

**How can we use the community
services dataset (CSDS) for research
into health visiting?**

7th October 2020

Funding and authors

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This project is delivered as part of PHE's 2020/21 Life Course Intelligence business plan for child and maternal health in order to understand CSDS data quality and its suitability for further analysis to understand trends, variation and inequalities in health visiting and outcomes for children in the early years. An honorary contract with PHE enabled the researcher to work as part of the analytical team and analyse the CSDS for this purpose.

Ethics

Approved by UCL Institute of Education Research Ethics Committee on 01.05.20 (Ref 1333)

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THE COMMUNITY SERVICES DATASET (CSDS) DATA COMPLETENESS

2018 – 2019

The example of the 2 – 2½ year health visitor review

WHAT IS CSDS?

The CSDS captures community services activity in England including health visiting for individual children within all 151 Local Authority Areas in England (LAs).

Public Health England (PHE) recommend Health visitors review the health and development of all pre-school children in England at five key points

28 weeks pregnancy

0 – 14 days

6 – 8 weeks

9 – 12 months

2 – 2½ years

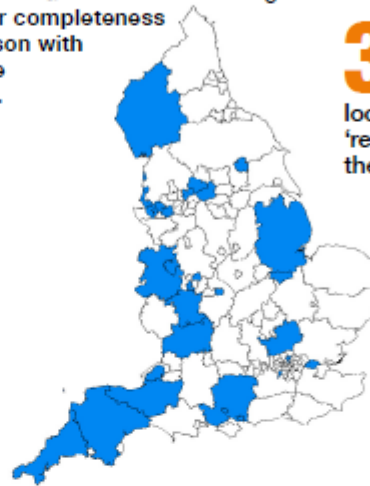
Data in whole-country CSDS is too incomplete to use for research on the mandated health visitor reviews. A 'research-ready' subset of CSDS can be identified using thresholds for completeness and comparison with two reference data sources.

33

local authorities had 'research-ready' data on the 2-2½ year review

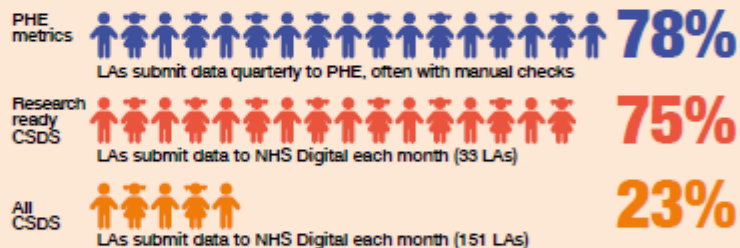
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local authorities in CSDS



Children in the 33 research-ready local authorities were **similarly deprived but less ethnically diverse** than all children in England.

Percentage of children with a 2 – 2½ year review.



CONCLUSIONS

- 1 Researchers and analysts should adapt our approach to identify 'research-ready' subsets of CSDS for research on children's contacts with health visiting teams, and use multiple data sources.
- 2 Despite limited generalisability, 'research-ready' subsets of CSDS are an important source of evidence about health visiting in England.
- 3 Despite its limitations, CSDS remains a critical data source for understanding health visiting in England.

Please cite as: Caroline Fraser, Katie Harron, Jane Barlow, Samantha Bennett, Geoffrey Woods, Jenny Shand, Jenny Woodman.
Infographic: The community services dataset (CSDS): data completeness 2018-9. The example of the 2-2½ year health visitor review.
Full report available at: www.ucl.ac.uk/children-policy-research/projects/how-can-we-use-community-services-dataset-csds-research-health-visiting

This study is funded by the National Institute for Health Research (NIHR) Policy Research Programme.
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Data Source: Community Services Dataset (CSDS), NHS Digital Copyright © 2020, Re-used with the permission of the NHS Digital. All rights reserved.

Experimental Statistics: Statistics based upon the CSDS are classified as experimental and should be used with caution. Experimental Statistics are official statistics which are published in order to involve users and stakeholders in their development and as a means to build in quality at an early stage. It is important that users understand that limitations may apply to the interpretation of this data.

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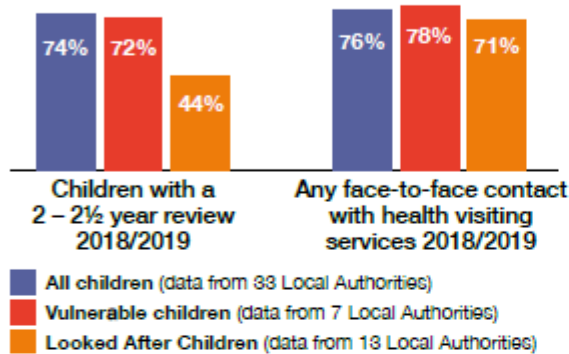
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THE 2-2½ YEAR HEALTH VISITING REVIEW AND VULNERABLE CHILDREN

2018 – 2019



Analyses of children who turned two in 2018/2019 using Looked After child and 'safeguarding vulnerability' codes in a small 'research-ready' subset of the Community Services Dataset 2018/2019.



Vulnerable children were **just as likely** to 'miss' a 2-2½ year review as other children.

Looked After children were **much more likely** to 'miss' their 2-2½ year review than other children but were **just as likely** to see a member of the health visiting team for any reason.

What is already known

Local Authorities do not systematically ensure their vulnerable children have a 2-2½ year review (1).

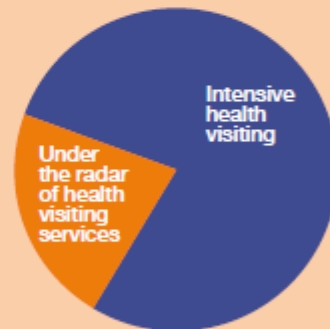
What this study adds

A sizeable minority (up to a third) of vulnerable children might not see a member of the health visiting team at all for any reason over a year.

However, the large majority of vulnerable children might be receiving intensive health visiting services, at least in some areas of England.

(1): Office of the Children's Commissioner, *Best Beginnings: A proposal for a new early years guarantee to give all children in England the best start in life* Children's Commissioner for England, Editor: 2020, London.

Vulnerable children 2018/2019



LIMITATIONS

We likely underestimated children with a 2-2½ year review but estimates of other face-to-face contacts are more robust. We only used information recorded in CSDS, which will miss many vulnerable children. We cannot confidently generalize from our small sample to all of England.

Please cite as: Caroline Fraser, Katie Harron, Jane Barlow, Samantha Bennett, Geoffrey Woods, Jenny Shand, Jenny Woodman.

INFOGRAPHIC: The 2-2½ year health visiting review and vulnerable children.

Full report available at: www.ucl.ac.uk/children-policy-research/projects/how-can-we-use-community-services-dataset-csds-research-health-visiting

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Executive Summary

Background

Health visitors are the lead for delivering the Healthy Child Programme and focus on promoting the health and development of young children, and preventing and mitigating the impact of adversity and inequalities in early childhood. Health visiting services are determined locally and health visiting contacts may be delivered by health visitors or other members of health visiting teams (e.g. community nursery nurses). The Community Services Dataset (CSDS) is a quantitative administrative dataset which includes records of health visiting contacts in England but is relatively new data, with outputs classified as 'experimental' (published in order to involve users in development and data quality). To our knowledge, CSDS has not yet been used for research.

Aims

This study investigates the data completeness of CSDS to assess how we can use it to investigate variation in frequency, type and location of health visiting contacts for different groups of children in England. We report on data completeness in CSDS and demonstrate the value of CSDS as a data resource using an illustrative example of the 2-2½ year child's development review (the 2-2½ year review).

Illustrative example of the 2-2½ year review

The 2-2½ year review is one of five health reviews that local authorities are mandated to commission for **all** children in England ('mandatory contacts/reviews'). Local authorities submit aggregate data to Public Health England (PHE interim health visiting service delivery metrics or 'PHE metrics'). PHE metrics report that while coverage is high, not all children are receiving the five recommended mandatory contacts from the health visiting service.¹ In July 2020, a report from the Office of the Children's Commissioner described the 2-2½ year review as a 'vital opportunity'² to identify and meet needs of children before they reach five years of age so they can start formal

education on a level footing with their peers. Yet, if PHE metrics are accurate, 1 in 5 children in England do not receive a 2-2½ year review at the right age. In this report, we use the 2-2½ year review as an illustrative example to demonstrate what we can learn about health visiting contacts from CSDS. We investigate how we can use CSDS to learn about the children who do and do not receive a 2-2½ year review, including whether they receive any other support from health visiting services.

Research Questions (RQ)

1. How does data in the CSDS compare to reference data?
2. Can we identify a 'research-ready' subset of CSDS for research on the 2-2½ year review?
3. What can we learn from the CSDS about the characteristics of children who receive a 2-2½ year review?
4. How are the 2-2½ year reviews delivered according to the CSDS (e.g. home visits, individual or group clinic appointments, face-to-face or phone calls)?

Methods

To assess completeness of the CSDS for the financial year 2018/19 we compared data on the mandated reviews to data obtained directly from three local authorities (Kent, East Sussex and Barking and Dagenham) and reference data (PHE metrics and Office for National Statistics [ONS] birth statistics).

We identified a subset of the CSDS which had sufficiently well-completed data for research on the 2-2½ year review. We called this subset 'research-ready' data. To identify the research-ready subset of data we developed two indicators based on correlation between CSDS and reference data (ONS births and PHE metrics):

- i) **Eligible children:** children born in 2018/19 in CSDS compared to ONS births
- ii) **2-2½ year reviews:** 2-2½ year reviews in CSDS compared to PHE metrics

Local authorities whose data in the CSDS were highly correlated with the reference data were included in our research-ready subset and used for analyses of the 2-2½ year review (RQ3&4). To assess how similar children in the research-ready subset of data were to all children in England, we compared the distribution of deprivation (IMD quintile) and ethnicity for children aged <5 years in the research-ready subset of data to all of CSDS, and compared all children in CSDS born in 2018/19 to data on ethnicity and deprivation from ONS births.

Using the research-ready subset of data, we calculated the proportion of children with a 2-2½ year review recorded in the CSDS, by available indicators of need and vulnerability: safeguarding vulnerability, index of multiple deprivation (IMD) quintile, Looked After Child status and ethnicity. In the same data, we analysed whether children had a contact with health visiting services at home or elsewhere, if the family was seen individually or in a group and duration of the contact in minutes.

Results

1. How does data in CSDS compare to reference data?

Both the number of eligible children (i.e. children born in 2018/19) and the number of mandated contacts were substantially under-recorded in CSDS compared to reference data, though this varied by local authority.

2. Can we identify a 'research-ready' subset of CSDS for research on the 2-2½ year review?

We identified 181,130 children in 33 local authorities with 'research-ready' 2018/19 data in CSDS for analyses of the 2-2½ year review. The proportion of children with a 2-2½ year in the 'research-ready' subset was closer to reference data but still an underestimate. Children in the 33 local authorities were similarly deprived but less ethnically diverse than all children in England.

3. What can we learn from the 'research-ready' subset of CSDS about the characteristics of children who receive a 2-2½ year review?

In CSDS 74% of children had a 2-2½ year review recorded in 2018/19 but this is likely an underestimate. When we include children aged 2-3 years with a record of an Ages and Stages Questionnaire (assessment tool used at the 2-2½ year review) our estimate increased to 81%.

We found that children with a 2-2½ year review recorded in CSDS were similar to those without a review, in terms of deprivation, ethnic group or whether the child had a safeguarding vulnerability recorded.

Looked After Children who were aged 2 years at the end of 2018/19 were slightly less likely than other children to have a contact with health visiting services (71% compared to 77%,) but they were much less likely to have a 2-2½ year review recorded (44% compared to 69%).

The majority of all children (76%), children with safeguarding vulnerabilities recorded (78%) and Looked After children (71%), who were aged 2 years at the end of 2018/19, had a record of a contact with health visiting services in CSDS, either for a 2-2½ year review or another reason. However, there remained a substantial proportion of all children (24%), children with safeguarding vulnerabilities recorded (22%) and Looked After children (29%) who were aged 2 (at the end of 2018/19) and did not have a record of either a 2-2½ year review or any other face-to-face contact. Most of these children who did not have a face-to-face contact had no other contacts (e.g. letter or telephone call) from health visiting services, suggesting no contacts were attempted. These estimates are uncertain due to: 1) limitations of the specification of the CSDS extract we used (imprecise age and only one year of data) and 2) probable under-ascertainment of the denominator population in CSDS.

Unlike other children, children with safeguarding vulnerabilities recorded and Looked After children who were aged 2 years at the end of 2018/19 and had contact with health

visiting services did so multiple times in the year (3 and 5 times on average, respectively). Contacts with health visiting services for children aged 2 (at the end of 2018/19) were more often at home for Looked After children (63%), children with safeguarding vulnerabilities (78%) and children living in the most deprived areas (38%) compared to all children (28%).

4. How are the 2-2½ year reviews delivered?

Across all levels of deprivation, most children (96%) had their 2-2½ year review face-to-face (rather than by telephone or video call). Group contacts were very rarely recorded in CSDS. Children living in deprived areas were more likely to have their 2-2½ year review at home (43%), compared to those living in less deprived areas (20%).

Conclusions

Complete national CSDS for 2018/19 cannot be used for research on children's contacts with health visiting services due to incomplete data on the mandated health reviews in most local authorities. We anticipate that improvements to completeness of data in CSDS will be gradual and incremental, meaning that a research-ready dataset approach will need to be employed for the foreseeable future.

However, researchers and analysts can access CSDS through NHS Digital and develop a 'research-ready' subset of their extract of CSDS which is sufficiently complete to generate hypotheses about children's contacts with health visiting services in England. This can be done by comparisons with reference data. The research-ready subset of CSDS will depend on the timeframe and aims of the research but is likely to be small and unrepresentative of both local authorities and children in England.

Due to limitations of our CSDS extract and CSDS, our results about the 2-2½ year review should be used as hypotheses to be tested, explored and extended. This should be done using a CSDS extract with multiple years of data and age of child in months linked to other health data and combined with local data and deep dives into practice, with collaborative work with the sector.

