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Publicly available ASQ®-3 and 2-2½-year health and development review data: completeness and useability

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Ethics

Ethical approval was not required for this project as it was an analysis of existing publicly available data.

Art

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Background

As part of the Healthy Child Programme (HCP), health visiting is mandated at several milestones, including at 2-2½-years, in the form of a health review.[1] This health review will be conducted in a clinic or a child's home by a health visitor, staff nurse or a nursery nurse from the health visiting team. The Ages and Stages Questionnaire®, Third Edition (ASQ®-3) is one part of this review and is a tool to measure child development across five domains. The questionnaire allows for parent-led exploration of child development in conversation with the member of the health visiting team. ASQ®-3 is mandated for use to collect population-level data in one of the five health and wellbeing reviews that occur before school age, and should be completed universally, for every child in England aged two years as per the health visiting and school nursing service delivery model.[2] The data collected are used as a population measure, designed to identify population health needs and allows for planning and delivery of services within a community to improve health and wellbeing outcomes early in life. However, at times, ASQ®-3 is used as an assessment of development in individual children at times, despite not being mandated for this use.[3]

Data on the 2-2½-years and ASQ®-3 scores are entered into local data systems by NHS providers and are then transferred to the Community Services Dataset (CSDS), which is a national-level administrative dataset held by NHS England.[4] However, CSDS is still considered 'experimental' (new and official statistics used to involve users and stakeholders in their development and to build in quality at an early stage), so there are known issues with data quality and completeness. The Office for Health Improvement and Disparities (OHID) provides an alternative and publicly available interim reporting system to ensure adequate reporting of child development while providers work to fully operationalise mandatory CSDS reporting. The interim reporting is submitted to OHID at aggregate level for each local authority and is presented in this form on the OHID website, by quarter of each fiscal year.[5]

Our research teams are working to assess data completeness for ASQ®-3 in CSDS to inform future uses of this data for monitoring child development and evaluating policies and interventions.[6] As part of this work, we analysed the publicly available interim reporting data to understand how rates of 2-2½-years and ASQ®-3 scores vary by local authority in these data.

Aim

To describe the variation in rates of 2-2½-years and ASQ®-3 scores by local authority in publicly available data in one year (2020-2021).

Research Questions

1. How many local authorities submitted data to the interim reporting system in 2020-2021, and how does that vary by quarter?
2. How similar are the proportions of children receiving a 2-2½-year health and development review and with an ASQ® score, based on publicly available data?

Methods

I accessed the following datasets from the OHID website:

- Interim reporting system annual dataset on child development outcomes for 2020-2021[7]
- Health visitor service delivery metrics for 2020-2021[8]

I used Public Health England's Fingertips portal to obtain 2019 Index of Multiple Deprivation scores.[9] Following data collection, the data needed to be cleaned, mainly by performing local authority

matching because the number of local authorities in England changes slightly year-on-year and there were slight discrepancies in the number of local authorities in each dataset (justifications for the changes made are outlined in Appendix 1). These changes resulted in 149 local authorities present in the dataset, a change from the 153 in the IMD 2019 dataset. Next, I used the data downloaded to create and define variables needed for this analysis including region which defined local authority, measures of ASQ®-3 performance, and levels of health visiting in a region (see Appendix 2 for more details). These data were then imported into Stata for analysis.[10]

To see how complete the dataset was I used Stata to gain information about how many children received ASQ®-3, and how many were performing above the expected level based on voluntary reporting. This provided information on how many local authorities were missing information for a variable, and how many submitted data (Table 1 and Table 2). To then see how this varied across local authority, I created new variables which identified how many values were missing for total number of children receiving ASQ®-3, total number of children performing above expected levels in ASQ®-3, and the total number of missing data values in a submission. I also explored whether a pattern exists between IMD and missing values (Figure 1). To see how ASQ®-3 is utilised in health visiting, the health visitor service delivery metrics were merged into the dataset, totals of children eligible for their 2–2½-year health and development review, those who received a 2–2½-year health and development review, and those who received ASQ®-3 in the year 2020-2021 were calculated to draw percentages of those in the publicly available data who received ASQ®-3 (Figure 2).

