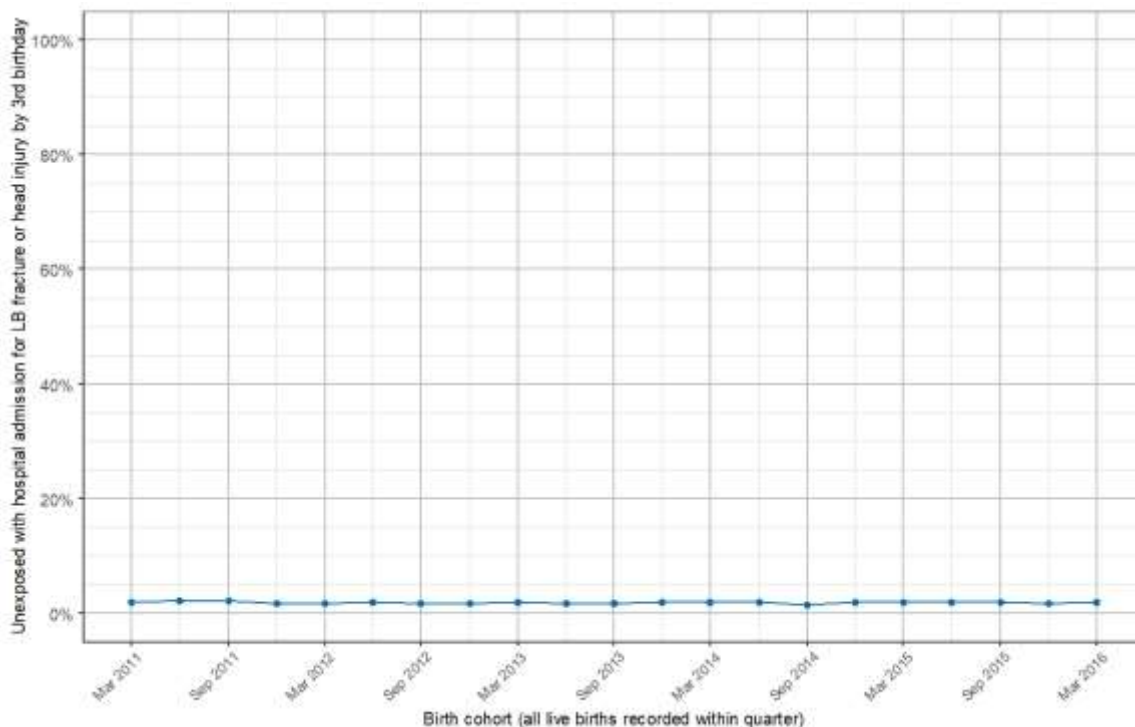
Outcome 7c: Any hospital admission for unintentional long bone fracture or head injury by 3rd birthday

Overall, 1.8% of children had a hospital admission recorded for unintentional long bone fracture or head injury by their third birthday (Table 32). There was no change to this figure for children born between 1 January 2011 and 31 March 2016 (Figure 43).

Table 32 Number of totally unexposed children who had any hospital admission for unintentional long bone fracture or head injury by third birthday (Outcome 7c), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	293,081	13,956
Outcome 7c: Number (%) of totally unexposed children with any hospital admission for unintentional long bone fracture or head injury by 3 rd birthday	5,302	252 (1.8%)

Figure 43 Percentage of totally unexposed children who were admitted to hospital for any unintentional long bone fracture or head injury before 3rd birthday (Outcome 7c)



(b) Scotland, stratified by SIMD quintile

For unintentional injury outcomes, children for whom SIMD could not be identified have been excluded. However, as presented in Table 33 below, for Outcome 7a, only 1.4% of children who were admitted to hospital for any unintentional injury by their third birthday had unknown SIMD; the percentages for Outcomes 7b and 7c were 1.6% and 1.8% respectively.

Table 33 Investigation of children with unknown SIMD for serious unintentional injury: Outcomes 7a, 7b and 7c

Description	Percentage with SIMD unknown
Outcome 7a: Number of totally unexposed children with any hospital admission for unintentional injury by 3 rd birthday, where child SIMD is unknown	145
Of totally unexposed children with any hospital admission for unintentional injury by 3 rd birthday, percentage where child SIMD is unknown	1.4%
Outcome 7b: Number of totally unexposed children with any hospital admission for any unintentional poisoning, burn or scald by 3 rd birthday, where child SIMD is unknown	49
Of totally unexposed children with any hospital admission for any unintentional poisoning, burn or scald by 3 rd birthday, percentage where child SIMD is unknown	1.6%
Outcome 7c: Number of totally unexposed children with any hospital admission for any unintentional long bone fracture or head injury by 3 rd birthday, where child SIMD is unknown	96
Of totally unexposed children with any hospital admission for any unintentional long bone fracture or head injury by 3 rd birthday, percentage where child SIMD is unknown	1.8%

Outcome 7a: Any hospital admission for unintentional injury by 3rd birthday by SIMD

When explored by SIMD, there was little variation between SIMD groups in the percentage of children who had been admitted to hospital for any unintentional injury by their third birthday: over the five years, mean percentages ranged from 3.1% (SIMD 4 and 5, less deprived quintiles) to 3.9% (SIMD 1, most deprived quintile) (Table 34). Although these differences are very small, this largely reflects that these are relatively rare outcomes, and the gradient seen by SIMD is in line with the literature which demonstrated that more disadvantaged children aged 0-5 years were at greater risk of any hospital admission for unintentional injury compared with less disadvantaged children.¹¹ Furthermore, as can be observed in Figure 44, for all SIMD quintiles the percentage of children who had been admitted to hospital for any unintentional injury by their third birthday was constant over the time period.

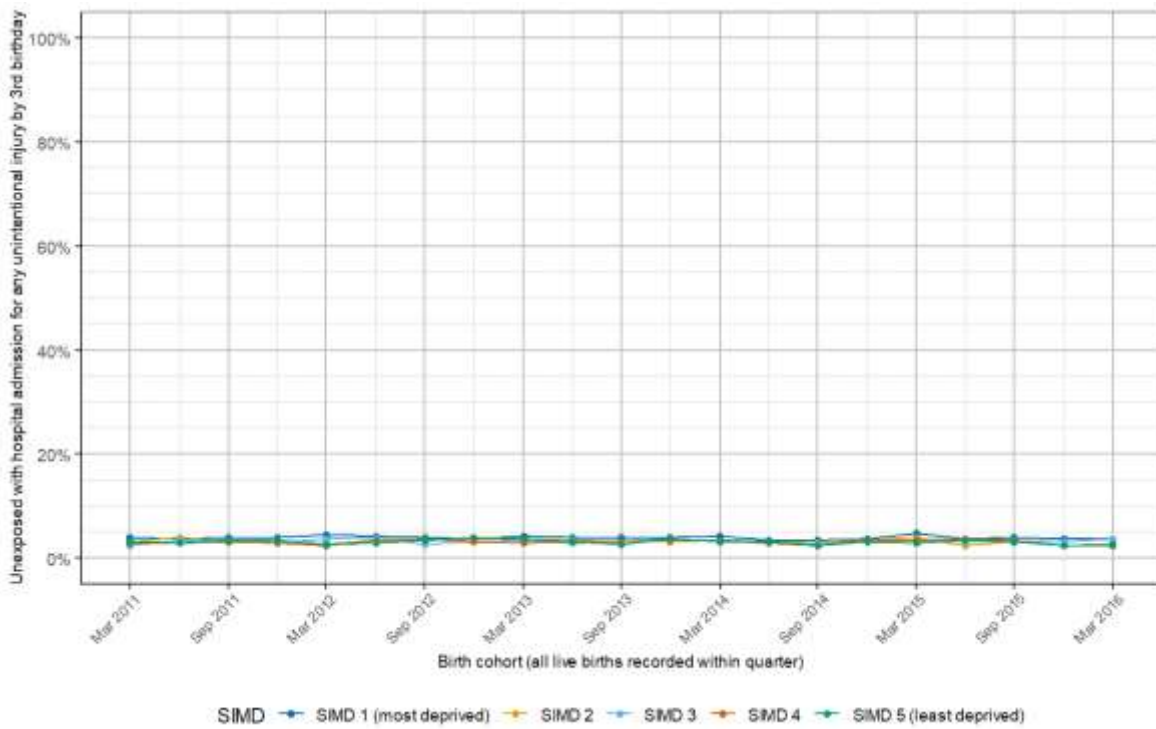
Table 34 Number of totally unexposed children with any hospital admission for unintentional injury by third birthday (Outcome 7a), stratified by SIMD