Our estimate that 76% of all children aged 2 in 2018/9 had a contact with health visiting services is likely an underestimate. We identified two groups of vulnerable and Looked After children: 1) a substantial minority who might be 'under the radar' of health visiting services, without contacts or records of attempted contacts (letters or calls) and 2) a majority with multiple face-to-face contacts in the year.

Despite data quality challenges, CSDS remains an important source of data available to build the evidence-base about health visiting in England. As data quality of CSDS improves, the data available for research will be larger, more generalisable for England and will support more robust conclusions.

Limitations

There is uncertainty around our estimates of the percentage of children receiving contacts as without a precise measure of age, we could not correctly identify when children were due the 2-2½ year review. Our estimates related to location of contact or group contacts, including differences between groups, are very uncertain due to high levels of missing data.

Recommendations

Researchers should adapt our approach to identify 'research-ready' subsets of CSDS which can be used for research on children's contacts with health visiting services, and use multiple data sources

NHS Digital should include age in months at care contacts for research into health visiting, consider adding additional validations during CSDS submission procedures, generate flags on CSDS data related to completeness, and with support from PHE, investigate common factors of local authorities that submit 'research-ready' data to CSDS.

Local authorities and providers should consider manual checks within the provider before data for CSDS is submitted to NHS Digital and prioritise the accuracy of records of children known to be vulnerable.

Background

The role of health visiting

Health visitors lead the delivery of the [Healthy Child Programme \(0-5\)](#) an evidence-based intervention programme which focuses on promoting the health and development of young children, and preventing and mitigating the impact of adversity and inequalities in early childhood.³ Health visiting services in England focus on six early years high impact areas which include: transition to parenthood, maternal mental health, breastfeeding, healthy weight, managing minor illness and accident prevention, and healthy 2 year olds and school-readiness.^{4, 5} Health visitors are registered nurses or midwives (who have undertaken an additional recordable Specialist Community Public Health Nursing qualification) whose work is supported by other members of health visiting teams, for example community nursery nurses, who may also deliver health visiting contacts.

Local authorities are required to commission delivery of the Healthy Child Programme which includes ensuring a minimum of five mandated health reviews for every child and family in England before the child is aged 5 years, in which health visitors or a member of their team will review the health and development of the child. The mandated reviews, also known as 'universal health reviews', are antenatal visit after 28 weeks of pregnancy, a new birth visit within 14 days, a 6 to 8 week review, a one year review and a 2-2½ year review.⁵ The universal reviews provide repeat opportunities for early intervention and health promotion and for health visitors to identify families who need extra support. However, health visiting services are not restricted to these five reviews, the level and frequency for each family is needs led so that families with greater needs have more contacts. Frequent contacts, with continuity of practitioner, allow health visitors and their team to identify issues and intervene early and to develop the relationships and trust with parents that are essential for helping parents negotiate the journey into and through parenthood.^{6, 7} Small scale studies suggest that health visitors and parents agree that home visits are best for health visitors' relational work with parents.⁶⁻⁸

The five mandated health reviews form the universal health visiting service, but families with greater need should receive the 'universal plus' or 'partnership plus' level of service.^{3, 5} Additional support in the universal plus service might take the form of extra conversations and advice for childhood illnesses, breast feeding support, infant feeding, sleeping, or child development concerns and/or referrals to specialist services for postnatal depression. In the partnership plus service, families who have complex and enduring problems such as parental substance misuse, parental mental health problems or domestic violence and abuse, health visiting services will receive a multiagency coordinated response which includes health visiting.⁹⁻¹³ Health visiting contacts can be delivered through home visits, individual or group clinic appointments, or phone calls and are supported by administrative activity such as letters to families.¹⁴ Health visitors review the child's health and development in the context of family health and environment, and offer support in a range of areas, signposting to community resources such as children's centres, child care and early years services.¹³

The context of health visiting services

Local delivery models for health visiting services will vary depending on local needs, budgets, workforce capacity and partnership or commissioning arrangements.^{2, 12, 15, 16} In some areas, local authority commissioners and service managers have been making difficult decisions about how to use scarce resources, with considerable variation in local need and wider service context (e.g. closure of Children's Centres).¹⁷ There is anecdotal evidence of service innovation to meet these challenges, including use of less qualified professionals, clinics instead of home visits, and groups instead of individual sessions.¹² In contrast, there are other areas that report significant investment in health visiting. For example, Blackpool who have prioritised universal preventative services by providing 8 mandatory health visitor contacts and up to 30 visits for vulnerable families, supported by the 'A Better Start' programme and additional funding for this enhanced service.¹² North Manchester is another example of additional investments to improve health visiting services, where breast feeding support has increased through funding from the Clinical Commissioning Group. The health visiting service in North Manchester now employs seven breast feeding specialists and provided 6,000 additional breast feeding support contacts.¹² The challenges of delivering health visiting services with targeted support for vulnerable families are likely to be exacerbated by the effects of lockdown and continued social distancing policies, implemented in 2020 to control the spread of COVID-19.¹⁸⁻²¹

Opportunities of the Community Services Dataset

There have been three evidence reviews to support delivery of the Healthy Child Programme for children under five years since local authorities took over commissioning of the Healthy Child Programme including health visiting services in 2015.^{6, 22, 23} Two reviews concluded that we need evidence on the impact of business-as-usual health visiting, including about 'dose' (number of contacts).^{22, 23} We would add that a first step is to describe current service provision of health visiting across all levels of service (from universal to complex need) for the under-fives in England. This would enable advocacy for health visiting, for example demonstrating the need for additional resources.

The most promising source of data to build the evidence-base about frequency, type and location of health visiting contacts for different groups of children in England is the Community Services Dataset (CSDS).²⁴ The CSDS is individual-level longitudinal administrative data from community services (including health visiting) across all of England since 2015, which means that it contains data on individual children's contacts with health visiting services across each child's pre-school period. The CSDS is operated by NHS Digital and providers of publicly-funded community services (including NHS trusts, private providers and the voluntary sector) are legally mandated to submit data. CSDS captures basic child characteristics, contacts with health visiting services (type, frequency, length, date) and a wider range of identified

needs in children. CSDS is the only child-level national source of information about health visiting (HV) but to our knowledge has not yet been used for research.ⁱ

Public Health England (PHE) report the percentage of children in England who receive each mandated health review and aim to use CSDS for this purpose, but quality and completeness of data in CSDS is not yet sufficient. PHE therefore set up the 'interim health visiting service delivery metrics', which we refer to as 'PHE metrics' in this report. The purpose of this data collection is to measure how many children receive each of the mandated health reviews and to evaluate the quality of data in CSDS. These aggregate data provide information on the numbers and proportion of children that received each of the five mandatory contacts (one antenatal and four in childhood) with health visitors each year across England and for each local authority. As child-level longitudinal data, CSDS has the potential to tell us much more than the PHE metrics, including which children receive each of the four mandated contacts in childhood and how patterns of health visiting contacts vary over the preschool period by local area and according to child characteristics such as deprivation and other indicators of need. We cannot use CSDS to learn about the mandated pre-birth contact, as there is no denominator for women in the last trimester of pregnancy in the dataset and the only information collected is date of contact. A key difference between CSDS and PHE metrics is that data are submitted to CSDS by service providers (e.g. NHS trusts), whereas local authorities (commissioners) submit data to PHE metrics.

Accurate descriptions of service activity can provide insight into how far local authorities are managing to provide both a universal and targeted health visiting service in a challenging context. CSDS could make an important contribution to the information that we need to understand health visiting and build an evidence-base that can inform decision-making at a local and national level. In-depth collaborative work with health visiting teams, commissioners, policy makers and families will also be needed to understand **why** we find certain patterns in a data source such as CSDS, including why these patterns vary between local authorities, and what different types of health visiting services mean for children and families.

ⁱ We did not find any published studies or reports using CSDS in two rapid scoping searches.

Search A) We used the terms "CSDS" and "Community Services Dataset" in Google and Google Scholar and as Title and Abstract terms in PubMed and Scopus, limited to studies in English since 2015. The search was last done on 24.08.20. The phrase "Community Services Dataset" was not found in either PubMed or Scopus.

Search B) We searched Google ("health visiting AND policy AND England"), PHE's website ("health visiting"), PubMed and Web of Science using: Title: ((health visit* OR (Healthy Child Programme) OR (proportionate universalism) OR (Building Blocks trial) OR (Family Nurse Partnership) OR "nurses, community health"[MeSH Terms in PubMed] OR ["health visitor" in subject topic in Web of Science]), limited to studies in English since 2010. This search was last run on 30.01.20.

The importance of understanding data quality

Large administrative datasets have limitations as well as strengths. Users of these data need to take account of data inaccuracies and incompleteness and gain proper insight into the meaning of data items so that analyses are sensibly designed and results appropriately interpreted. For long-running administrative health data, such as Hospital Episode Statistics or the Clinical Practice Research Datalink there exists a body of published work describing data quality and the relationship between data and what is happening on the ground.

The same published evidence-base does not exist for statistics based upon the CSDS, which is a relatively new dataset (established in 2015), with outputs classified by NHS Digital as experimental. Experimental Statistics are published to involve users and stakeholders in their development and build in quality at an early stage. NHS Digital advises users that experimental data should be used with caution and with an understanding that limitations may apply to the interpretation of these data. NHS Digital are working on improving CSDS data quality, with support from PHE (summary provided in Box 1).

Box 1: Data quality improvement work by NHS Digital in collaboration with PHE

PHE and NHS Digital continue to work together to improve recording of health visiting contacts in CSDS. In 2017/18, NHS Digital reported on health visiting from the CSDS at local authority level for the first time to enable PHE to compare CSDS data with PHE metrics and feedback findings to local areas. PHE and NHS Digital have ensured a joint approach has been taken to queries about data quality. PHE has led on questions relating to indicator definitions or specific data items and NHS Digital has responded to problems with submissions, rejected records and coding, but the two organisations have worked together to ensure queries are answered correctly and consistently.

A similar comparison was repeated for 2018/19 data. During this period, NHS Digital has communicated key messages to providers through newsletters, for example the importance of recording the correct “contact type” for health visits (e.g. whether it was a 2-2½ year review). In addition, NHS Digital publish routinely on data quality and field completeness at provider level which have been used to identify large errors with submissions affecting data for local areas.

There are several reasons why data may not be well recorded in CSDS. For example, data systems and codes used by health visitors to record their activity for their own professional practice are not always compatible with the data entry practices required for CSDS. This means that, for a specific local authority, local administrative data might be very accurate, but the data returned to CSDS for children in that local authority is incomplete or inaccurate. Providers of health visiting services submit data to CSDS directly, so data cleaning or management carried out by the local authority before submitting PHE metrics may not impact the quality of data submitted to CSDS.

This report is a first contribution to the evidence-base about data quality in CSDS, focusing on data completeness of health visiting activity. The first step to using administrative data sources, such as CSDS, is to produce reliable and robust evidence about service activity. We use an exemplar question about the delivery of the 2-2½ year review in 2018/9, to illustrate data completeness and what the CSDS can and can't tell us about health visiting activity in this year.

The illustrative example: 2-2½ year health visitor review

The PHE metrics report that while coverage is high, not all children are receiving the five recommended mandatory contacts with health visiting services. Of all the mandatory contacts, coverage of the 2-2½ year review is lowest: according to PHE metrics 22% of eligible children in England did not have a record of this contact in 2018/19.¹ This figure hides substantial variation across the country (27-97%).^{2, 25} The 2-2½ year review is the last of the mandated health reviews that all children should receive and was recently described by the Office for the Children's Commissioner (OCC) as a 'vital opportunity' to identify and meet needs of children before they reach five years of age so they can start formal education on a level footing with their peers.² Based on a literature review and an analysis of administrative education data, the same report concluded that 'the wider impact of starting school behind are significant and can be devastating to a children's progress and prospects.'^{2, 26} The report presents stark inequalities in development aged 5, which persist into the teenage years. In areas of greatest deprivation 1 in 5 children start school 'so far behind that they will struggle to ever catch up' and 40% of the very significant development gap between disadvantaged 16-years olds and their peers has already emerged by the age of 5.²

It is clear that the 2-2½ year review is an important contact with health visiting services and yet, if PHE metrics are accurate, 1 in 5 eligible children do not have a 2-2½ year review. This prompts questions. Are these contacts taking place but not captured in the data? Are the children without 2-2½ year reviews the most or least disadvantaged in their local areas? If the poorest, most disadvantaged and highest need children are most likely to 'miss' their 2-2½ year review, this could indicate a missed opportunity to address inequalities in child development in the early years. Conversely, if it is the most affluent and lower need children who do not have a 2-2½ year review, this may be a result of strategic decisions to target their scarce resources to families with the most serious levels of known disadvantage and need.

In this report, we use the 2-2½ year review as an illustrative example of what we can learn about children's contacts with health visiting teams from CSDS. We investigate to what extent we can use CSDS to learn about the children who do and do not receive a 2-2½ year review, including whether they receive any other health visiting support in their second year of life.

As we were writing this report, the Office of the Children's Commissioner published its own report on the early years, also focusing on the 2-2½ year review (17th July 2020).²⁶ For her report, the Children's Commissioner used her unique statutory powers to request data from all 152 local authorities in England.²⁷ In the discussion of this report, we compare the learning from the OCC report with our findings from CSDS.

Research Questions

1. How does data in CSDS compare to reference data?
2. Can we identify a 'research-ready' subset of CSDS for research on the 2-2½ year review?
3. What can we learn from CSDS about the characteristics of children who receive a 2-2½ year review?
4. How are the 2-2½ year reviews delivered according to CSDS (e.g. home visits, individual or group clinic appointments, face-to-face or phone calls)?

Methods and results

All technical detail and more detailed results are available in the appendices.

Data sources

Data from CSDS for the financial year 2018/19 was compared to data obtained directly from three local authorities (Kent, East Sussex and Barking and Dagenham) and reference data (PHE metrics and ONS births). Full details of the data sources are contained in Appendix 1.1.

The number of children born in 2018/19 and the number of children receiving new birth visits and 2-2½ year reviews were similar in reference data and local data from Kent and East Sussex (within 10%, Appendix 1, Table A1). This supports our use of the reference data to evaluate completeness of data in CSDS.