Results

How many local authorities submitted data to the interim reporting system in 2020-2021?

My findings (outlined fully in Appendix 3) indicate that for annual data in financial year 2020/2021, 90.6% of local authorities (n=135/149) submitted

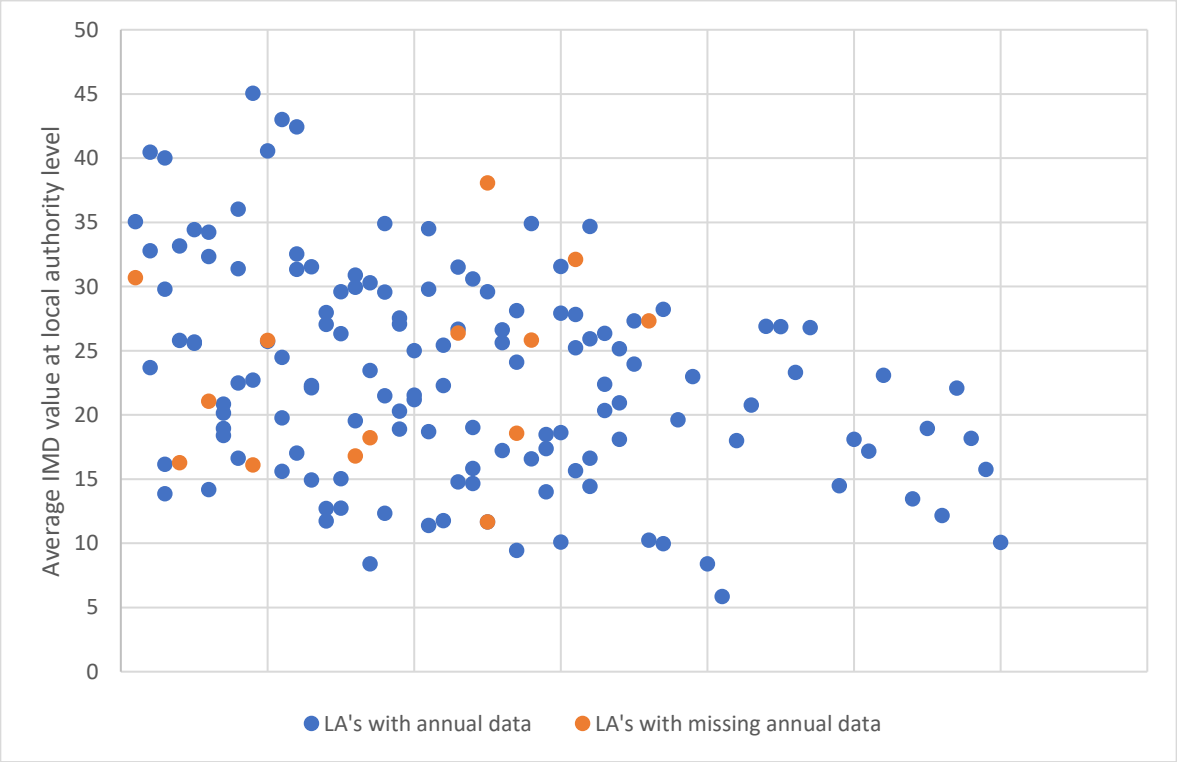

Figure 1. Scatter plot of each local authority that did and did not submit annual data on percentage of children performing at or above expected levels by average index of multiple deprivation (IMD) values of each local authority (LA).

data on scoring of children who received the ASQ®-3, and proportion of children performing above the expected level. This was consistent across the domains within the ASQ®-3, with one local authority submitting scoring records on the communication domain.