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Outcome 7a: Number (%) of totally unexposed children with any hospital admission for unintentional injury by 3 rd birthday ¹	<i>n</i> %	3,006 <u>3.9</u>	2,066 <u>3.3</u>	1,804 <u>3.2</u>	1,638 <u>3.1</u>	1,509 <u>3.1</u>

Note

1 Total number for children born in quarters ending March 2011 to March 2016.

Figure 44 Percentage of totally unexposed children who were admitted to hospital for any unintentional injury before 3rd birthday (Outcome 7a), stratified by SIMD



Outcome 7b: Any hospital admission for unintentional poisoning, burn or scald by 3rd birthday by SIMD

Again, there was very little variation between quintiles, when exploring the percentage of children with any hospital admission for unintentional poisoning, burn or scald by the third birthday: mean percentage of admissions over the five-year period varied from 0.8% (SIMD 5, least deprived quintile) to 1.3% (SIMD 1, most deprived) (Table 35). For children born in the quarter ending March 2011, the percentage with admissions for unintentional poisoning, burn or scald was 1.1% in the most deprived quintile and 0.7% in the least deprived quintile; similarly, for those born in the quarter ending March 2016, the respective percentages were 1.2% (SIMD 1) and 0.7% (SIMD 5). This was also constant across the time period (Figure 45).

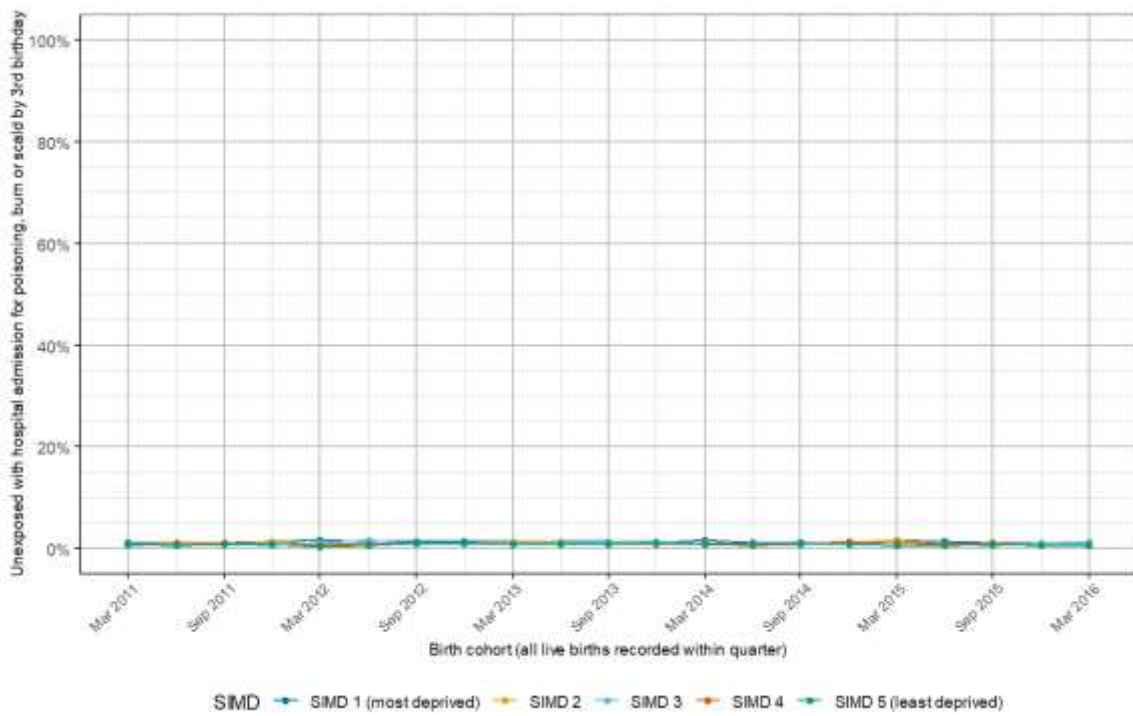
Table 35 Number of totally unexposed children with any hospital admission for any unintentional poisoning, burn or scald by third birthday (Outcome 7b), stratified by SIMD

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of children in totally unexposed cohort ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Outcome 7b: Number (%) of totally unexposed children with any hospital admission for unintentional poisoning, burn or scald by 3 rd birthday ¹	<i>n</i> %	959 1.3	640 1.0	516 0.9	467 0.9	366 0.8

Note

¹ Total number for children born in quarters ending March 2011 to March 2016.

Figure 45 Percentage of totally unexposed children who were admitted to hospital for any unintentional poisoning, burn or scald before 3rd birthday (Outcome 7b), stratified by SIMD



Outcome 7c: Any hospital admission for unintentional long bone fracture or head injury by 3rd birthday by SIMD

In relation to unintentional long bone fracture or head injury admissions by the third birthday, there was almost no difference between SIMD quintiles (1.92% in the most deprived quintile vs 1.79% in the least deprived quintile) (Table 36), again possibly reflecting more how rare these events are. There was little variation in any quintile for children born between between 1 January 2011 and 31 March 2016 (Figure 46).

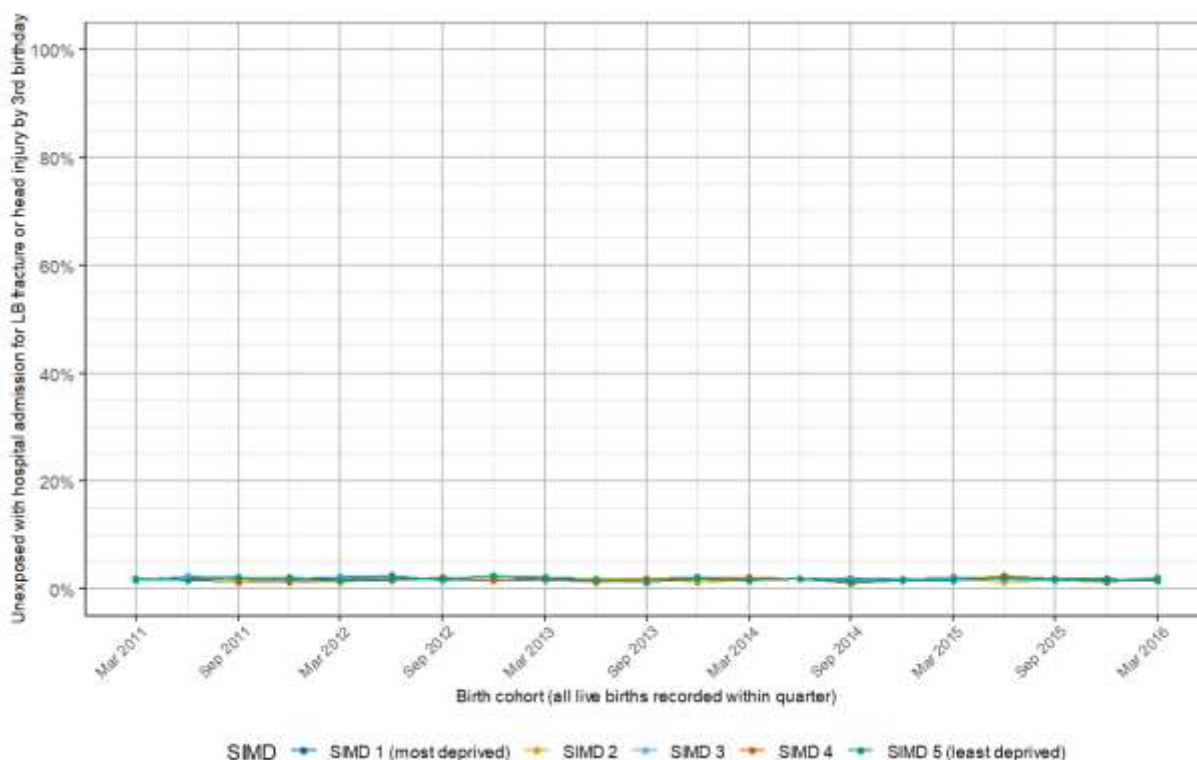
Table 36 Number of totally unexposed children with any hospital admission for any unintentional long bone fracture or head injury, by third birthday (Outcome 7c), stratified by SIMD