1. How does data in CSDS compare to reference data?

Methods

To assess to what extent CSDS contained the number of children that we would expect (children 'eligible for health visiting services'), we compared the number of births in 2018/19 for each local authority in our CSDS extract and as reported by the Office for National Statistics (ONS births, reference data 1). To assess how far CSDS contained the numbers of mandated health reviews that we might expect, we compared the proportion of children with a record of a 2-2½ year review in the CSDS extract with and PHE metrics (reference data 2). We made the same comparison for the other mandated health reviews, but for simplicity only present results for 2-2½ year review (main report) and the new birth visit.

Results

Key finding: both the number of children eligible for health visiting and the number of health visiting contacts were substantially under-recorded in CSDS compared to reference data (Table 1).

Table 1: Comparison of new birth visits and 2-2½ year reviews recorded in CSDS versus reference data (PHE metrics and ONS births) for all of England

	Number of children (% of all eligible ¹)	
	Reference data (149 LAs)	CSDS (149 LAs)
With a new birth visit ¹	597,831 (98%)	151,217 (29%)
With a 2-2½ year review ¹	521,528 (78%)	146,993 (23%)
Record of birth in 2018/19	621,904	519,949

¹ Children eligible for new birth visit in CSDS were those born in 2018/19, for PHE metrics it was those aged up to 30 days of age in 2018/19; children eligible for 2-2½ year review in PHE metrics were those who turned 2 years in 2018/19, we could not calculate this in CSDS due to lack of age measure so estimated by subtracting number of children who had contact aged 3 from number of children aged 2 (based on age at end of 2018/19). Full methods in Appendix 2.

The number of infants (aged <1 year) in CSDS 2018/19 was lower than we would expect based on the reference data (ONS births), but varied by local authority with high agreement between the two data sources for many local authorities in England (Figure A1, Appendix). On average, we found that the CSDS extract had 16% fewer births recorded than the same period in the reference data (ONS births). However, our methods underestimate true difference because we could not account for children born outside England (not captured by ONS births data) but move to England within their first year of life (should be captured by CSDS).

The under-recording of mandated reviews was highly variable across local authorities, with many areas having almost no new birth visits or 2-2½ year reviews recorded in the CSDS extract (Appendix 1, Figure A1). Based on a comparison of new birth visits and 2-2½ year reviews in Kent and East Sussex across three data sources (the CSDS extract, PHE metrics and the local data), it seems that differences are due to translation of data into CSDS, rather than issues with local data capture. For example, Kent had just over 14,800 2-2½ year reviews recorded in both the local and reference data but only 60 2-2½ year reviews recorded in CSDS for the same time period. In other words, the CSDS data for Kent is 'missing' records of >14,000 2-2½ year reviews, which are captured in two other data sources.

Conclusions

The whole-of-England CSDS 2018/19 is too incomplete to be used for research on either the 2-2½ year review or other mandated health reviews. Unpublished data from PHE show improvements in data quality over time, therefore this conclusion should also apply to CSDS prior to 2018/19.

Appendix 1.2 contains technical details and more detailed results for research question 1.

2. Can we identify a ‘research-ready’ subset of CSDS for research on the 2-2½ year review?

Methods

We developed and applied methods for identifying a subset of ‘research-ready’ CSDS data which was sufficiently complete to use for analyses of the 2-2½ year review. We created two indicators to measure the agreement between CSDS and reference data and then applied thresholds of data agreement to categorise local authorities as having high, moderate or low correlation with reference data (high correlation thresholds shown in Table 1). We describe data that falls within the ‘high correlation’ category as ‘research-ready’.

Table 2: thresholds for identifying research-ready ('high correlation') local authorities

Indicators	High correlation threshold
(i) Eligible children: Agreement between the number of children aged 0 at the end of the reporting year in CSDS and ONS births	- 10% to +20%
(ii) 2-2½ year reviews: Agreement between the number of children with a 2-2½ year review in CSDS and PHE metrics	-15% to +15%

We demonstrated how results varied using the research-ready (high correlation) subset of local authorities compared with all local authorities by calculating the percentage of children in CSDS who had a record of the new birth visit and 2-2½ year review using the high correlation group only and all of CSDS. To assess how similar children in the research-ready subset of data were to all children in England, we compared the distribution of deprivation (IMD quintile) and ethnicity in all children in the research-ready subset of CSDS in 2018/19 to data on ethnicity and deprivation from ONS births.

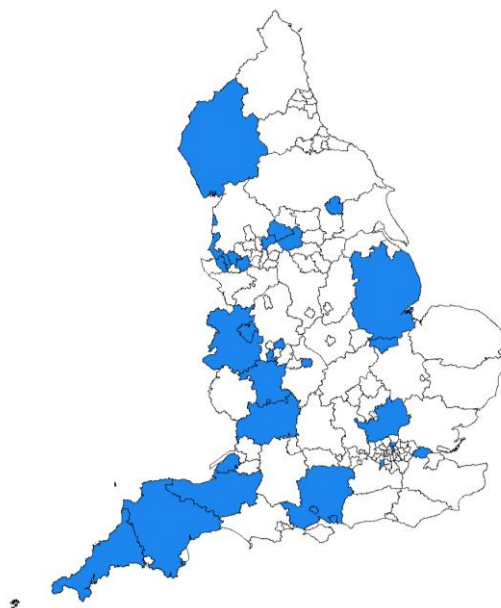
Full details of how we derived thresholds, categorised high and moderate correlation local authorities and investigated differences in deprivation and ethnicity is available in Appendix 2.

Results

Key finding: We identified 33 local authorities and 181,130 children within CSDS who had ‘research-ready’ 2018/19 data for analyses of the 2-2½ year review (Figure 1).

Children in the ‘research-ready’ (high correlation) local authorities had better completed data for some variables, such as breastfeeding, compared to all-of-England CSDS (Appendix 2, Table A4). However, the recording of safeguarding factors and whether a child was Looked After was poorer in the high correlation group than all of CSDS, suggesting that recording of these variables is independent from the recording of health visiting contacts. A list of the 33 local authorities is shown in Appendix 2, Box 2.

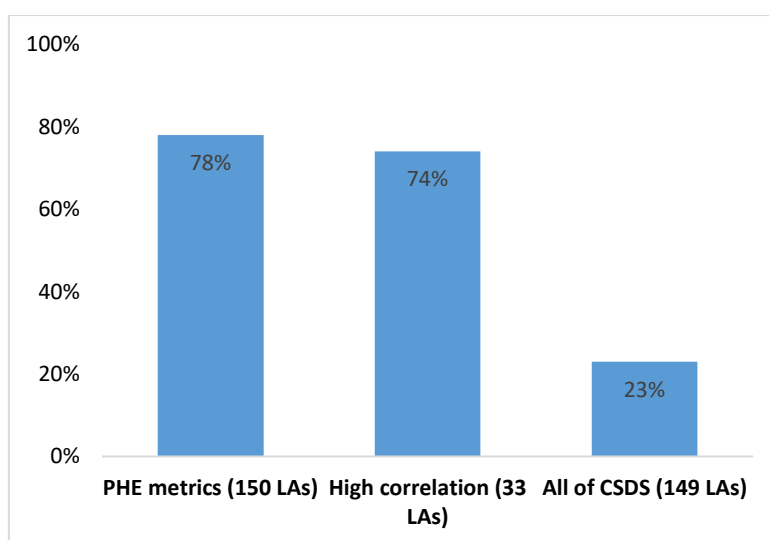
Figure 1: Map of the 33 'research-ready' local authorities for 2-2½ year reviews in 2018/19



When we applied the same criteria to new birth visits **and** 2-2½ year reviews within each local authority, we found that there were 22 local authorities with 'research-ready' data for 2018/19. If similar limits were also applied for the 6-8 week and 12-month reviews, the number of local authorities included would further decrease to 17 (Appendix 2, Table A3).

Key finding: The proportion of children with a 2-2½ year in the 'research-ready' subset is closer to reference data but still an underestimate (Figure 2)

Figure 2: Percentage of children with a 2-2½ year review recorded in the research-ready subset of CSDS, compared to all CSDS and reference data.



Key finding: Children in the 33 local authorities with 'research-ready' data in CSDS were similarly deprived but less ethnically diverse than all children in England

Children in the research-ready (high correlation) group were not representative of all children in terms of ethnicity. The percentage of children in the mixed, Asian, Black and other ethnicity categories was lower in the high correlation group compared to all of CSDS (Appendix 2, Table A5). This likely reflects regional differences in ethnicity. People in the Black, Asian, mixed and other ethnic groups are more likely to live in London than any other region in England, but only three London boroughs are in the high correlation subset.²⁸ Children in the high correlation group were similar in terms of deprivation, based on IMD quintile. Full results presented in Appendix 2, Table A5 and Table A6.

Conclusions

It is possible to identify a research-ready subset of CSDS data for analyses of the 2-2½ year review based on simple indicators of agreement with publicly available reference data. The exact criteria for identifying the research-ready dataset will vary according to the specific research question. For example, an analysis of new birth visits and 2-2½ year reviews will require a subset of data that is sufficiently complete in both these variables. Analyses that require sufficiently complete data across more variables will have a research-ready subset of CSDS that contains data from fewer local authorities.

For current years of CSDS data a research-ready subset of CSDS will contain data from only a small number of local authorities, regardless of the specific focus of the research. This means research-ready subsets of CSDS data are very unlikely to be representative either of all 151 local authorities or of children in England. The inclusion or not of London boroughs is likely to influence the distribution of ethnicity and deprivation within the research-ready subset of CSDS. Limited generalisability is likely to characterise research-ready subsets of CSDS data for the foreseeable future, assuming gradual improvements in data completeness rather than sudden and large step-changes

For current data collection years, findings based on research-ready subsets of CSDS should be treated as hypotheses that need to be further explored and tested. Again, this conclusion is likely to apply for the foreseeable future.

3. What can we learn from the ‘research-ready’ subset of CSDS about the characteristics of children who receive a 2-2½ year review?

Methods

Using the research-ready subset of data (33 local authorities), we calculated the proportion of children with a 2-2½ year review recorded in CSDS, by available indicators of need and vulnerability: safeguarding vulnerability, index of multiple deprivation (IMD) quintile, Looked After Child status and ethnicity. Box 2 lists the characteristics that are likely to result in a child having a safeguarding vulnerability recorded in CSDS, if known to health visiting services. Other relevant child characteristics were too poorly recorded to use. For example, only 3% of children had completed data for disability (this includes children recorded as **not** having a disability, Appendix 2, Table A4). Detailed methods for research question 3 are available in the Appendix 3, including the assumptions we made when deriving denominators for calculating proportions.

Box 2: The safeguarding vulnerability factors (from CSDS technical output specification):

Referral from Social Services or Police	History inconsistent with injuries
Previously known to Social Services	Concerning parent child interaction
Significant injury in child (last 12 months)	Worrying parent behaviour
Domestic abuse	Mental Health concerns
Disclosure of abuse	Worrying child behaviour
Bullying	Self-harm
Repeat Accident and Emergency Attendances	Genital injury
Delay in presentation to medical staff for children with frequent minor injuries	Female Genital Mutilation (FGM)

Results

Key findings:

We found that children with a 2-2½ year review recorded in CSDS were similar to those without a review, in terms of deprivation, ethnic group or whether the child had a safeguarding vulnerability recorded. (Table 3).

Looked After Children who were aged 2 years at the end of 2018/19 were slightly less likely than other children to have a contact with health visiting services (71% compared to 77%,) but they were much less likely to have a 2-2½ year review recorded (44% compared to 69%, Table 3).

This suggests that the health visiting team is seeing the same proportion of Looked After Children as other children, but are less likely to conduct a 2-2½ year review for Looked After children. We cannot see a reason why the 2-2½ year review would be conducted but systematically under-recorded for Looked After children. The lower proportion of 2-2½ year reviews recorded in the research-ready subset of CSDS was

not explained by a high number of appointments which were scheduled but then not attended by the family (Appendix 3, Table A8).

There is uncertainty around our estimates of children with a 2-2½ year review. Using the CSDS data on completed Ages and Stages Questionnaires (ASQ), we found evidence that some 2-2½ year reviews had taken place but did not have a 2-2½ year code attached to them in the CSDS extract. The ASQ is used for when children are aged 24, 27 or 30 months to assess children's development by health visiting team at the 2-2½ year review. If we assume that **all** the children with an ASQ record aged 2 or 3 did in fact have a 2-2½ year review, our estimate of children with a 2-2½ year review in 2018/19 would increase to 81%

Key finding: The majority of all children (76%), children with safeguarding vulnerabilities recorded (78%) and Looked After children (71%), who were aged 2 years at the end of 2018/19, had a record of a contact with health visiting services in CSDS, either for a 2-2½ year review or another reason. (Table 3)

The most common face-to-face activities (n=110,780) for children aged 2 other than the 2-2½ year review were "other" (31%, n=34,180) assessments (23%, n=26,015), counselling, advice or support (17%, n=18,875) and clinical interventions (15%, n=17,145). These figures include multiple activities recorded for the same child (including on the same day). The clinical intervention code is used for delivering individualised care plans, for example breastfeeding support, weaning or dealing with sleep problems.

Key finding: There remained a substantial proportion of all children (24%), children with safeguarding vulnerabilities recorded (22%) and Looked After children (29%) who were aged 2 (at the end of 2018/19) and did not have a record of either a 2-2½ year review or any other face-to-face contact. (Table 3).

Most of the children who did not have a face-to-face contact had no other contacts (e.g. letter or telephone call) from health visiting services, suggesting no contacts were attempted.

There is high uncertainty around our finding that 76% of children had any health visiting contact age 2 (and therefore that 24% did not).