On a quarterly-level, more local authorities submitted data on the number of children who had received an ASQ®-3 than the number who had scored at or above the expected level. Although all domains of ASQ®-3 should be completed for a child and entered onto the system, more local authorities submitted data on communication than the other domains. Inconsistency in usage has been evidenced in other research and can create issues with analysis of ASQ®-3 data.[11]

Of the 14 local authorities (N=14) without data submitted for their annual submission, eight submitted data for some quarters and did not report any ASQ®-3 scoring whatsoever. Meanwhile, there were an additional further 12 local authorities with up to one quarter missing in their submissions.

There was no patterning of annual data submission by local authority deprivation (average IMD, local authorities, see Fig 1).

What percentage of eligible children are represented in the scored ASQ®-3 data, a 2-2½-year health and development review, and one with an ASQ®-3 score?

While the information on ASQ®-3 scoring is a result of submissions from 135 local authorities, the aggregate total of records of receipt of ASQ®-3 and receipt of health visiting review is a result of information from 140 local authorities, and the data regarding all children eligible comes from aggregate data from 145 local authorities.

In the publicly available data, we only have ASQ®-3 score data for equivalent of 59.1% of the eligible population, or 80% of the number of children who have a review. Only 62.5% of eligible children represented in the data are recorded to have received the ASQ®-3.

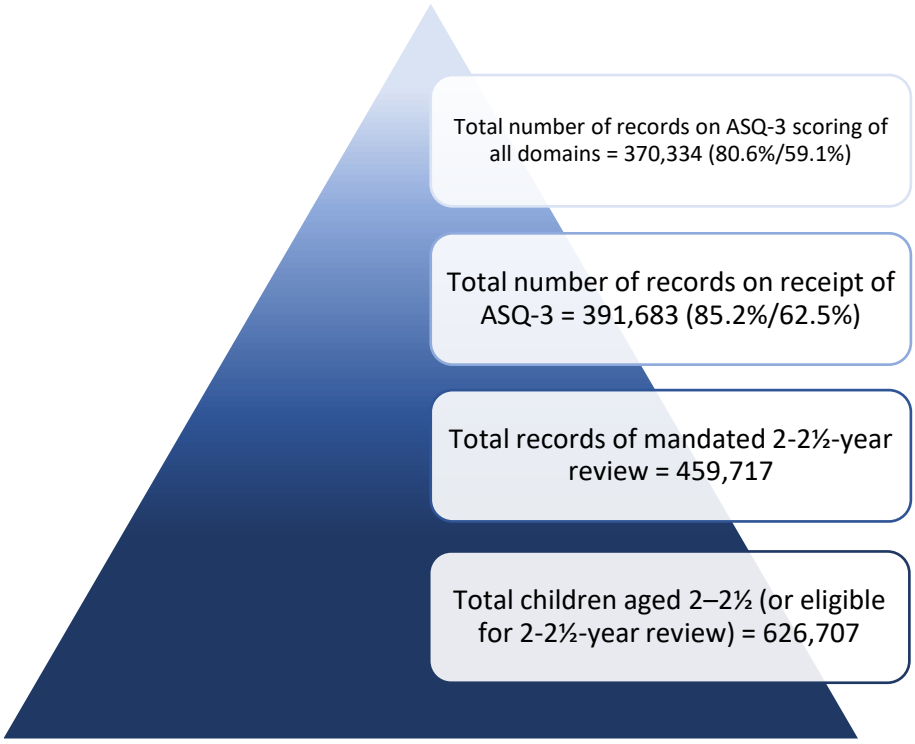

Figure 2. Comparison of the numbers and percentages of records of children with ASQ scores and ASQ receipt based on the total records of mandated reviews/total records of eligible children. Note: This is based on aggregate data, there is no way to confirm if the same child is represented in each statistic

Limitations

- These are aggregate-level data and we don't have information on individual children to confirm that it is the same children represented in the health visiting review aggregate data and the ASQ®-3 aggregate data.
- As this is aggregate data, we have not been able to look at how far the ASQ®-3 data is socially patterned which is important for understanding how far the publicly available statistics are representative of the percentage of children in England who are at or above expected child development.
- We have not investigated why there are lower numbers of ASQ®-3 than expected compared to the 2-2½-year health and development review or why some local authorities have not submitted data for all quarters or for the annual returns.