Description	<i>n</i> or %	SIMD 1 (most deprived)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (least deprived)
Number of totally unexposed children ¹	<i>n</i>	76,418	62,405	56,038	53,174	48,144
Outcome 7c: Number (%) of totally unexposed children with any hospital admission for unintentional long bone fracture or head injury by 3 rd birthday ¹	<i>n</i>	1,469	1,073	977	887	859
	%	1.9	1.7	1.7	1.7	1.8

Note

¹ Total number for children born in quarters ending March 2011 to March 2016.

Figure 46 Percentage of totally unexposed children who were admitted to hospital for any unintentional long bone fracture or head injury before 3rd birthday (Outcome 7c), stratified by SIMD



Child protection interventions

The final group of outcomes to be explored in this element of the evaluation focuses on child safety measures. These comprise Child Protection registrations, and Looked After Child (LAC) status, and were supplied by the Scottish Government Child Protection data, 2012-13 to 2018-19, and Children Looked After Statistics, 2008-09 to 2018-19. We will explore each of these in turn.

(a) Scotland

Outcome 8a: Placed on child protection register at any point between birth and 3rd birthday

The percentage of children placed on the child protection register (CPR) at any point between birth and their third birthday was explored. Overall, 2.7% of children were placed on the CPR during this time (Table 37). An increase could be seen, from 1.2% of children born in the quarter ending March 2011, rising to 3.5% of children born in the quarter ending March 2016. However, it should be borne in mind that individual-level child protection data records began on 1 August 2012; therefore for children in the first seven birth cohorts (i.e. born between 1 January 2011 and 30 September 2012), the percentages that were reported as having been placed on the CPR in their first three years are almost certainly underestimated, as some children will have been placed on the CPR before the individual level data recording began (see Appendix 1 for further detail) (Figure 47).

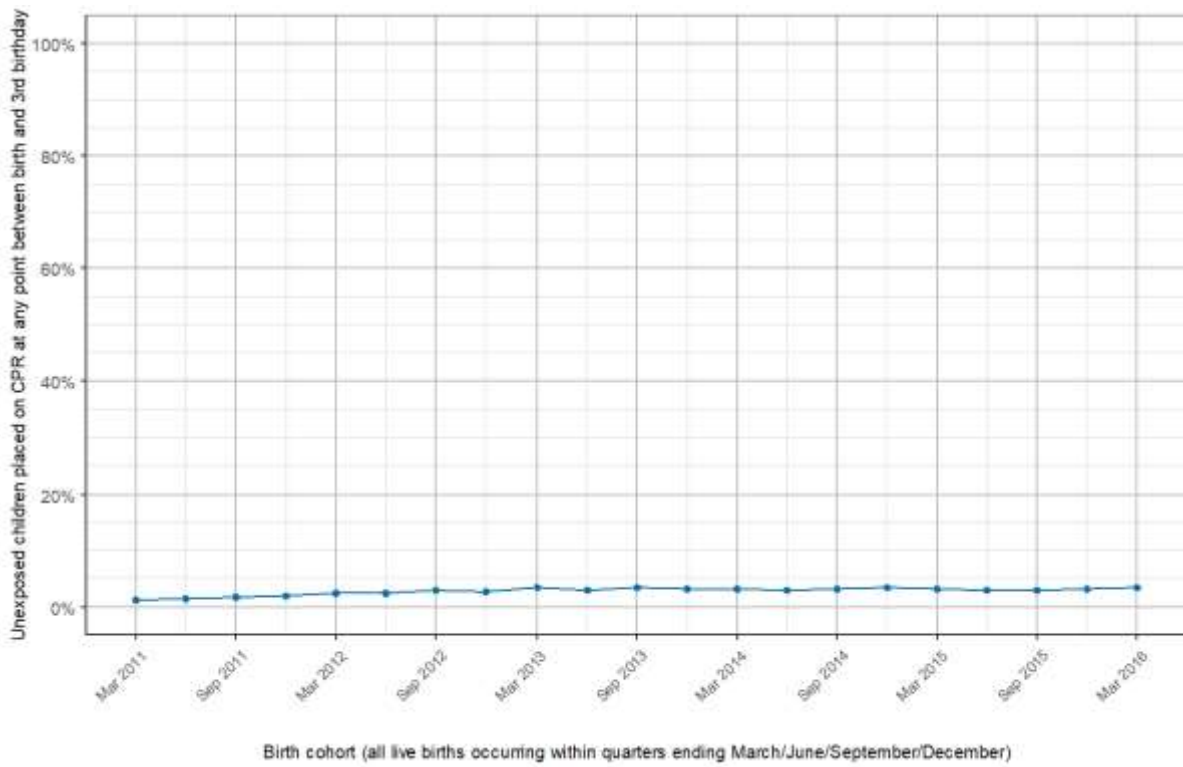
Table 37 Number of totally unexposed children placed on child protection register at any point between birth and third birthday (Outcome 8a), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	297,337	14,159
Outcome 8a: Number (%) of totally unexposed children placed on child protection register at any point between birth and 3 rd birthday	8,082	385 (2.7%)

Note

The total and mean number of children is slightly larger in the child safety outcomes because it was not possible to remove data for children who might have been partially exposed to the UHVP in Shetland and Tayside in the final four quarters and in Orkney in the final two quarters.

Figure 47 Percentage of totally unexposed birth cohort that has been placed on child protection register at any point between birth and 3rd birthday (Outcome 8a)



Outcome 8b: Placed on child protection register for ≥6 months between birth and 3rd birthday

To aid the interpretation of data about child protection registrations, data on the length of time spent on the register were additionally explored. For example, in Phase 2, following the implementation of the UHVP, and increases in home visits, one might anticipate greater detection of child protection cases, and this is not necessarily a negative outcome. However, it may be useful to analyse the data to look at whether, in intervening earlier, children might be less likely to stay on the Child Protection Register (or have Looked After Child status) for a longer period of time, hence the need to explore both the proportion of children on the register and the length of time spent on the register (i.e. whether this exceeds 182 days (6 months)).

It should be borne in mind that some children are placed on the CPR more than once between birth and their third birthday: for these multiple episodes, if the cumulative number of days on the CPR is greater than 182, then the child is considered to have spent at least six months on the CPR.