First, the imprecise measure of age of child and 12-month time-period (April 2018 to March 2019) in the extract of CSDS likely resulted in an under-estimation of the proportion of children aged 2 years at the end of 2018/19 who had any contact with a member of the health visiting team. Some of the children aged 2 at the end of 2018/19 will have had a 2-2½ year review in early 2019/20 (before they turned 2½ years of age). We could not accurately identify when a child turned 2 years or a child's age at each contact. These children may not have missed any contacts with health visiting services, but we could not accurately identify whether they were due a contact, and therefore they have been counted as having no contacts with a health visiting team. These are issues arising from the data specification of the CSDS extract we used and could be addressed if an extract of CSDS was provided with more years of data and/or child age in months at each contact.

On the other hand, we may have over-estimated the proportion of children with any contact aged 2 as some children may be missing from CSDS altogether (i.e. not referred in to the system and not known to health visiting services). If this is the case, the true number of eligible children (denominator) may be greater than 93,525 which would decrease the proportion of all children with a contact. If this is an issue, it could only be addressed by improvements in the system which alerts local health visiting teams to children born or moving into their area.

Table 3: Percentage of children with a 2-2½ year review compared to children aged 2 at the end of 2018/19 with any face-to-face, or other medium, contact with a health visiting team

Child characteristics	% of children (95% confidence intervals)	% of children aged 2 at the end of 2018/19 (95% confidence intervals)	
	With a 2-2½ year review attended	With any face-to-face contact with health visiting teams	With any contact (including letters and telephone) with health visiting teams
All children (33 LAs)	74% (73%, 74%)	76% (75%, 76%)	78% (78%, 78%)
Safeguarding factors (7 LAs)			
No	86% (85%, 86%)	80% (80%, 81%)	83% (83%, 84%)
Yes	83% (78%, 88%)	78% (73%, 83%)	80% (75%, 85%)
Looked After child (13 LAs)			
No	69% (69%, 70%)	77% (77%, 78%)	79% (78%, 79%)
Yes	44% (37%, 51%)	71% (65%, 77%)	73% (67%, 79%)
IMD (33 LAs)			
1 (most deprived)	72% (72%, 73%)	78% (78%, 79%)	81% (80%, 82%)
2	72% (71%, 72%)	76% (76%, 77%)	79% (78%, 79%)
3	73% (72%, 74%)	74% (73%, 74%)	76% (75%, 77%)
4	75% (75%, 76%)	73% (73%, 74%)	76% (75%, 77%)
5 (least deprived)	78% (77%, 78%)	76% (75%, 76%)	78% (78%, 79%)
Ethnicity (33 LAs)			
White	73% (72%, 73%)	73% (72%, 73%)	75% (75%, 75%)
Mixed	79% (78%, 80%)	90% (89%, 91%)	91% (91%, 92%)
Asian or Asian British	76% (75%, 78%)	80% (78%, 81%)	81% (80%, 82%)
Black or Black British	73% (71%, 75%)	80% (79%, 82%)	82% (80%, 83%)
Other	63% (61%, 66%)	71% (69%, 73%)	75% (73%, 77%)

Note: The percentage of children aged 2 with any face-to-face contact may be lower than the percentage of children with a 2-2½ year review because we reduced the number of children in the denominator for the 2-2½ year review to account for children with the 2-2½ year review aged 3 (based on age at end of 2018/19) and a small number of 2-2½ year reviews were not be face-to-face. See Appendix 3 for details of denominators.

Key finding: Unlike other children, children with safeguarding vulnerabilities and Looked After children who were aged 2 years at the end of 2018/19 and had contact with health visiting services did so multiple times in the year (3 and 5 times on average, respectively, Table 4)

Table 4: Median contacts per child who had a record of a contact aged 2 during 2018/19

Child characteristics	Median (interquartile range) number of contacts aged 2 for children with contacts	
	Any medium	Face-to-face
All children (33 LAs)	1 (1 to 2)	1 (1 to 2)
Safeguarding factors (7 LAs)		
No	1 (1 to 2)	1 (1 to 2)
Yes	3 (2 to 7)	3 (1 to 7)
Looked After child (13 LAs)		
No	1 (1 to 2)	1 (1 to 2)
Yes	6 (3 to 10)	5 (3 to 9)
IMD (33 LAs)		
1 (most deprived)	2 (1 to 4)	2 (1 to 3)
2	2 (1 to 3)	1 (1 to 3)
3	1 (1 to 3)	1 (1 to 2)
4	1 (1 to 2)	1 (1 to 2)
5 (least deprived)	1 (1 to 2)	1 (1 to 2)
Ethnicity (33 LAs)		
White	1 (1 to 3)	1 (1 to 2)
Mixed	1 (1 to 3)	1 (1 to 2)
Asian or Asian British	2 (1 to 2)	1 (1 to 3)
Black or Black British	2 (1 to 4)	1 (1 to 3)
Other	1 (1 to 3)	1 (1 to 2)

LAs = local authorities

Key finding: Contacts with health visiting services for children aged 2 (at the end of 2018/19) were more often at home for Looked After children (63%), children with safeguarding vulnerabilities (78%) and children living in the most deprived areas (38%) compared to all children (28%, Appendix 3, Table A9).

Due to high levels of missing data (no contacts with a recorded location, 12%; 8,805 / 70,695), there is a high level of uncertainty about the estimates of contacts in a child's home versus at clinic or children's centre contacts. If all contacts where location was not recorded in CSDS were home visits, the proportion of all face-to-face contacts that were in a child's home could be as high as 40%. If missing location data were often for home visits and there were systematic differences in missing versus completed location data for children with known safeguarding vulnerabilities and children Looked After than for other children, the differences in home visits between the groups might be an artefact of the data.

Conclusions

The CSDS 2018/19 extract we had access to did not contain any evidence that children with and without a 2-2½ year review were systematically different from one

another in terms of deprivation, ethnicity or recorded safeguarding vulnerabilities. Differences in the proportion of Looked After Children with a record of a 2-2½ year review were attenuated when other face-to-face visits were taken into account.

In this subset 2018/19 CSDS data, there was a consistently high proportion of children not receiving their 2-2½ year review, including among groups with vulnerabilities known to health visiting services. However, there is very high uncertainty about these estimates because of the specifications of the CSDS extract. It may be that a higher proportion of children are receiving the 2-2½ year review than our data suggested.

Our results suggest that Looked After Children who are engaged with health visiting services have multiple contacts a year and often at home but a lower proportion of Looked After children have a 2-2½ year review. It might be that Looked After children are less likely to receive a 2-2½y review due to placement moves or because their 2-2½y review occurs at a time when they are having other reviews from services and the carer or guardian therefore declines the 2-2½ year review.

Between 28% and 40% of all contacts with children aged 2 were at home, taking into account uncertainty caused by missing location data. We found some evidence that children living in highly deprived areas, with known safeguarding vulnerabilities and who are Looked After might be more likely to see health visitors in their own home. However, this result was highly uncertain due to missing data and possible systematic differences in levels of missing data. Given that most evidence based interventions to support the most vulnerable children are centred around home visits, it is notable that approximately a third of Looked After Children and a quarter of children with safeguarding factors recorded did not have a home visit recorded.⁶

The specification of the CSDS extract means that our results are uncertain even for the 33 local authorities included in our research-ready subset of data. The low completeness of data in CSDS resulted in a small subset of research-ready data which means that our results can't be generalised. Our results should be treated as hypotheses which need to be further explored and tested, including through collaborative work with the sector.

4. How are the 2-2½ year reviews delivered?

Methods

For 33 local authorities in the research-ready (high correlation) subset of CSDS, we analysed:

- Location: whether the contact occurred at the child's home or elsewhere. Locations other than the child's home include GP practice and children's centres.
- Medium: whether the contact was face-to-face rather than, for example text message or phone calls.
- Group: whether the contact was delivered as part of a group or to individual children and parents or carers.
- Contact duration: the length of the contact. CSDS reports the duration in minutes, we categorised duration as: ≤30, 31-60, 61-90, >90.

These variables were the only variables characterising contacts that were sufficiently well completed for analysis. Other variables (e.g. whether child saw a health visitor or other team member) had very high levels of missing data. We evaluated whether the characteristics of the contacts varied by IMD quintile (IMD is complete for all children). For children who had more than one record of a 2-2½ year review (excluding 'did not attend'), we included the earliest face-to-face review, as earlier records via phone or text message are likely to have been records of the health visitor (or other staff) arranging the face to face contact, rather than a health review. If no contacts were face-to-face we included the earliest contact of any type.

Results

Key findings: Across all levels of deprivation, most children (96%) had their 2-2½ year review face-to-face (rather than by telephone or video call). Group contacts were very rarely recorded in CSDS.

Our estimates related to group contacts are very uncertain due to high levels of missing data (17-23%, Appendix 3, Table A11). If all missing data were for group contacts, up to 23% of 2-2½ year reviews would have been in a group in CSDS. Variation in use of group contacts by deprivation could be hidden in missing data.

Children in CSDS who very lived in deprived areas were more likely to have their 2-2½ year review at home (43%), compared to those living in less deprived areas (20%).

Due to high levels of missing data on location of 2-2½ year reviews, our estimates of home visits are uncertain. Missing data might create apparent differences between children living in low and high deprivation areas where in fact there are none. Alternatively, missing location data may hide even greater differences in the receipt of a home visit between children living in the most and least deprived areas (Appendix 3, Table A11). In other words, variation in use of group contacts by deprivation could be hidden in missing data. Children in the most deprived areas had most missing data for duration (13%) and children in the least deprived areas had the least (2%). Around two-thirds of contacts had a duration of 31-60 minutes and 20% were ≤30 minutes. Full technical details and detailed results for research question 4 are presented in Appendix 3.

Discussion

Key findings

Data quality and use of CSDS for research

On average, data on the mandatory health reviews is substantially under-recorded in CSDS, compared to national and local reference data. However, it is possible to identify a 'research-ready' subset of CSDS data which can be used with caution for research on children's contacts with health visiting teams, using data completeness correlation' criteria applied to data from each local authority for each quarter of each year. In 2018/19, this 'research-ready' subset of data, based on three correlation criteria for 2-2½ year reviews, included 514,245 children aged 0-5 years from 33 local authorities. These 514,245 children were slightly less diverse in ethnicity than children in the whole of England, likely explained by the low inclusion of London boroughs in the 33 local authorities. Our approach to identify a 'research-ready' subset of CSDS can be adapted by others, using indicators specific to the research question.

What can we learn from CSDS about which children receive a 2-2½ year health review and how the reviews are delivered?

Our analyses has produced the following **hypotheses** about the 2-2½ year review as delivered in 2018/19 and vulnerable children, which need to be further tested and explored:

- With the exception of Looked After Children, there may be no systematic difference between children who do and do not receive a 2-2½ year review
- It might be that the 2-2½ year is perceived as less helpful for Looked After children who are more likely to be engaged with a range of professionals compared to all children and may be having continuous needs and developmental assessment, including from health visiting services.
- There might be two distinct groups of vulnerable children with regard to receipt of health visiting services: Looked After and vulnerable children who are engaged with the health visiting service and receive intensive health visiting services (see a member of the team multiple times in a year) This group might comprise the majority of vulnerable children. On the other hand, there remains a substantial proportion of vulnerable children who are not in contact with the health visitor team and do not see the team at all in the same period. As we did not find evidence of attempted contacts with these children, this group might be 'under the radar' of the health visiting team.
- Less than half of all children see a health visitor in their own home aged 2 years. Children who are Looked After, have known vulnerabilities and live in the most deprived areas might be more likely to have contacts with health visiting services in their own home, but estimates are particularly uncertain due to high levels of missing data.
- Pre-COVID-19, it was likely very rare for the 2-2½ year reviews to be conducted remotely, for example by phone or video call. Despite anecdotal evidence of group contacts,¹² they also appeared to be rare in 2018/19.

How do our findings about the 2-2½ year review compare to other evidence?

Other available evidence on the 2-2½ year review comprises PHE metrics, which are publicly available statistics provided by PHE, and a report by OCC published on 17th July 2020 ('the OCC report'), which also used the 2-2½ year review as an illustrative example of how young children's additional needs are identified and responded to.²The OCC report is based on data from 2018/19 in 148 local authorities in England, obtained using The Children's Commissioner's unique statutory powers to request data from local authorities (only 3 local authorities in England did not comply with the request).¹⁸

In all three reports, there is evidence that approximately 4 in 5 children received their 2-2½ year review in 2018/19: PHE metrics 78%, OCC report 81%, our analyses of 33 local authorities 74%, rising to 81% if all children aged 2 or 3 with an ASQ were assumed to have had a 2-2½ year review. It is not surprising that our data was similar to PHE metrics as that was a criteria for classifying local authorities as 'research-ready'. However, similarity between the OCC report, PHE metrics and local data from Kent and East Sussex (Appendix 1, Table A1) supports the conclusion that on average across England, approximately 1 in 5 children do not receive a 2-2½ year review.

The OCC report concludes that this 1 in 5 figure masks substantial variation across England (range 0% to 65% of children receiving a 2-2½ year review in 2018/19, see p.28 OCC report). The OCC reported that few local authorities could identify their vulnerable children in their data which groups 'missing' their 2-2½ year reviews. This implies that it is poor recording of data at a local level that is driving the highly missing data on safeguarding vulnerabilities and Looked After children in CSDS rather than problems in transferring local data to NHS Digital. We were only able to include data from 7 local authorities who had sufficiently complete data on 2-2½ year reviews and safeguarding vulnerabilities (<10% missing data). This rose to 13 local authorities for Looked After children.

The OCC requested information from Local Authorities on the proportion of their vulnerable children who had a 2-2½y review in 2018/9, using eligibility for the 2 year childcare offer, Child in Need Status and Special Educational Needs (SEN) as markers of a vulnerable child. However, a minority of Local Authorities could provide this information to the OCC which led the OCC to conclude "There is little evidence that local areas are ensuring that their vulnerable young children are checked". The sub-group analyses for vulnerable children were not presented in the report. We found that Looked After children were less likely to receive a 2-2½ year review than other children but that they were just as likely to have any face-to-face contact from the health visiting team in 2018/9. This suggested that children who were living in deprived areas, known to be living with significant adversity or known to be Looked After were just as likely to have contact with health visiting services in a year as other children. This means our findings are consistent with the OCC's conclusions about reviews for vulnerable children.

However, unlike the OCC, we also analysed data on other face-to-face contacts between children and health visiting services. These analyses suggested that there is intensive health visiting activity for the majority of vulnerable and Looked After

children. In other words, although a substantial minority of children known to be vulnerable or Looked After did not have contact with health visiting services in the year, those that did saw the team multiple times in this period. This might reflect strategic targeting of scarce resources but, as we did not find evidence of attempted contact for these families, it is perhaps more likely that these families are 'under the radar' of the health visiting team and unknown to them.

OCC reported that a third of 2-2½ year reviews were done by qualified health visitors and the rest done by other members of staff in a health team but the CSDS was too poorly completed to be able to compare results. This suggests that there is complete data held locally and the missing data in CSDS is an artefact of the way that data is collected.

Conclusions

The complete CSDS data in 2018/19 cannot currently be used for research on children's contacts with health visiting services because data on the mandated health visitor reviews is too incomplete in most local authorities.

However, researchers and analysts can access CSDS through NHS Digital and identify a 'research-ready' subset of CSDS which is sufficiently complete to generate hypotheses about health visiting activity in England, using thresholds of agreement with reference data.

The subset of CSDS which can be used for research will vary according to the timeframe and specific focus of the research. As it currently stands (in 2020), a research-ready subset of CSDS will be small, likely less than a quarter of all local authorities regardless of the specific research questions, and not representative of local authorities or children across England. Despite data quality challenges, CSDS remains an important source of data available to build the evidence-base about health visiting in England. As data quality of CSDS improves, the data available for research will be larger, more generalisable for England and support more robust conclusions.

Due to limitations the CSDS extract and CSDS data generally, our results about the 2-2½ year review should be used as hypotheses about the 2-2½ year review to be tested, explored and extended using a CSDS extract with longitudinal data and age of child in months, locally held health visiting data, deep dives into practice alongside collaborative work with the sector.

Our estimate that 76% of all children aged 2 in 2018/9 saw a member of the health visiting team between April 2018 and March 2019 is likely an underestimate. Our hypotheses that vulnerable and Looked After children who are engaged with the health visiting team see them 3-5 times a year on average is more robust. Children who did not see health visiting teams may have additional needs and vulnerabilities that have not been identified due to lack of contact with the health visiting team.

We found that 96% of contacts in 2018/19 were face-to-face. In response to the COVID-19 pandemic and the lockdown policy of 26th March 2020, most health visiting services switched to remote contacts (telephone or video call). This raises questions about the impact of such a dramatic and sudden shift in the mode of

delivering health visiting services, both for children and families and for the staff and services.

Research using a longitudinal CSDS extract with age of child in months is needed to ascertain a more certain estimate of children that did not see a member of the health visiting team during their second year of life, with sub-group analyses for children with recorded safeguarding vulnerabilities and recorded as Looked After. The specification of the CSDS extract prevented us from more certain conclusions about the coverage of health visiting for children aged 2 in 2018/19.

We found evidence in CSDS to suggest that the majority of vulnerable and Looked After children were engaged with the health visiting team and saw them multiple times a year, on average. We also found evidence that there was a substantial minority of vulnerable and Looked After children who did not have any contact with the health visiting team in the same period.

Limitations

The limitations of our analyses arise from limitations of the data, some of which are specific to PHE's CSDS extract and can be addressed with a different data specification and some of which are intrinsic to CSDS.

CSDS

CSDS only contains information, identified with specific codes entered into local systems by the local health visiting team. There is much potential for discrepancies between what health visitors did, what health visitors knew or suspected about families, the input and services families received in practice and what we saw in CSDS.

First, information might be coded very accurately on local systems but not with the codes used by NHS Digital in CSDS. This means that data returned to NHS Digital will have empty data items, even if the local authority has its own accurate records. This might explain the under-recording of the 2-2½ year review in CSDS compared to reference data. Given that the mandated reviews are often used as performance indicators for health visiting teams, it seems unlikely that health visiting teams are conducting but failing to code 2-2½ year reviews on their system. NHS Digital have amended their data definitions and 2019/20 publications will include health visiting activity from READ and SNOMED-CT clinical codes, rather than only using activity codes as is currently the case. This will likely increase recording in CSDS of the 2-2½ year review and other mandated health reviews as anecdotally we know that some health visiting teams record data locally using READ codes, for example these were used in the local data from East Sussex.

Secondly, contacts may be recorded but miscoded, which might explain the difference in any contact vs 2-2½ year reviews. This is likely, based on our analyses of ASQ records without a record of a 2-2½ year review. A more precise measure of age is needed to investigate miscoded contacts, which should be available in other extracts of the CSDS but was not available in our CSDS extract. For example, if age in months had been available, we could have classified any face-to-face contact within the first month of birth as a new birth visit.

Thirdly, we know that much abuse and neglect of children does not come to the attention of professionals and instead remains hidden.²⁹ The most vulnerable families are known to find it difficult to focus on their child's needs and are often less motivated to seek out and use support services. Some children might be known to be living with adversity by children's social care but there may be failures in sharing this information with the health visiting team and/or recording it using codes in local health visiting systems. We also know that other primary care health professionals (GPs) employ high threshold of certainty for coding vulnerabilities such as domestic violence when a child is not receiving statutory protection services from children's social care.^{30, 31} In other words, if professionals think there may be a problem but are not certain, it is unlikely to be recorded in the system using a code that would also be used by CSDS. This means that in CSDS there will be misclassification of children living with adverse childhood experiences (i.e. vulnerable children) and Looked After children in the community as well as misclassification of the subset of these groups who are known to the health visiting team. Classifying vulnerable and Looked After children as not vulnerable or Looked After will mean that our findings under-estimate differences between vulnerable and other children, particularly if there is a high number of children with adversity known to the health visiting team who receive more than average support but do not have any vulnerability recorded using codes in local administrative data systems.

Our results cannot be generalised to all children in England for two reasons. First, children in the 33 local authorities who contributed 'research-ready' data to PHE's CSDS extract were not nationally representative in terms of ethnicity. Second, delivery of health visiting services varies substantially between local authorities and is likely associated with data completeness in CSDS so that local authorities in the research-ready (high correlation) group are probably systematically different from the other local authorities. For example, group contacts may be used more often in the local authorities that were not included based on commissioning decisions. Or it could be that the 'low correlation' group of local authorities are the ones with the most stretched services, leading to differences in service coverage and intensity as well as capacity for recording accurate data. To obtain a full picture of health visiting activity, all types of local authorities need to be investigated and this will involve a triangulation of data sources, including CSDS, locally held data, surveys and in-depth qualitative data collected from professionals and families.

CSDS captures information on health visiting activity and key child characteristics but does not contain the full picture of the quality or nuances of the interaction between health visitors and parents. To fully understand health visiting and the contribution of this service to child health and wellbeing, qualitative research is needed.

IMD quintile was complete for all children in our analyses as it was derived from postcode. Children without a complete postcode were excluded (3%) as postcode was used to derive local authority and therefore these children were also missing local authority (Appendix 1). However, even if postcode is complete it may not be accurate. We had only access to lower super output area (LSOA), not exact

postcode, so could not determine whether certain postcodes were used more than expected (which would indicate use of proxy postcode).

Access to CSDS data within PHE

The analysis for this project was carried out on PHE's existing CSDS extract which had been requested and received prior to planning this project. Analysis was restricted to the most recent complete year (2018/19) and only included age in years at the end of the year. This meant we could not follow children over time, and therefore could not tell if a child had a contact the previous or following year. As children are eligible for the 2-2½ year review over a 6 month period, and the only age variable available was age in years at the end of the reporting period (31st March 2019), we were unable to distinguish between children who missed their 2-2½ year review (i.e. children who turned 2½ years during the year and had no review) and those who had them in 2019/20. Our estimate that 74% of children had a 2-2½ year review is based on the assumption that the number of children who have a review in the year they turn 3 is similar in 2019/20 as 2018/19. We also could not tell if children without a record of the 2-2½ year review had previous mandatory contacts. The lack of a precise measure of age meant we could not determine whether contacts recorded without the correct code (e.g. "other") were likely to represent a mandatory contact based on timings. It also reduced the accuracy of our comparisons with other data sources. These issues could be addressed by analysing longitudinal CSDS data with age in months at the time of activity.

The limitations of CSDS and the extract we analysed mean that our findings about the 2-2½ year review should be treated as hypotheses for further exploration and testing.

Recommendations

Due to the uncertainty of our findings, we do not make substantive recommendations about health visiting or the 2-2½ year review.

Recommendations for researchers

Use the indicators reported here to identify local authorities with data suitable for research into new birth visits and the 2-2½ year review. As data quality improves, more local authorities can be included for analysis. For research into different questions, such as immunisation or breastfeeding, indicators should be developed based on the relevant reference standard data (for example PHE Fingertips).³² Our work can be used as a framework that can be adapted for different research purposes.

Use subsets of CSDS tailored to specific research questions to generate hypotheses about health visiting and combine with other data sources and in close collaboration with the sector, in order to create a comprehensive overview health visiting. Avoid making policy recommendations based on CSDS alone in its current format. Actively investigate differences between the research subset of local authorities and other local authorities, to address issues related to data quality issues and lack of generalisability.

Evaluate the generalisability of the research subset of CSDS for each study. As data quality improves over time, generalisability and reliability will also improve.

A complete CSDS extract that includes age in months and several years of data is necessary for research into national health visiting contacts but will still not be able to answer all research questions. Researchers should also consider using local data from local authorities and CSDS data linked to other sources (e.g. Hospital Episode Statistics or social care data) to find out more about children who do not get the 2-2½ year review (or other health visiting contacts). For example, do they present at A&E with injuries implying there are safeguarding issues that have been missed.

Recommendations for NHS Digital

NHS Digital should routinely supply data released for research into health visiting with a suitable measure of age, including to PHE. Age in weeks since birth would allow for checking which children were eligible for the mandatory contacts (e.g. how many children were aged 0-14 days and therefore eligible for new birth visits).

NHS Digital, aided by PHE, could consider adding additional validation checks during the CSDS submission procedure driven by the universal nature of health visiting to identify when a provider enters no (or very few) records for each of the mandatory contacts.

NHS Digital could extend its work with PHE to improve recording of health visiting activity in CSDS (see Box 1) by investigating common factors that might explain higher than average data completeness in submissions to CSDS among the local authorities with research-ready data on the mandated health visiting reviews.

NHS Digital could generate flags on data related to data quality based on our indicators and other indicators that are likely relevant to work using the CSDS. These could classify records from different local authorities at different times as high/moderate/low correlation, also allowing tracking of the size and characteristics of the 'research-ready' data. PHE could recommend useful flags for NHS Digital to create.

Recommendations for local authorities and providers

Local authorities should work with providers to ensure data entered into CSDS is of suitable quality and completeness. There could usefully be a collaborative review of the process of data submission to CSDS between local authorities and providers to identify areas where problems occur. Ensuring data quality is an important aspect of commissioning health visiting services.

Local authorities can share practice with others in their region to improve the quality of data submission and share good practice.

Consider requesting manual checks within the provider before data is submitted to CSDS, as happens for the PHE metrics in some local authorities. Validation checks already exist for data submitted to CSDS, but these mostly relate to formatting. Checks related to a minimum expected number of activities could be useful for providers that submit health visiting data.

Providers should ensure their frontline practitioners are engaged in data quality. Members of health visiting teams require support for continuous personal development to keep pace with the rapid advancements in technology to support their learning and increase their confidence and competence in applying data and analytics to their everyday practice.

Appendix 1: Data sources and supplementary material RQ1

1.1 Data sources

CSDS

The CSDS extract is a pseudonymised extract, held securely within PHE for the purpose of delivering PHE's core work programme and priorities.

A member of UCL staff working on a PHE honorary contract performed the required analysis using PHE equipment and systems and under PHE governance arrangements. Only aggregate data was transferred out of PHE systems for the purposes of this report.

We analysed the CSDS for 2018/19 (April 2018 to March 2019). Although date of birth and exact age are available in the full CSDS, PHE's CSDS extract only contained age in years at the end of the period. After excluding 4,545 (<1%) children from local authorities outside England and 87,812 (3%) children who were missing local authority (no postcode recorded), there were 3,314,665 children aged 0-5 in our data. There are 151 local authorities in England, but we report results for 149 because we combined Isles of Scilly with Cornwall and City of London with Hackney to match our results to PHE metrics.

Local data

We used local data from three local authorities: Kent (2018/19), East Sussex (2018/19), and Barking and Dagenham (2017/18). From Kent, we received aggregate data on the number of children receiving each of the postnatal mandatory contacts in 2018/19. From East Sussex, we obtained an extract of de-identified health visiting data containing data on children who had health visiting contacts in 2018/19 and consulted with an information analyst who manages the data and is author on the report (GW). From Barking and Dagenham, we accessed de-identified individual-level linked data for children aged 0-5 in 2017/18 from the Care City Cohort.³³

Reference data

We used data on the number of births in 2018/19 from Office for National Statistics birth statistics (ONS births) and PHE interim health service delivery metrics (PHE metrics) as reference data. The ONS released data on births by month, sex and area of usual residence of mother in England and Wales for September 2017 to August 2018 and September 2018 to August 2019.^{34, 35} We used this data to calculate the number of births per quarter per local authority in England for April 2018 to March 2019. PHE metrics are collected via an online form in which local authorities submit aggregate data on the number of children who are eligible for and receive each of the mandatory health visitor contacts. There are no penalties or incentives related to the data submission, but PHE recommends submission is signed off by a Director of Public Health or equivalent to assure the quality of the data.

1.2 Supplementary material RQ1

How does data in CSDS compare to national reference data?

Methods

To determine how accurately CSDS captured children eligible for health visiting (the denominator population), we calculated the percentage difference between the number of children who were born in 2018/19 in data published by the ONS (ONS births) and CSDS, by local authority. To determine how accurately CSDS captured health visiting activity, we calculated the percentage difference between the number of children with a 2-2½ year review or face-to-face new birth visit in PHE metrics and CSDS, by local authority. For face-to-face new birth visits, we included contacts that were face-to-face or where the medium was missing. We did this to exclude those we thought most likely to not be face-to-face (recorded as something else), but included the contacts where the medium was missing as most contacts with medium complete were face-to-face.