Overall, 1.3% children were placed on the child protection register for at least 6 months between birth and their third birthday (Table 38). This proportion also rose for children born in the quarters ending between March 2011 and March 2016, from 0.6% to 1.7% (Figure 48); however, again this may be due to changes in recording. As explained in Outcome 8a, it should be noted that individual-level child protection data records began on 1 August 2012; therefore for children in the first seven birth cohorts (i.e. born between 1 January 2011 and 30 September 2012), the percentages that were reported as having been placed on the CPR in their first three years are almost certainly underestimated, as some children will have been placed on the CPR before the data recording began (see Appendix 1 for further detail).

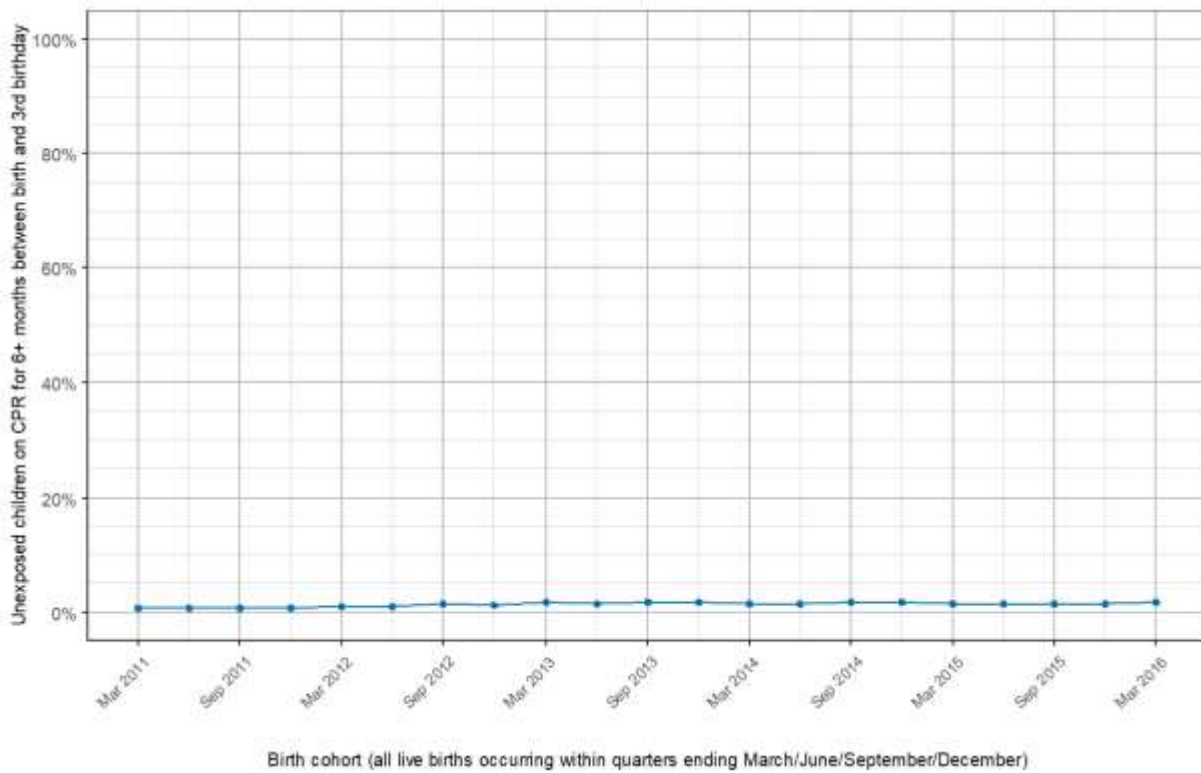
Table 38 Number of totally unexposed children placed on child protection register for ≥ 6 months between birth and third birthday (Outcome 8b), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	297,337	14,159
Outcome 8b: Number (%) of totally unexposed children placed on child protection register for ≥ 6 months between birth and 3 rd birthday	3,764	179 (1.3%)

Note

The total and mean number of children is slightly larger in the child safety outcomes because it was not possible to remove data for children who might have been partially exposed to the UHVP in Shetland and Tayside in the final four quarters and in Orkney in the final two quarters.

Figure 48 Percentage of totally unexposed birth cohort that has been placed on child protection register for ≥ 6 months between birth and 3rd birthday (Outcome 8b)



Looked After Child status

(a) Scotland

Outcome 9a: Registered as having Looked After Child status at any point between birth and 3rd birthday

Overall, 2.1% children had Looked After Child (LAC) status at some point between birth and their third birthday (Table 39 Table). This was constant over time (see Figure 49).

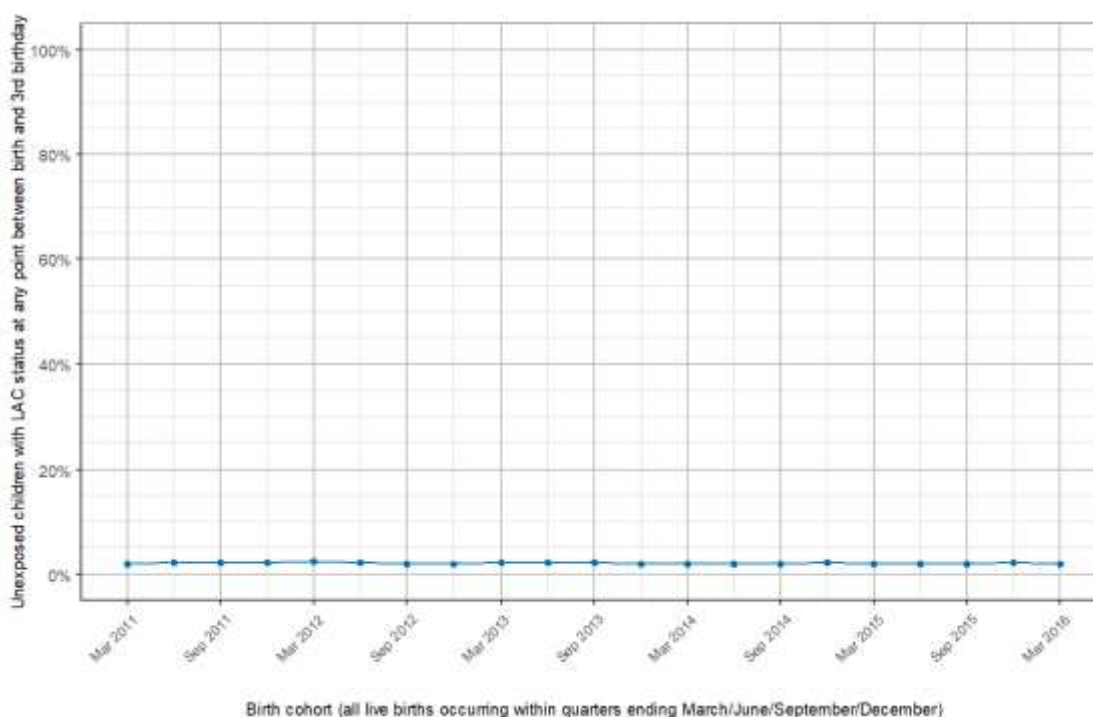
Table 39 Number of totally unexposed children registered as having Looked After Child status at any point between birth and third birthday (Outcome 9a), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	297,337	14,159
Outcome 9a: Number (%) of totally unexposed children registered as having Looked After Child status at any point between birth and 3 rd birthday	6,127	292 (2.1%)

Note

The total and mean number of children is slightly larger in the child safety outcomes because it was not possible to remove data for children who might have been partially exposed to the UHVP in Shetland and Tayside in the final four quarters and in Orkney in the final two quarters.