Results

Both the number of children eligible for health visiting and the number of health visiting contacts were substantially under-recorded in CSDS compared to PHE metrics.

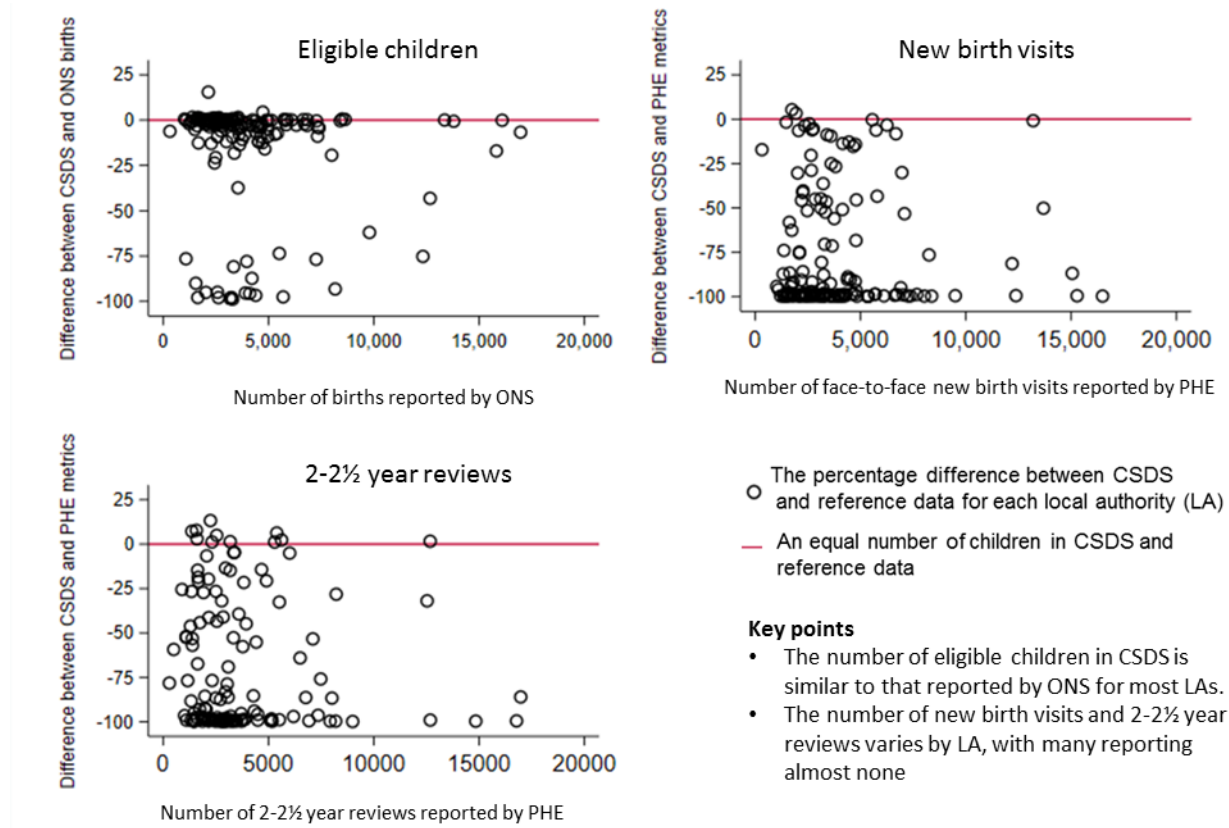
Recording of eligible children, new birth visits and 2-2½ year reviews was poor in CSDS and variable by local authority, based on a comparison of CSDS with reference data. On average, there were 16% fewer children born in 2018/19 recorded in CSDS compared to ONS births (519,949 vs 621,904, Table 1). ONS births only includes children born in England, but children who moved to England after birth are included in the eligible children number in CSDS. If children moved out of England or died within their first year of life, we would still expect them to have been referred to health visiting services and therefore be recorded in CSDS, unless they moved or died very soon after birth.

Therefore, the difference between the number of eligible children in CSDS and the true number of eligible children is greater than 16%. In other words, comparison with ONS births will provide an underestimation of the ascertainment of eligible children in CSDS. The number of children with a face-to-face new birth visit was 74% lower in CSDS than PHE metrics (151,217 compared to 597,831) and the number of children with a 2-2½ year review in CSDS was 72% lower (146,993 compared to 531,436). Figure A1 shows the number of children recorded in CSDS in each local authority compared to reference data: many local authorities had similar but slightly lower births compared to ONS, but for new birth visits and 2-2½ year reviews many local authorities reported almost nothing.

Table A1 shows examples from two local authorities. In data within CSDS for Kent, almost no children were recorded as having a new birth visit or 2-2½ year review, despite a difference of only 9% in the number of births between CSDS and the local data. In data within CSDS for East Sussex, the number of children with a new birth visit was 68% lower than PHE metrics. The number of children with new birth visits and 2-2½ year reviews in local data from Kent and East Sussex was similar to PHE

metrics, which suggests that differences are due to translation of data into CSDS, rather than issues with local data collection.

Figure A1: Scatter plot of the percentage difference in number of eligible children, face-to-face new birth visits and 2-2½ year reviews in CSDS compared to reference data



LA = local authority; Eligible children = all children born in 2018/19

Table A1: The difference between CSDS and two reference data in 2018/19: PHE metrics for all children and local data from two local authorities

	Number of children recorded in			Difference		
	Local data	Reference data	CSDS	Reference vs local	CSDS vs local	CSDS vs reference
All children in England (149 local authorities)						
With a face-to-face new birth visit recorded	n/a	597,831	151,217	n/a	n/a	-74%
With a 2-2½ year review aged <5 years recorded ⁴	n/a	521,528	146,993	n/a	n/a	-72%
Born in 2018/19	n/a	621,904	519,949	n/a	n/a	-16%
Kent (single local authority)						
With a face-to-face new birth visit	16,385 ¹	16,487 ²	60 ⁶	+1%	-100%	-100%
With a 2-2½ year review aged <5 years ⁴	14,830	14,841 ²	45 ⁶	+0%	-100%	-100%
Born in 2018/19	17,482	16,970 ³	15,960 ⁶	-3%	-6%	-9%
East Sussex (single local authority)						
With a face-to-face new birth visit	4,726	4,783 ²	1,520 ⁶	+1%	-68%	-68%
With a 2-2½ year review aged <5 years ^{4, 5}	4,598	4,146 ²	2,000 ⁶	-10%	-52%	-57%
Born in 2018/19	5,273	4,830 ³	4,005 ⁶	-8%	-17%	-24%

¹ By 30 days of age; ² The reference data for contacts is PHE metrics; ³ The reference data for births is from ONS birth statistics ; ⁴ Age in whole years on 31st March 2019; ⁵ Date of contacts not available in East Sussex local data, instead there is days since birth and month and year of birth, so number of contacts in 2018/19 were estimated assuming that all children were born on 15th of the month; ⁶ data is rounded to 5 to minimise risk of disclosure as required by NHS digital for CSDS data

Appendix 2: Supplementary material RQ2

Can we identify a 'research-ready' subset of CSDS for use in research into the 2-2½ year review?

Methods

Identifying “high correlation” data for local authorities

To identify local authorities within CSDS with sufficiently complete data for research into 2-2½ year reviews, we created two indicators of how well data was recorded in CSDS and sense-checked these indicators with the research team which includes a Consultant in Public Health working with a Health Visiting Service (SB), an information analyst who manages health visiting data (GW) and the lead for PHE metrics (KT, see ‘contributor’ section). The indicators measure the agreement between CSDS and aggregate reference data (PHE metrics or ONS births). Based on these indicators, we categorised local authorities as having high, moderate or low correlation between data in CSDS and reference data.

The indicators are based on the number of eligible children and children who had 2-2½ year reviews recorded (Table A2). These indicators were selected to account for the two mechanisms of under-recording in CSDS that would affect research into health visiting activity. First, some children may be missing completely from the data. If children are missing from CSDS, we do not have accurate data on how many children are eligible for health visiting and therefore do not have an accurate denominator to calculate the percentage of children who received contacts. We were able to determine whether the number of eligible children were accurate through comparisons between CSDS and ONS birth statistics. We focused on “eligible children” who were aged 0 because we did not have reliable reference data on the number of children aged 2 or 3 to compare with CSDS. Second, contacts with health visitors may be under-recorded. We were able to determine whether the number of contacts were accurate through comparisons between CSDS and PHE metrics.

Table A2: The indicators and limits for identifying high or moderate correlation local authorities in CSDS

Indicator	Limits	
	High correlation	Moderate correlation
(i) Eligible children: Agreement between the number of children aged 0 at the end of the reporting year in CSDS and ONS birth statistics	- 10% to +20%	-30% to +30%
(ii) 2-2½ year reviews: Agreement between the number of children with a 2-2½ year review in CSDS and PHE metrics	-15% to +15%	-40% to +40%

We used local data from East Sussex and Kent to select appropriate limits for the high and moderate correlation categories, by comparing local data to the reference data. The limits we selected (Table A2) were agreed with the report authors, who

include an Information Analyst in a local authority (GW), Consultant in Public Health working with a Health Visiting Service (SB) and PHE colleagues from beyond the author team, with expertise in health visiting and health visiting data (KT and HS, see 'contributors section'). The percentage difference between the local data and PHE metrics ranged from -10% to +1% for the new birth visit and 2-2½ year review (See Table A1). Based on this, we considered a difference between CSDS and PHE metrics of +/-15% to be appropriate for high correlation and +/-40% appropriate for moderate correlation (Table). We expect the true number of "eligible children" (children born in 2018/19) to be higher than the number of children born in England, because CSDS should include children born elsewhere who moved to England before their first birthday. This was true in our comparisons of local data and ONS births, where there were 3-8% more children aged <1 year in the local data compared to ONS births (Table). This is reflected in the limits we selected for high correlation for eligible children (-10% to +20%).

Local authorities that did not meet either high or moderate criteria were classified as low correlation. As for many local authorities agreement with the indicators varied by quarter, we allowed local authorities to move between categories by quarter. This means that data from specific time periods within a local authority could be considered as high correlation and therefore included in analyses. The contact date was used to allocate children who had a contact to a local authority quarter (and therefore to a correlation category). For children without contacts (i.e. to calculate the denominator population), we could not determine which child became eligible in each quarter. Therefore, we calculated the total number of children per local authority divided by four to estimate the number of children per quarter.

To determine whether similar indicators could be used for other mandatory contacts, we created a new indicator for new birth visits, based on agreement between the number of children with a face-to-face new birth visit in CSDS and PHE metrics. We used the same limits for high (-15% to +15%) and moderate (-40% to +40%) correlation as the 2-2½ year review indicator. We calculated how many local authorities met the high correlation criteria based on the eligible children and new birth visit indicators (without 2-2½ year review indicator), and how many of those were in the high correlation group based when using the 2-2½ year review indicator.

To determine whether the indicators could be to identify suitable datasets for other research questions, we compared the completeness of variables relevant for research into early years by correlation category. We evaluated completeness of indicator of disability, breastfeeding status, accommodation type, safeguarding indicator, Looked After Child status, ethnicity and IMD (from LSOA). We also report how often the following variables are recorded: each mandatory contact, the ages and stages questionnaire for 24/27/30 months of age, any contact (including contacts other than the health reviews), immunisation (date and type), and child protection plan. These were only recorded if present, but we compare the prevalence in CSDS to national estimates reported elsewhere.

Are children in the high correlation local authorities nationally representative?

To draw conclusions from research using the subset of children in the high correlation group we must understand whether results can be extrapolated to

children in other local authorities in CSDS, and to all children whether or not they were recorded in CSDS. To determine whether the subset of local authorities were representative, we focused on the IMD quintile and ethnicity because of the completeness of these variables in CSDS (IMD is complete for all children in the study and ethnicity is complete for 82% of children) and because there were a substantial number of children within each IMD or ethnicity category.

To determine whether the chances of a child being recorded in CSDS varied by IMD quintile and ethnicity, we compared the distribution of IMD and ethnicity in ONS births to children in CSDS who were born in 2018/19. We also compared the distribution of IMD quintile and ethnicity of children aged <5 years in CSDS and local data for two local authorities (East Sussex and Barking and Dagenham). We did not have data from 2018/19 from Barking and Dagenham, therefore we compared 2017/18 local data to 2018/19 CSDS data. We do not expect any significant changes in the distribution of IMD and ethnicity in such a short time frame (one year). To determine whether the high correlation group was representative of the whole of CSDS, we compared the ethnicity and IMD in the high correlation group to all of CSDS for children aged less than 5 years.

What percentage of children receive contacts using different correlation groups?

To demonstrate how results vary using the high correlation subset of local authorities compared with all local authorities, we calculated the percentage of children in CSDS who had a record of the new birth visit and 2-2½ year review using the high correlation group only, high and moderate groups together, and all of CSDS. For the new birth visits we based the high correlation group on those that met the criteria for eligible children and new birth visits (not 2-2½ year review).

We were unable to determine time at risk or the exact number of children in CSDS who were eligible for the 2-2½ year review, due to the lack of a precise measure of age in the CSDS extract. The age variable available is age at the end of 2018/19 (i.e. age on 31st March 2019). A child who received a 2-2½ year review in 2018/19 could be aged 2 or 3 at the end of 2018/19 and as we only have data for 2018/19, we cannot tell whether a child received a contact the previous or following year. To estimate the percentage of children who had a 2-2½-year review, we used the number of children who had the 2-2½ year review and were aged 2 (at end of 2018/19). To calculate the denominator, we used all children aged 2 (at the end of 2018/19) minus the number of children who had the 2-2½-year review aged 3 (at end of 2018/19). See Equation 1. This was based on the assumptions that (i) children who had the 2-2½ year reviews and were aged 3 (at end of 2018/19) were born towards the end of the year (i.e. were younger than 2½ years at the start of 2018/19), and (ii) a similar number of children who were aged 2 (at end of 2018/19) would have not yet turned 2½ years and would be expected to have their 2-2½ year review in 2019/20. If we had not estimated the percentage in this way, we would have either only counted children who had their 2-2½ year review and were aged 2 at the end of 2018/19 (excluding children who were born late in the year and would have their review the following year), or as the percentage of all children aged 2 or 3 who had a record of 2-2½ year review – but this would count in the denominator 3

year olds who had their review in the previous year (2017/18) and 2 year olds who were not due their review until the following year (2019/20).