Figure 49 Percentage of totally unexposed birth cohort that have been registered with Looked After Child status at any point between birth and 3rd birthday (Outcome 9a)



Outcome 9b: Registered as having Looked After Child status for ≥6 months between birth and 3rd birthday

As described for the child protection registrations outcome above, some children have multiple episodes (i.e. some children are recorded as LAC or placed on the child protection register more than once between birth and third birthday). For LAC status; these episodes are summed, and if this exceeds 182 days they are considered to have been registered as LAC for six or more months between birth and 3rd birthday. The percentage of children with 'Looked After Child' status for six months or longer between birth and their third birthday was 1.8% (Table 40). This showed very little change between 2011 and 2016 (Figure 50).

For a small percentage of looked after children, records show them being in care at 31 July (academic year end), but they do not appear in the following data collection; for example, there is a record for them being looked after at 31 July 2015 (i.e. the end of the 2014/15 academic year), but no record of them being looked after exists in the 2015/16 data return. This probably happens when there is a time-lag between the child's records being updated and the data being submitted to the Scottish Government Child Looked After Statistics, and they actually ceased to be looked after at some point before 31 July. For calculating the time with looked after status for Outcome 9b, it has been assumed that such children were looked after until 31 July of the last extract in which they appeared; therefore the length of time that they have looked after child status may be slightly overestimated for a very small percentage of children.

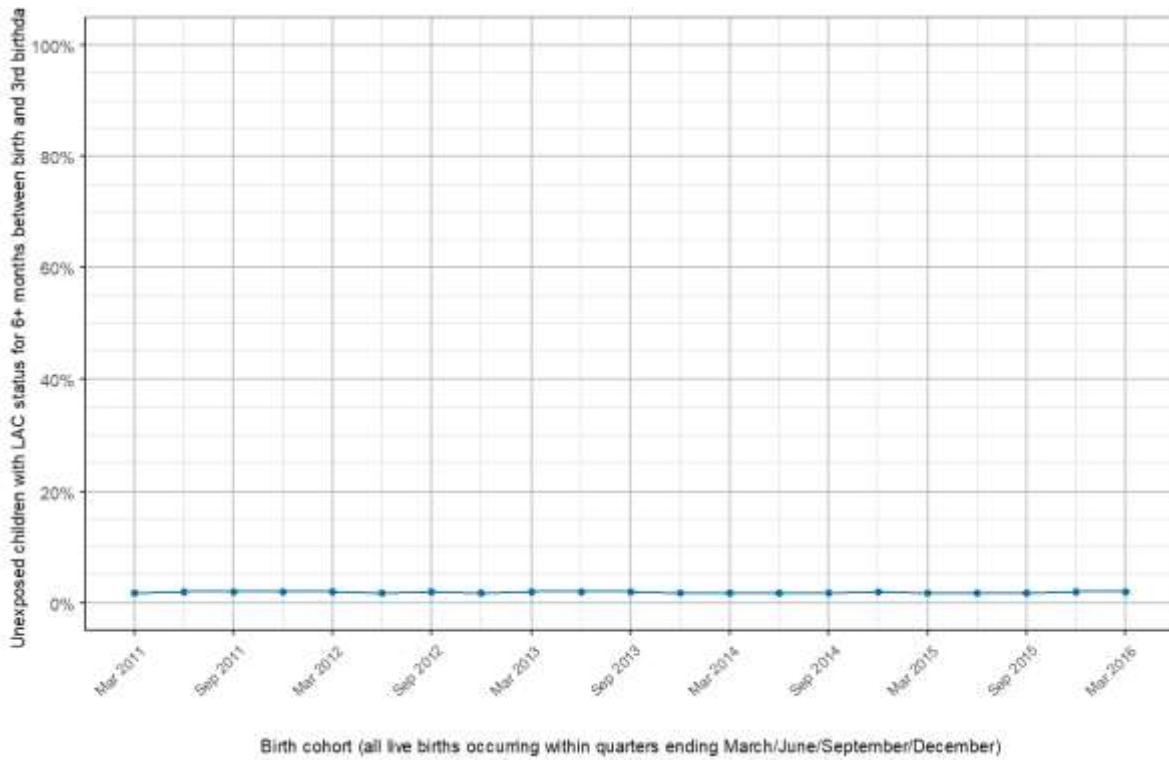
Table 40 Number of totally unexposed children registered as having Looked After Child status for ≥ 6 months between birth and third birthday (Outcome 9b), for Scotland level data

Variable	Babies born January 2011 to March 2016	
	Total	Mean for quarters ending March 2011 to March 2016
Number of totally unexposed children	297,337	14,159
Outcome 9b: Number (%) of totally unexposed children registered as having Looked After Child status for ≥ 6 months between birth and 3 rd birthday	5,374	256 (1.8%)

Note

The total and mean number of children is slightly larger in the child safety outcomes because it was not possible to remove data for children who might have been partially exposed to the UHVP in Shetland and Tayside in the final four quarters and in Orkney in the final two quarters.

Figure 50 Percentage of totally unexposed birth cohort that have been registered with Looked After Child status for ≥ 6 months between birth and 3rd birthday (Outcome 9b)



Conclusions

This report set out to ascertain baseline patterns of outcomes of children aged up to 3 years relating to (a) parental health-related behaviours; (b) child development; (c) child physical health; and (d) child safety, prior to the implementation of the Universal Health Visiting Pathway. Additionally, inequalities by deprivation level were explored (see Supplementary Table 2 in Appendix 3 below).

In terms of the parental health-related behaviours examined, signs can be seen of improvement in the percentage of children receiving exclusive or some breast milk, at age 6-8 weeks, dental attendance by age 2 years, and both parental smoking and child exposure to second hand smoke at 27-30 months. The proportion of children who have received all their childhood immunisations started, and remained, high, at 93.8%. Differences by SIMD quintile were found across all of these outcomes, with the exception of immunisations, where less variation was seen.

Overall, 17.9% children had a developmental concern of any kind recorded at 27-30 months, with a gradual decrease from 20.3% for children born in the quarter ending March 2011 to 15.2% for those born in the quarter ending March 2016. To a lesser extent, Speech, language and communication concerns and Social and emotional concerns were found to decrease over the same period. Substantial variation was seen by SIMD quintiles across all three developmental outcomes, with children in the most deprived quintiles being more likely to have concerns reported. Changes in data completeness were also seen; these occur at the time of the new version of the 27-30 month review form, on which several of the domain boundaries changed, and are at least partially likely to reflect the exclusion of Greater Glasgow and Clyde from the data due to that health board using a different developmental assessment.

The two physical development outcomes measured in the routine data related to (a) overweight and obesity, recorded at the 27-30 month review, and (b) unintentional injuries, explored up to the child's third birthday. Levels of overweight and obesity at this age were high, with two-fifths of children falling into this category, and 11.9% were considered to be clinically obese. This level of overweight and obesity appeared high, and possibly reflected the use of the WHO standard, rather than UK90, and/or selective weighing of heavier children by health visitors at this age. Data completeness for height and weight was poor, with fewer than two-thirds of children having height and weight available. Unlike almost all of the other outcomes measured, there was no variation by SIMD quintile in relation to being in the overweight or obese group, and only small differences within the 'obese only' group, with those from the most deprived areas being slightly more likely to be obese (excluding overweight) than those from less deprived areas for this age group. Levels of unintentional injuries were very low with 3.4% of children experiencing an unintentional injury at this age. No change could be seen in prevalence of any of the unintentional injury outcomes for children born between 1 January 2011 and 31 March 2016, and little discernible difference between deprivation groups, primarily due to the very small numbers of cases.

The final group of outcomes related to child safety, and encompassed child protection registrations and Looked After Child status. The percentage of children experiencing either

of these events was relatively low. The proportion of children with a child protection registration rose somewhat over the same period: from 1.2% in the birth cohort born in the quarter ending March 2011 to 3.5% in the cohort born in the quarter ending March 2016. However, this is likely to be due to changes in data recording rather than a 'true' difference.

Appendix 1

A. Outcomes recorded in child health reviews

Nine outcome measures were recorded in two child health reviews:

- infant feeding (Outcomes 1a and 1b) in the 6-8 week review, and
- in the 27-30 month review:
- parental / carer smoking (Outcomes 4a and 4b),
- developmental concerns (Outcomes 5a, 5b and 5c), and
- child's BMI (Outcomes 6a and 6b).

For all these outcomes, data quality was explored initially. First, the percentage of each birth cohort with the subsequent appropriate review was calculated. For example, for the infant feeding outcomes:

Percentage of children in specific birth cohort with subsequent record of 6-8 week review = (Number of children in that birth cohort with subsequent record of 6-8 week review / Number of live births in that quarter) x 100%

The percentage of each birth cohort with a 27-30 month review was similarly calculated for parental/carer smoking, developmental concern, and BMI outcomes.

Second, the percentage of the birth cohort with 'meaningful' data was computed. Again, for the infant-feeding outcomes:

Percentage of children in specific birth cohort with meaningful data for 'current feeding' = [Number of children in that birth cohort with meaningful data for 'current feeding' (i.e. B or F or M or O or U) / Number of live births in that quarter] x 100%

'Meaningful' or 'valid' data for these four outcome groups are defined as follows:

- 'Meaningful' data for the infant feeding outcomes are defined as either B (breast milk only), F (formula milk only), M (mixed breast and formula milk), O (other) or U (unknown).
- 'Meaningful' data for the smoking outcomes are responses 'yes' or 'no' to 'primary carer current smoker' (Outcome 4a) and 'child exposed to second hand smoke' (Outcome 4b).
- For the two BMI outcomes, 'valid' data was defined as the recording of both height and weight, to enable the child's BMI at age 27-30 months to be calculated. BMI is calculated as:

$$(\text{weight in kg}) / [(\text{height in m})^2]$$

- See subsection 'Developmental concerns' below for a description of the developmental-concern outcomes.

Infant feeding: outcomes 1a and 1b

Data source for all child health data is CHPS-PreSchool May 2020, Public Health Scotland, and for births is NRS.

The two outcome measures for infant feeding are:

- exclusive breast milk feeding at 6-8 weeks (Outcome 1a), and
- any breast milk feeding at 6-8 week (Outcome 1b).

They are calculated thus:

Outcome 1a = [(Number of children in specified birth cohort with 'current feeding' = B) / (Number of children in that birth cohort with meaningful data for 'current feeding')] x 100%

Outcome 1b = {[(Number of children in specified birth cohort with 'current feeding' = B) + (Number of children in specified birth cohort with 'current feeding' = M)] / (Number of children in that birth cohort with meaningful data for 'current feeding')} x 100%

Parental smoking: outcomes 4a and 4b

Data source for all child health data is CHPS-PreSchool May 2020, Public Health Scotland, and for births is NRS.

The two outcome measures for parental/carer smoking are:

- primary carer current smoker at 27-30 months (Outcome 4a), and
- child exposed to second hand smoke at 27-30 months (Outcome 4b).

These outcomes were calculated using a similar method to the feeding outcomes above.

Developmental concerns: outcomes 5a, 5b and 5c

Data source for all child health data is CHPS-PreSchool May 2020, Public Health Scotland, and for births is NRS.

The three developmental-concern outcome measures relate to a number of developmental domains, which changed slightly in 27-30 month reviews recorded from April 2017 onwards. Appendix Table 1 displays how the domains in the earlier reviews (undertaken before April 2017) map to the domains in the later reviews. The three developmental-concern outcome measures looked at as part of this evaluation are:

- any developmental concern at 27-30 months (Outcome 5a),
- any concern about speech, language and communication development at 27-30 months (Outcome 5b), and
- any concern about social and emotional development at 27-30 months (Outcome 5c).

Health visitors recorded N (no concerns), C (concern newly suspected), P (concern/disorder previously identified) or X (assessment incomplete) on the 27-30 month review form.

As with the other three groups of outcomes derived from CHSP-PS data, first the level of data recorded in each birth cohort for each developmental outcome was explored, and then the percentage of children with 'meaningful' data who have the outcome was calculated for each birth cohort.

For Outcome 5a (any developmental concern at 27-30 months), first the percentage with complete data for all the developmental concerns (that is, N, C or P recorded for each developmental domain) was calculated:

Percentage of children in birth cohort with complete data for 'development' =
[Number of children in specified birth cohort with complete data for
'development' (i.e. N or C or P) for each development domain / Number of
live births in that quarter] x 100%

The percentage of the birth cohort with any developmental concern at 27-30 months is:

Outcome 5a = [Number of children in specified birth cohort with C or P recorded
against any developmental domain / Number of children in that birth cohort
with complete data for 'development' (i.e. N or C or P) for each development
domain] x 100%

It should be noted that for some children, no developmental concern is noted, but some of the developmental-concern domains (see Appendix Table 1 **Error! Reference source not found.**) in the 27-30 month review are incomplete or missing:

Percentage of birth cohort who have no concern recorded, but data in some
domains are incomplete or missing = (Number of children in specified birth
cohort without a concern, but some domains incomplete or missing / Number
of live births in that quarter) x 100%

For Outcome 5b, any concern about speech, language and communication (S, L & C) development at 27-30 months, the two calculations are:

Percentage of birth cohort with meaningful data for 'S, L & C development' =
 [Number of children in specified birth cohort with meaningful data for 'S, L & C development' (i.e. N or C or P) / Number of live births in that quarter] x 100%

Outcome 5b = [Number of children in specified birth cohort with C or P recorded against S, L & C domain / Number of children in that birth cohort with meaningful data for 'S, L & C development' (i.e. N or C or P)] x 100%

For Outcome 5c, any concern about social and emotional (S & E) development at 27-30 months, the relevant domains for this outcome measure are:

- Social, Emotional, Behavioural and Attention domains for reviews provided between April 2013 and March 2017 (i.e. 16 birth cohorts from January-March 2011 to October-December 2014); and
- Personal/Social and Emotional/Behavioural domains for reviews provided from April 2017 onwards (i.e. 5 birth cohorts from January-March 2015 to January-March 2016).

Supplementary Table 1 How developmental domains in the earlier version of the 27-30 month child health review (April 2013 to March 2017) map to domains in the later version (from April 2017 onwards)

Reviews provided April 2013 – March 2017 (i.e. approximate birth cohorts January 2011 – December 2014)	Reviews provided from April 2017 onwards (i.e. approximate birth cohorts January 2015 – March 2016 in Phase 1)
Social*	Personal/Social*
Emotional*	Emotional/Behavioural*
Behavioural*	
Attention*	
Speech, Language & Communication	Speech, Language & Communication
Fine Motor	Fine Motor
Gross Motor	Gross Motor
Vision	Vision
Hearing	Hearing
n/a	Problem Solving

Note

*The domains preceded by an asterisk are those relating to Outcome 5c, any concern about social and emotional development at 27-30 months. There are four domains in the earlier version of the review form, and two in the later version.