Equation 1: Estimation of the percentage of children with a 2-2½ year review

$$\text{Percentage of children with a 2-2}\frac{1}{2}\text{y review} = \frac{\text{Children aged 2 with a 2-2}\frac{1}{2}\text{ review}}{\text{Children aged 2 - children aged 3 with a 2-2}\frac{1}{2}\text{ review}}$$

Results

Identifying “high correlation” local authorities

Thirty-three local authorities met the high correlation criteria for research into the 2-2½ year review. These are listed in Box 2 and shown in Figure 1: Map of the 33 'research-ready' local authorities for 2-2½ year reviews in 2018/19. These groupings do not reflect the quality of local data recording for case management purposes or the quality of the health visiting service. The groupings are based solely on the correlation between the reference data and the CSDS extract.

Box 2: Local authorities that had data in CSDS with high correlation between data in CSDS and reference data based on indicators in table 2 for 2018/19

Blackpool	Hertfordshire	Sefton
Calderdale	Islington	Shropshire
Cornwall and Isles of Scilly	Kingston upon Thames	Somerset
Coventry	Kirklees	Southampton
Cumbria	Knowsley	St Helens
Derby	Lincolnshire	Telford and Wrekin
Devon	Liverpool	Thurrock
Dudley	North Somerset	Walsall
Gloucestershire	Peterborough	Warrington
Hampshire	Portsmouth	Worcestershire
Haringey	Rochdale	York

Only 22 of the 33 high correlation local authorities (based on eligible children and 2-2½ year review) met the additional criteria for new birth visits (Table A3). If only using the eligible children and new birth visit criteria, 31 local authorities were high correlation for research into new birth visits. If criteria were applied for eligible children and all four postnatal health reviews, only 17 local authorities would be included.

Table A3: Number of local authorities included with limits applied to different contacts

Review criteria applied to	Number of local authorities
2-2½ year review	33
New birth visit	31
12-month review	41
6-8 week review	34
All four postnatal health reviews	17

The antenatal visit is not included as the contacts are not routinely recorded in CSDS; Criteria is number of children with review recorded in CSDS within +/- 15% of the number of children in PHE metrics

In general, children in the high correlation local authorities had better completed data for other variables, compared to using all of CSDS (Table A4). For example, the high correlation local authorities had better completed data on breastfeeding compared to all local authorities in CSDS (69% vs 26%). However, for the recording of safeguarding factors and whether a child was Looked After was poorer in the high correlation group than all of CSDS. This suggests the recording of these variables is independent from the recording of health visiting contacts. This may be the case if, for example, these variables are recorded at point of referral (from outside of health visiting services), rather than during the health visiting contacts. However, many variables (e.g. accommodation type) were poorly completed even in the high correlation local authorities and there may be different indicators that could be used to identify a more suitable subset for research questions focused on these areas. Information on how the variables in the table are defined are available in the CSDS Technical Output Specification.³⁶

For child protection plans, immunisations and the Ages and Stages Questionnaire (ASQ), we cannot tell whether children without a record were negative or missing, as they are only recorded if a child has a child protection plan/immunisation/ASQ. However, there are national estimates that we can compare against: CSDS recorded 121,107 children with an ASQ aged 2 or 3, which is 75% lower than PHE metrics (n=479,887).²⁵ PHE report that 92% of children aged 1 had the DtaP / IPV / Hib vaccine (a combined vaccine that protects against diphtheria, whooping cough, Haemophilus influenzae type b and polio).³⁷ In CSDS, only 19% of children aged 1 had a record of any vaccine, increasing to 35% in the high correlation group. According to Children in Need statistics, 17,950 children aged 0-5 years were on a Child Protection Plan on 31st March 2019.³⁸ This is nearly double the 9,889 children who had a Child Protection Plan recorded in CSDS at any point during 2018/19.

Table A4: completeness of other variables, by correlation group

	High correlation ¹	High and moderate ¹	All of CSDS
Number of LAs	33	47	149
Number of children in CSDS by age in years:			
These are the denominators for the percentages below			
0	85,945	146,750	519,949
1	90,475	156,025	568,102
2	93,525	160,775	575,675
3	87,605	154,910	559,219
4	80,746	147,505	549,269
5	75,950	141,505	542,451
0-5	514,245	907,470	3,314,665
Percentage of children in CSDS with a contact recorded: (age in years)			
The children without a contact recorded may have had no contact or they had a contact that was not recorded in CSDS; includes any record of contact (e.g. even if not attended)			
New birth visit (0y)	83% (71,560)	70% (102,600)	29% (150,440)
6-8 week review (0y)	69% (59,125)	59% (87,130)	23% (118,915)
12 month review (0y)	10% (8,710)	9% (13,315)	4% (18,764)
12 month review (1y)	74% (66,565)	64% (99,495)	24% (137,984)
2-2½ year review (2y)	60% (56,375)	62% (88,050)	19% (112,232)
2-2½ year review (3y)	20% (17,895)	18% (30,065)	6% (36,187)
Antenatal visit date (0-5y)	16% (79,865)	10% (87,095)	3% (105,809)
Any type of contact (0-5y)	813% (427,850)	75% (679,125)	58% (1,929,076)
Percentage of children in CSDS with complete data for: (age in years)			
Includes children with a value for these variables, including negative e.g. not looked after, but excluding unknown, don't know or missing.			
IMD (0-5y)	100% (514,245)	100% (907,470)	100% (3,314,665)
Ethnicity (0-5y)	84% (434,405)	84% (759,770)	82% (2,731,857)
Looked After Child (0-5y)	43% (221,020)	54% (488,075)	60% (1,972,723)
Safeguarding factors (0-5y)	46% (235,255)	56% (523,175)	63% (2,072,699)
Accommodation type (0-5y)	29% (149,985)	22% (199,470)	12% (382,643)
Disability (0-5y)	3% (16,895)	4% (40,805)	3% (88,587)
Breastfeeding status (0y)	69% (59,305)	57% (84,260)	26% (134,013)
Percentage of children in CSDS with a record of: (age in years)			
For these variables, we cannot tell whether a child without a record is missing or did not have an immunisation/child protection plan/ASQ			
Immunisation date (1y)	35% (31,600)	28% (42,910)	19% (108,666)
Immunisation type (1y)	26% (23,845)	22% (33,690)	14% (79,254)
Child Protection Plan (0-5y)	0% (1,200)	0% (2,825)	0% (9,889)
ASQ for 24/27/30 months (2y)	30% (27,950)	30% (48,530)	15% (89,113)
ASQ for 24/27/30 months (3y)	10% (9,745)	10% (16,095)	6% (31,904)

LAs = local authorities; ASQ = ages and stages questionnaire for 24, 27 or 30 month old children delivered at the 2-2½ year (ASQ3) review. Figures are rounded to nearest 5.

Are children in the high correlation local authorities nationally representative?

Recording of children in CSDS varied by ethnicity but not deprivation. ONS births reported a higher percentage of births of White children compared to CSDS: 72% vs 61% (Table A5). However, the data from ONS births included Wales, which likely has a higher proportion of White children than England. The percentage of children who were Asian, Black or another ethnicity were similar, but 14% of children were missing ethnicity compared to 4% in ONS births. This suggests that White children in CSDS were more likely to have missing data for ethnicity. In East Sussex, White children were under-represented and children with mixed ethnicity were over-represented in CSDS, compared to local data. In Barking and Dagenham, the percentage of White children was similar in CSDS and local data, but the local data recorded more children with mixed ethnicity and fewer Black and Asian children. As the overall number of children was similar, this is likely due to differences in recording, rather than differences in which children are in the datasets. The distribution of IMD in CSDS was similar to ONS births and local data from East Sussex and Barking and Dagenham (Table A6).

Children in the high correlation group were not representative of all children in CSDS in terms of ethnicity. The percentage of children in the mixed, Asian, Black and other ethnicity categories was lower in the high correlation group compared to all of CSDS (Table A5). This likely reflects regional differences in ethnicity. People in the Black, Asian, mixed and other ethnic groups are more likely to live in London than any other region in England, but only three of 32 London boroughs are in the high correlation subset.²⁸ Children in the high correlation group were similar in terms of deprivation. These differences mean that results from analysis of the high correlation group cannot be generalised to all children in England.

Table A5: The distribution of ethnicity and IMD for children aged less than 5 in the high correlation group compared to all CSDS and children in ONS births compared to births in CSDS

	Children aged <5 years in 2018/19		Births	
	Children in the high correlation group (33 LAs) ¹	All children in CSDS (149 LAs)	Children in ONS births (2018) ²	Children in CSDS born in 2018/19 (151 LAs)
Ethnicity				
White	297,365 (68%)	1,845,171 (56%)	468,456 (72%)	316,820 (61%)
Mixed	32,255 (7%)	325,145 (10%)	³	³
Asian	23,350 (5%)	298,071 (9%)	56,821 (8%)	48,265 (9%)
Black	9,865 (2%)	129,352 (4%)	27,363 (4%)	19,610 (4%)
Other	10,200 (2%)	109,987 (3%)	77,060 (12%)	59,880 (12%)
Missing	64,360 (15%)	609,939 (18%)	27,023 (4%)	75,375 (14%)
Total	437,395	3,314,665	656,723	519,950
IMD				
1 (most deprived)	112,305 (26%)	832,885 (25%)	161,709 (26%)	129,915 (25%)
2	88,285 (20%)	714,728 (22%)	140,416 (22%)	113,005 (22%)
3	85,145 (19%)	640,986 (19%)	121,500 (19%)	103,655 (20%)
4	76,630 (18%)	575,712 (17%)	107,339 (17%)	91,340 (18%)
5 (least deprived)	75,025 (17%)	550,354 (17%)	94,687 (15%)	82,030 (16%)
Total	437,390	3,314,665	625,651	519,945

¹ CSDS data for the high correlation LAs is rounded to the nearest 5² Ethnicity includes children born in Wales which is why the total is higher; ³ ONS do not report mixed as an ethnicity category in ONS births, therefore we have grouped mixed with other for this comparison

Table A6: Comparison of the distribution of IMD and ethnicity recorded in local data vs CSDS for East Sussex and Barking and Dagenham

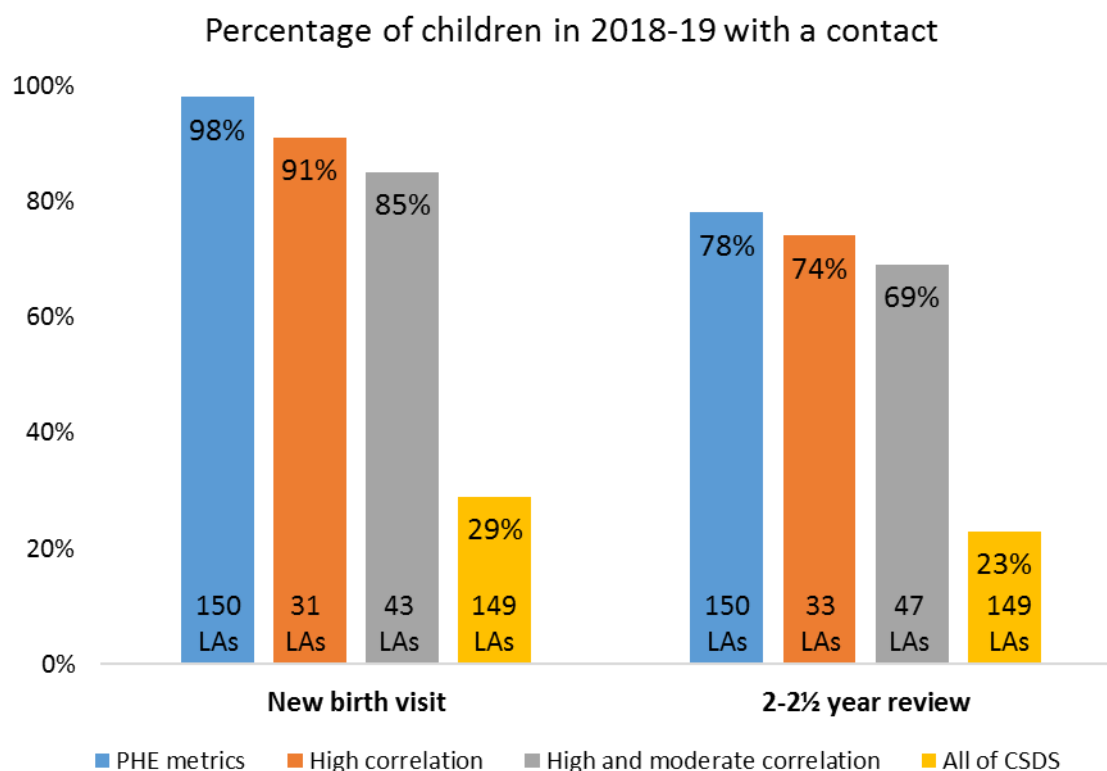
Children aged <5 years	East Sussex		Barking and Dagenham	
	Local data	CSDS ¹	Local data	CSDS ¹
Ethnicity				
White	21,453 (79%)	16,635 (69%)	5,786 (32%)	5,770 (32%)
Mixed	1,140 (4%)	2,585 (11%)	3,672 (20%)	975 (5%)
Asian	556 (2%)	450 (2%)	2,683 (15%)	4,230 (23%)
Black	204 (1%)	190 (1%)	1,081 (6%)	3,350 (18%)
Other	213 (1%)	260 (1%)	428 (2%)	740 (4%)
Missing	3,669 (13%)	4,145 (17%)	4,534 (25%)	3,150 (17%)
Total	27,235	24,265	18,184	18,215
IMD				
1 (most deprived)	5,162 (19%)	4,840 (20%)	10,067 (59%)	10,190 (56%)
2	5,275 (19%)	4,965 (20%)	6,200 (36%)	6,815 (37%)
3	6,314 (23%)	5,840 (24%)	1,011 (6%)	1,210 (7%)
4	5,615 (21%)	5,310 (22%)	0 (0%)	0 (0%)
5 (least deprived)	3,521 (13%)	3,305 (14%)	0 (0%)	0 (0%)
Missing	1,348 (5%)	0 (0%)	0 (0%)	0 (0%)
Total	27,235	24,260	17,278	18,215

¹CSDS data is rounded to nearest 5

What percentage of children receive contacts using different correlation groups?