Hence the two calculations for Outcome 5c are:

Percentage of birth cohort with meaningful data for 'S & E development' (each relevant domain) = [Number of children in specified birth cohort with meaningful data for 'S & E development' (i.e. N or C or P for each S & E domain) / Number of live births in that quarter] x 100%

Outcome 5c = [Number of children in specified birth cohort with C or P recorded against S & E domains / Number of children in that birth cohort with meaningful data for 'S & E development' (i.e. N or C or P)] x 100%

It should be noted that Greater Glasgow and Clyde (GGC) did not change to use the ASQ in line with other Health Boards. For this reason, developmental data for children from GGC is incomplete on the data systems.

BMI: outcomes 6a and 6b

Data source for all child health data is CHPS-PreSchool May 2020, Public Health Scotland, and for births is NRS.

Height and weight measurements recorded on the 27-30 month review form where the values were greater or less than 7 standard deviations from the mean value are considered 'extreme' values and have been excluded. BMI is calculated as:

$$\text{BMI} = \text{Body mass in kg} / (\text{Body height in m})^2$$

The two BMI outcomes are:

- Child at risk of overweight or obesity (BMI $\geq 85^{\text{th}}$ centile) at 27-30 months (Outcome 6a); and
- Child clinically obese (BMI $\geq 98^{\text{th}}$ centile) at 27-30 months (Outcome 6b).

These outcomes are calculated using a similar method to the feeding outcomes.

B. Other outcomes

Immunisations: outcome 2

Data source is Scottish Immunisation and Recall System (SIRS).

Longitudinal data at individual-child level are required to construct the immunisation-coverage outcome; hence the number of live births per quarter (which forms the denominator for Outcome 2) has been taken from SIRS and is restricted to children who had been registered for the Child Health Programme (CHP) between birth and second birthday.

Complete coverage of universal primary and end infancy immunisations by second birthday (Outcome 2) is defined as the child having received all of the following vaccines:

- 3 doses of the 5-in-1 (DOB up to 31 July 2017) or 6-in-1 (DOB from 1 August 2017) vaccine (provided at any point);
- 1 dose of pneumococcal (provided on or after 1st birthday);

- 1 dose of HiB/MenC booster (provided on or after 1st birthday); and
- 1 dose of MMR (provided on or after 1st birthday).

Outcome 2 = Percentage of children in specified birth cohort with complete immunisation coverage recorded on SIRS by 2nd birthday

$$= (\text{Number of children in birth cohort with complete immunisation coverage recorded on SIRS by 2nd birthday} / \text{Number of live births in that quarter}) \times 100\%$$

The Scottish Index of Multiple Deprivation (SIMD) has been used to categorise the data into population-weighted quintiles, based on the child's home postcode at the time of their second birthday. The SIMD version has been used according to the point in time when the children reached their second birthday. A small number of SIMD quintiles are missing/unknown due to missing postcode information.

The following versions of SIMD have been used:

- 2011 births (assessed in 2013): SIMD 2012;
- 2012-2014 births (assessed in 2014-2016): SIMD 2016;
- 2015-2016 births (assessed in 2017-2018): SIMD 2020v2.

Health Board boundaries change over time; Health Board of residence is based on the 2019 Health Board configurations for all time periods presented. A small number of Health Boards are missing or unknown due to missing postcode information and therefore the Health Board of residence could not be mapped for these records.

Dental care: outcome 3

Data sources are MIDAS, Public Health Scotland and NRS for births.

Outcome 3 is attendance at a dentist by the child's second birthday, and includes attendance at any NHS dentist providing general dental services: independent contractor 'high-street' dentists and the Public Dental Service are both included.

Outcome 3 = Percentage of children in the birth cohort who attended a dentist before 2nd birthday

$$= (\text{Number of patients in the birth cohort who attended a dentist before 2nd birthday} / \text{Number of live births in that quarter}) \times 100\%$$

Where the data are stratified by SIMD quintile, some children are excluded as their SIMD status could not be identified (see SIMD data subsection above in main text).

Unintentional injuries: outcomes 7a, 7b and 7c

Data sources are SMR01, ISD Scotland, PHS, and NRS for births.

Data for hospital admission for unintentional injuries were collected on discharge from non-obstetric and non-psychiatric hospitals (SMR01) in Scotland. The definitions for each of

the three outcomes using SMR01 emergency admission type and ICD10 codes for each outcome are listed in Appendix 2 below.

The data are a count of individuals, not a count of admissions: a patient could have had several emergency admissions in any year, but would only be counted once in our data. Data for NHS patients treated in non-NHS locations (for example, private hospitals, hospices, etc.) are incomplete.

Where the data are stratified by SIMD quintile, some children are excluded as their SIMD status could not be identified. SMR01 completeness varies across health boards, and where fewer than 5 children have an outcome, the values have been suppressed due to the potential risk of disclosure and to help maintain patient confidentiality.

The three outcomes are calculated as follows:

Outcome 7a = (Number of children in the birth cohort with any hospital admission for an unintentional injury by 3rd birthday / Number of live births in that quarter) x 100%

Outcome 7b = (Number of children in the birth cohort with any hospital admission for an unintentional poisoning, burn or scald by 3rd birthday / Number of live births in that quarter) x 100%

Outcome 7c = (Number of children in the birth cohort with any hospital admission for an unintentional long-bone fracture or head injury by 3rd birthday / Number of live births in that quarter) x 100%

Child Protection Register: outcomes 8a and 8b

Data source is Scottish Government Child Protection data, 2012-13 to 2018-19.

The two CPR outcomes are:

- Child placed on Child Protection Register at any point between birth and 3rd birthday (Outcome 8a); and
- Child placed on CPR for ≥ 6 months between birth and 3rd birthday (Outcome 8b).

They are calculated for each birth cohort as a percentage of live births within that quarter.

There are three important points to note, when looking at the results for Outcomes 8a and 8b. First, individual-level child protection data only began on 1 August 2012; no individual level records are held centrally before this date. As a result of this, recorded values for the number of children placed on the CPR for each of the first seven birth cohorts will be lower than the actual values, because children could have been registered before individual level data collection started.

Second, because of the start date for data collection of the individual level data, sometimes the first record is a de-registration – i.e. the child was registered before 1 August 2012, but only appears in the data when they are de-registered after that date. For these children, it is known that they were registered at some point, but the date of

registration is unknown. Thus for calculating Outcome 8b, Placed on child protection register for ≥ 6 months between birth and third birthday, it has been assumed that all these children were registered on 1 August 2012, even though it is probable that some were registered some time prior to that date.

The third point refers to the data in the final year, i.e. from April-June 2015 to January-March 2016. Individual level data relating to children placed on the CPR are available for Scotland, and have also been broken down to council (rather than health board) level. However, data values less than 5 are suppressed to avoid identification of children, and as a result, data are unavailable for many of the smaller councils. Therefore it has not been possible to remove from the dataset children who were born in Shetland and Tayside in the final four quarters of the time period or children born in Orkney in the final two quarters. Thus, approximately 4,256 of the 55,258 children born during this final year (7.7%) may have been partially exposed to the UHVP.

In summary, it should be borne in mind that the data values for the first seven birth cohorts for Outcomes 8a and 8b are almost certainly underestimated, and data values for the final year (i.e. four quarters) may include a small number of children who have been partially exposed to the UHVP.

For those children with multiple episodes on the CPR, the sum of the periods has been calculated in days. Thus for Outcome 8b, Placed on CPR for ≥ 6 months, the cumulative time the child has spent on the register may be more than 6 months (183 days), although they will not necessarily have spent a single consecutive six-month period on the register.

Children can be on the child protection register and looked after at the same time: for example, of the 2,599 children on the CPR at 31 July 2019, 551 had LAC status. It is probable that some of these instances may be due to the time-lag between a child becoming looked after and being de-registered from the CPR.

Data stratified by SIMD quintile are not available for child protection interventions, due to the potential risk of identification (see SIMD data section above).

Looked After Children: outcomes 9a and 9b

Data source is Scottish Government Children Looked After statistics, 2008-09 to 2018-19.

The two LAC outcomes are:

- Registered as having Looked After Child (LAC) status at any point between birth and 3rd birthday (Outcome 9a); and
- Registered as having LAC status for ≥ 6 months between birth and 3rd birthday (Outcome 9b).

Each outcome is calculated for each birth cohort as a percentage of live births within that quarter.

A small proportion of the records for Looked After children (LAC) show children as being in care at 31 July year X, but they do not appear in the following data collection (year X + 1); for example, some children are shown as having LAC status at 31 July 2015, but do not appear in the 2015-2016 data return. This seems to happen when there is a lag between

the child's records being updated and the data being submitted to ScotXed, suggesting that they ceased to have LAC status prior to 31 July. When calculating the time in care in such instances, it has been assumed that the child had LAC status until 31 July of the last data extract in which they appeared.

For those children with multiple episodes of care, the sum of the periods has been calculated in days. Again, for Outcome 9b, LAC status for ≥ 6 months, the cumulative time the child has been looked after may be more than 6 months (183 days), although they will not necessarily have spent a consecutive six-month period in care.

Children can be on the child protection register and looked after at the same time: for example, of the 2,599 children on the CPR at 31 July 2019, 551 had LAC status. It is probable that some of these instances may be due to the time-lag between a child becoming looked after and being de-registered from the CPR.

As with Outcomes 8a and 8b, data relating to children registered with LAC status are available for Scotland, and have also been broken down to council (rather than health board) level. However, data values less than 5 are suppressed to avoid identification of children, and as a result, data are unavailable for many of the smaller councils. Consequently, it has not been possible to remove from the dataset children who were born in Shetland and Tayside in the final four quarters of the imte period or children born in Orkney in the final two quarters. Thus, approximately 4,256 of the 55,258 children born during this final year (7.7%) may have been partially exposed to the UHVP. Therefore it should be borne in mind that the data values for the final year (i.e. four quarters) may include a small number of children who have been partially exposed to the UHVP.

Data stratified by SIMD quintile are not available for Looked After Child interventions, due to the potential risk of identification (see SIMD data section above).

Appendix 2

A. Codes for Outcome 7, any hospital admission for unintentional injury

Outcome 7a, Any hospital admission for any unintentional injury by 3rd birthday

Admission for an unintentional injury is defined as:

- SMR01 emergency admission types:
- 32: patient injury in Road Traffic Accident (RTA),
- 33: patient injury in home incident (including assault or accidental poisoning in the home),
- 34: patient injury in incident at work (including assault or accidental poisoning at work),
- 35: patient injury – other injury (including accidental poisoning other than in the home) (indicating injury admission);
- and the following ICD10 codes against main or other condition:
- S00-T78 (any injury or poisoning) +
- V01-V99 or
- W00-X59 (accidental injury).

Outcome 7b, Any hospital admission for unintentional poisoning, burn or scald by 3rd birthday

Admission for an unintentional poisoning, burn or scald is defined as:

- SMR01 emergency admission types:
- 32: patient injury in Road Traffic Accident (RTA),
- 33: patient injury in home incident (including assault or accidental poisoning in the home),
- 34: patient injury in incident at work (including assault or accidental poisoning at work),
- 35: patient injury – other injury (including accidental poisoning other than in the home) (indicating injury admission);
- and the following ICD10 codes against main or other condition:
- T36-T50 (poisoning due to drugs) or
- T51-T65 (poisoning due to other substances) +
- X40-X49 (unintentional poisoning) or
- T20-T32 (burns [including electrical] and scalds) +
- W85-99 or

- X00-X19 (unintentional burns and scalds).

Outcome 7c, Any hospital admission for unintentional long-bone fracture or head injury by 3rd birthday

Admission for an unintentional long-bone fracture or head injury is defined as:

- SMR01 emergency admission types:
 - 32: patient injury in Road Traffic Accident (RTA),
 - 33: patient injury in home incident (including assault or accidental poisoning in the home),
 - 34: patient injury in incident at work (including assault or accidental poisoning at work),
 - 35: patient injury – other injury (including accidental poisoning other than in the home) (indicating injury admission);
- and the following ICD10 codes against main or other condition:
 - S00-S09 (head injury),
 - S42 (upper arm),
 - S52 forearm,
 - S72 (femur),
 - S82 (lower leg),
 - or any of:
 - T02.2, T02.3, T02.4, T02.5, T02.6, T10, T12 (multiple / unspecified limb) +
 - V01-V99 or
 - W00-W64 (accidental injury) or
 - X58-X59 (accidental exposure).

Appendix 3

Supplementary Table 1 Summary of the results for Outcome groups 1-7 by deprivation: percentage of children in the least and most deprived quintiles and difference between these two quintiles

Outcome	Child born quarter ending	Percentage of SIMD 1 quintile with outcome of interest	Percentage of SIMD 5 quintile with outcome of interest	Percentage point difference between least and most deprived quintiles (SIMD 5 – SIMD 1)	Inequality widened / narrowed / same =<0.5 percentage point difference
1a Exclusive breast milk feeding at 6-8 weeks	March 2011 March 2016	13.68 16.64	39.85 45.37	26.17 28.73	Widened
1b Any breast milk feeding at 6-8 weeks	March 2011 March 2016	21.06 23.91	55.48 57.82	34.42 33.91	Narrowed
2 Complete coverage of universal primary & end infancy immunisations by 2 nd birthday	March 2011 March 2016	93.3 91.7	93.7 94.1	0.4 2.4	Widened
3 Any attendance at dentist by 2 nd birthday	March 2011 March 2016	56.90 60.18	72.72 74.50	15.82 14.32	Narrowed
4a Primary carer current smoker at 27-30 months	March 2011 March 2016	35.21 25.82	8.25 5.46	-26.96 -20.36	Narrowed
4b Child exposed to second hand smoke at 27-30 months	March 2011 March 2016	24.22 12.35	5.35 2.19	-18.87 -10.16	Narrowed
5a Any developmental concern at 27-30 months	March 2011 March 2016	27.92 21.85	12.11 8.37	-15.81 -13.48	Narrowed
5b Any concern about speech, language & communication development at 27-30 months	March 2011 March 2016	16.82 15.23	7.13 5.24	-9.69 -9.99	same
5c Any concern about social & emotional development at 27-30 months	March 2011 March 2016	16.42 11.85	4.98 3.80	-11.44 -8.05	Narrowed
6a Child at risk of overweight or obesity (BMI ≥85 th centile) at 27-30 months	March 2011 March 2016	39.46 38.07	39.55 39.47	0.09 1.40	Widened

Outcome	Child born quarter ending	Percentage of SIMD 1 quintile with outcome of interest	Percentage of SIMD 5 quintile with outcome of interest	Percentage point difference between least and most deprived quintiles (SIMD 5 – SIMD 1)	Inequality widened / narrowed / same =<0.5 percentage point difference
6b Child clinically obese (BMI $\geq 98^{\text{th}}$ centile) at 27-30 months	March 2011	13.12	10.30	-2.82	Narrowed
	March 2016	12.06	9.95	-2.11	
7a Any hospital admission for unintentional injury by 3 rd birthday	March 2011	3.94	3.24	-0.70	same
	March 2016	3.70	2.75	-0.95	
7b Any hospital admission for unintentional poisoning, burn or scald by 3 rd birthday	March 2011	1.08	0.71	-0.37	same
	March 2016	1.16	0.69	-0.47	
7c Any hospital admission for unintentional long bone fracture or head injury by 3 rd birthday	March 2011	1.99	2.00	0.01	same
	March 2016	1.55	1.56	0.01	

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