In the high correlation category, 91% of children born in 2018/19 received a new birth visit and 74% received a 2-2½ year review, which are lower values than the 98% and 78% reported in the PHE metrics (Table A7 and Figure A2). If all of CSDS was used to calculate these percentages, the results would be 29% and 23%. This illustrates the difference in results using all of CSDS compared to the high correlation subset.

Figure A2: Percentage of children with each contact by correlation category and in PHE metrics



LAs = local authorities

Table A7: Percentage of children with each contact by correlation category and in PHE metrics

Data source	Percentage of children in 2018/19 with	
	New birth visit ^{1,2}	2-2½ year review ³
PHE metrics (150 LAs)	98% (597,830 / 608,847)	78% (531,436 / 672,241)
High correlation (31/33 LAs)	91% (107,470 / 117,620)	74% (55,975 / 75,955)
High & moderate correlation (43/47 LAs)	85% (161,530 / 190,320)	69% (86,705 / 124,355)
All of CSDS (149 LAs)	29% (145,529 / 505,741)	23% (110,975 / 492,840)

¹ categorisation of local authority quarters to correlation categories based on only denominator and new birth visit indicators; ² Includes visits that are face-to-face or are missing the medium; ³ categorisation of local authority quarters to correlation categories based on only denominator and 2-2½ year review indicators; LAs = local authorities; 150 local authorities in PHE metrics and 149 in CSDS due to a change in local authority boundaries (creation of new local authority Bournemouth, Christchurch & Poole)

Appendix 3: Supplementary material RQs3&4

What can we learn from the ‘research-ready’ subset of CSDS about the characteristics of children who receive a 2-2½ year review?

Methods

We calculated the percentage of children with a record of a contact as:

- 2-2½ year reviews attended: 2-2½ year reviews which were recorded as attended or where the attendance code was missing. We included those with a missing attendance code (5% of 2-2½ year reviews) because the majority of complete records (92%) were attended.
- 2-2½ year reviews scheduled: any scheduled 2-2½ year review, including those that were cancelled or not attended.
- Any face-to-face contact attended: any face-to-face contacts that were recorded as attended or where the attendance code was missing.
- Any face-to-face contact at home: any face-to-face contacts that were recorded as attended or where the attendance code was missing and location was recorded as at the child’s home.

We also report the median (and interquartile range) for the number of all attended contacts per child (including letters and phone calls) and face-to-face attended contacts.

We estimated the denominators for children who had a 2-2½ year review and who had any contact aged 2 using the methods explained in Appendix 2 (page 42).

In our analyses of any face-to-face contacts, we only included contacts delivered by health visiting or children’s community nursing services, or where the team type was missing. Excluded contacts were most commonly delivered by speech and language therapy services, community paediatrics services and physiotherapy services. School nursing, family support and vulnerable children’s services were recorded very rarely for 2-2½ year reviews, suggesting errors in coding or contacts delivered by staff outside of the health visiting team.

We classified children as having safeguarding vulnerability or being a Looked After Child if they had a positive indicator for safeguarding vulnerability/Looked After Child at any point during 2018/19. This means a child who was Looked After for only a few months would be classed as Looked After. The factors that would result in the child being marked as “vulnerable” are given in Box 1 (in main report), as reported in the CSDS technical output specification.³⁶ Completeness of safeguarding vulnerability and Looked After Child indicators varied by local authority within the high correlation group (Table A3 in these appendices), therefore we only included local authorities with less than 10% missing for these variables. We included all local authorities for our analyses of IMD and ethnicity, because IMD was complete for all local authorities and ethnicity had a similar level of completeness (16-23% missing) across all local authorities.

Results

Table A8: Percentage of children aged 2 or 3 with a 2-2½ year review recorded as attended or scheduled by child characteristic

Child characteristic	Percentage of children aged 2 or 3 with a 2-2½ year review recorded ²			
	Attended ³		Scheduled ⁴	
	% (95% CI)	Children with 2-2½ year review / eligible children ¹	% (95% CI)	Children with 2-2½ year review / eligible children ¹
All children (33 LAs)	74% (73%, 74%)	55,975 / 75,960	75% (74%, 75%)	56,375 / 75,630
IMD (33 LAs)				
1 (most deprived)	72% (72%, 73%)	14,295 / 19,800	72% (71%, 73%)	14,405 / 19,675
2	72% (71%, 72%)	11,065 / 15,475	72% (71%, 72%)	11,200 / 15,390
3	73% (72%, 74%)	10,685 / 14,680	73% (72%, 74%)	10,800 / 14,600
4	75% (75%, 76%)	9,850 / 13,075	75% (75%, 76%)	9,950 / 13,005
5 (least deprived)	78% (77%, 78%)	10,045 / 12,940	78% (77%, 78%)	10,115 / 12,905
Ethnicity (33 LAs)				
White	73% (72%, 73%)	33,455 / 45,920	74% (73%, 74%)	33,735 / 45,720
Mixed	79% (78%, 80%)	5,875 / 7,405	80% (79%, 81%)	5,900 / 7,375
Asian or Asian British	76% (75%, 78%)	2,920 / 3,825	77% (76%, 78%)	2,930 / 3,800
Black or Black British	73% (71%, 75%)	1,185 / 1,620	74% (72%, 76%)	1,190 / 1,605
Other	63% (61%, 66%)	1,045 / 1,650	65% (62%, 67%)	1,055 / 1,635
Looked After children (13 LAs)				
No	69% (69%, 70%)	19,475 / 28,035	72% (71%, 72%)	19,330 / 27,870
Yes	44% (37%, 51%)	90 / 205	44% (37%, 51%)	90 / 205
Safeguarding factors (7 LAs)				
No	86% (85%, 86%)	13,090 / 15,280	87% (87%, 88%)	19,930 / 27,870
Yes	83% (78%, 88%)	170 / 205	83% (78%, 88%)	170 / 205

¹ number of children with a 2-2½ year review aged 2 divided by the number of children aged 2 minus number of children who received the contact aged 3; ² Rounded to nearest 5³ contacts attended = any contact that was attended or if attendance code was missing; ⁴ contacts attempted = any contact that was scheduled and recorded in CSDS even if contact was cancelled or not attended; LAs = local authorities; IMD = index of multiple deprivation quintile

Table A9: Percentage of children aged with a record of a face-to-face contact in any location and at home by child characteristic

Child characteristic	Percentage of children aged with a record of a face-to-face contact ¹			
	In any location		At home	
	% (95% CI)	Children with a contact / children aged 2	% (95% CI)	Children with a contact / children aged 2
All children (33 LAs)	76% (75%, 76%)	70,695 / 93,525	28% (27%, 28%)	26,130 / 93,525
IMD (33 LAs)				
1 (most deprived)	78% (78%, 79%)	18,620 / 23,785	38% (37%, 38%)	8,920 / 23,785
2	76% (76%, 77%)	14,420 / 18,910	28% (27%, 29%)	5,345 / 18,910
3	74% (73%, 74%)	13,630 / 18,465	27% (26%, 27%)	4,900 / 18,465
4	73% (73%, 74%)	11,985 / 16,345	24% (23%, 24%)	3,845 / 16,345
5 (least deprived)	76% (75%, 76%)	12,165 / 16,015	20% (19%, 21%)	3,210 / 16,015
Ethnicity (33 LAs)				
White	73% (72%, 73%)	42,360 / 58,150	27% (27%, 28%)	15,985 / 58,150
Mixed	90% (89%, 91%)	7,390 / 8,210	25% (24%, 26%)	2,020 / 8,210
Asian or Asian British	80% (78%, 81%)	3,555 / 4,470	32% (31%, 33%)	1,435 / 4,470
Black or Black British	80% (79%, 82%)	1,530 / 1,905	32% (31%, 33%)	595 / 1,905
Other	71% (69%, 73%)	1,450 / 2,030	31% (29%, 33%)	630 / 2,030
Looked After children (13 LAs)				
No	77% (77%, 78%)	26,820 / 34,705	27% (27%, 28%)	9,500 / 34,705
Yes	71% (65%, 77%)	170 / 240	63% (56%, 67%)	150 / 240
Safeguarding factors (7 LAs)				
No	80% (80%, 81%)	14,550 / 18,150	38% (38%, 39%)	6,420 / 18,150
Yes	78% (73%, 83%)	195 / 250	65% (59%, 70%)	130 / 205

¹ Rounded to nearest 5 to reduce risk of disclosure as data is subnational; LAs = local authorities; IMD = index of multiple deprivation quintile

Table A10 Percentage of children aged 2 at the end of 2018/19 with any contact with health visiting team

Child characteristic	Any type of contact (including telephone/letters) % (95% CI)	Children with a contact / children aged 2
All children (33 LAs)	78% (78%, 78%)	73,065 / 93,525
IMD (33 LAs)		
1 (most deprived)	81% (80%, 82%)	19,305 / 23,785
2	79% (78%, 79%)	14,870 / 18,910
3	76% (75%, 77%)	14,035 / 18,465
4	76% (75%, 77%)	12,420 / 16,345
5 (least deprived)	78% (78%, 79%)	12,565 / 16,015
Ethnicity (33 LAs)		
White	75% (75%, 75%)	43,655 / 58,150
Mixed	91% (91%, 92%)	7,505 / 8,210
Asian or Asian British	81% (80%, 82%)	3,620 / 4,470
Black or Black British	82% (80%, 83%)	1,555 / 1,905
Other	75% (73%, 77%)	1,520 / 2,030
Looked After children (13 LAs)		
No	79% (78%, 79%)	27,355 / 34,705
Yes	73% (67%, 79%)	175 / 240
Safeguarding factors (7 LAs)		
No	83% (83%, 84%)	15,120 / 18,150
Yes	80% (75%, 85%)	200 / 250

¹ Rounded to nearest 5 to reduce risk of disclosure as data is subnational; LAs = local authorities; IMD = index of multiple deprivation quintile

Table A11 Characteristics of 2-2½ year reviews by IMD for children in 33 high correlation local authorities

	Number and percentage of 2-2½ year reviews with each characteristic by IMD (95% confidence interval) ¹					
	1 (most deprived)	2	3	4	5 (least deprived)	Total
Location						
Other location	6,200 37% (36%, 38%)	7,800 58% (57%, 58%)	8,130 60% (59%, 60%)	7,160 59% (58%, 59%)	7,100 56% (55%, 56%)	36,390 53% (52%, 53%)
Child's home	7,295 43% (43%, 44%)	4,100 30% (19%, 31%)	3,980 29% (28%, 30%)	3,070 25% (24%, 26%)	2,480 20% (19%, 20%)	20,925 30% (30%, 31%)
Missing	3,365 20% (19%, 21%)	1,660 12% (19%, 31%)	1,545 11% (11%, 12%)	1,990 16% (16%, 17%)	3,030 24% (23%, 25%)	11,590 17% (17%, 17%)
Medium						
Not face to face	80 0% (0%, 1%)	120 1% (19%, 31%)	105 1% (1%, 1%)	95 1% (1%, 1%)	90 1% (1%, 1%)	490 1% (1%, 1%)
Face to face	16,485 98% (98%, 98%)	12,975 96% (19%, 31%)	12,780 94% (93%, 94%)	11,675 96% (95%, 96%)	12,245 97% (97%, 97%)	66,160 96% (96%, 96%)
Missing	295 2% (2%, 2%)	460 3% (19%, 31%)	770 6% (5%, 6%)	450 4% (3%, 4%)	275 2% (2%, 2%)	2,250 3% (3%, 3%)
Group						
Not group	13,840 82% (82%, 83%)	9,735 72% (71%, 73%)	9,655 71% (70%, 71%)	8,925 73% (72%, 74%)	9,975 79% (78%, 80%)	52,130 76% (75%, 76%)
Group	225 1% (1%, 2%)	205 2% (1%, 2%)	110 1% (1%, 1%)	110 1% (1%, 1%)	45 0% (0%, 0%)	695 1% (1%, 1%)
Missing	2,795 17% (16%, 17%)	3,635 27% (26%, 28%)	3,890 28% (28%, 29%)	3,205 26% (25%, 27%)	2,580 20% (20%, 21%)	16,105 23% (23%, 24%)
Duration						
≤30 min	2,785 17% (16%, 17%)	2,785 21% (20%, 21%)	3,065 22% (22%, 23%)	2,765 23% (22%, 23%)	2,580 20% (20%, 21%)	13,950 20% (20%, 21%)
31-60 min	10,300 61% (60%, 62%)	8,775 65% (64%, 66%)	8,230 60% (59%, 61%)	7,685 63% (62%, 64%)	8,355 66% (65%, 67%)	43,345 63% (63%, 63%)
61-90 min	1,270 8% (7%, 8%)	1,115 8% (8%, 9%)	1,285 9% (9%, 10%)	1,005 8% (8%, 9%)	1,265 10% (10%, 11%)	5,940 9% (8%, 9%)

>90 min	295	160	125	120	85	785
	2% (2%, 2%)	1% (1%, 1%)	1% (1%, 1%)	1% (1%, 1%)	1% (1%, 1%)	1% (1%, 1%)
Missing	2,200	735	930	665	310	4,840
	13% (13%, 14%)	5% (5%, 6%)	7% (6%, 7%)	5% (5%, 6%)	2% (2%, 3%)	7% (7%, 7%)
Total	16,860	13,555	13,655	12,220	12,610	68,900

¹ Rounded to nearest 5 to reduce risk of disclosure as data is subnational; IMD = index of multiple deprivation quintile

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