Conclusions

Ninety percent (90.6%) of local authorities (n=135/149) submitted annual data on the percentage of children receiving an ASQ®-3. We found that only 80.1% of the children with a 2-2½-year health and development review had an ASQ®-3 score and only 59.1% of all eligible children in England had an ASQ®-3 score.

We did not see any pattern between average IMD of a local authority and their submission patterns. The local authorities that provided no annual data showed no noticeable variation in average deprivation compared to those who did submit annual data.

Based on interim reporting statistics for 2020-2021 82.9% of children who received a review in 2020-2021 performed at or above expected levels in all domains.[7] However, if the children not represented in the aggregate ASQ®-3 score data were systematically more or less likely to have expected levels of development then the children who were included, this whole country estimate could be inaccurate.

Implications

- OHID and local authorities could benefit from investigating the non-submission of ASQ®-3 scoring data for local authorities that have submitted data on children receiving ASQ®-3.
- Researchers should be aware that information from the interim reporting system in isolation might not present a complete picture of children's development in England due to the amount of missing data. Using multiple sources can help paint a better picture.

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Appendix

Appendix 1: Adjusted Local Authorities List

Area Code	Region	Notes
E06000052	Cornwall and Isles of Scilly	E06000053 (Isles of Scilly)'s IMD value was removed as the ASQ®-3 dataset listed Cornwall (E06000052) as Cornwall & Isles of Scilly, and if we were to do weighted averages of IMD with the two combined, the value would change very little due to the population difference between the two areas.
E06000060	Buckinghamshire	ASQ®-3 and Health Visiting metrics list Buckinghamshire as E10000002, where the IMD data uses E06000060, so this was used in the data.
E09000012	Hackney	E09000001 (City of London) was removed as it is negligible in size and none of the ASQ®-3 or Health Visiting data uses it, preferring to refer to Hackney (E09000012) as Hackney and City of London.
E10000006	Cumbria	E10000006 (Cumbria) is used in the ASQ®-3 and Health Visiting metrics, this is separated as Cumberland (E06000063), and Westmorland and Furness (E06000064) in IMD data, the IMD values are similar, so they were averaged, and the result put under "Cumbria".
E10000021	Northamptonshire	ASQ®-3 and Health Visiting datasets use E10000021 (Northamptonshire) where IMD data separates this as E06000061 (North Northamptonshire) and E06000062 (West Northamptonshire) - an average will be taken on North and West Northamptonshire IMD values, and they will be merged to be matched against Northamptonshire on final dataset.
E10000023	North Yorkshire	E06000065 (North Yorkshire UA) is no longer used so the IMD data for this was placed against E10000023 (North Yorkshire).
E10000027	Somerset	E06000066 (Somerset UA) is no longer used so the IMD value was placed under E10000027 (Somerset).

Appendix 2: Datasets and variables utilized

Dataset Name	Source	Variables used	Notes
Deprivation Score (IMD 2019)	PHE Fingertips 2023 (English indices of deprivation 2019, Ministry of Housing, Communities & Local Government)	Area Code	
		Area Name	
		Value	
		Compared to England value or percentiles	
Interim reporting system annual data set on child development outcomes for 2020-2021	Office for Health Improvement and Disparities. Child development outcomes at 2 to 2½ years. 2020-2021 Crown Copyright © 2021	Total number of children who received a 2-2½ year health and development review in the quarter for whom the ASQ®-3 **domain** skills was completed	Variables were taken for each quarter of the fiscal year, and for annual data.
		Total number of children who received a 2-2½ year health and development review in the quarter who were at or above the expected level in **domain** skills	
		95% confidence intervals	
		Total number of children who received a 2-2½ year health and development review in the quarter for whom the ASQ®3 all five areas was completed	
		Total number of children who received a 2-2½ year health and development review in the quarter who were at or above the expected level in all five areas of development	
		95% confidence interval	
Health visitor service delivery metrics for 2020-2021	Office for Health Improvement and Disparities. Health Visitor Delivery Metrics (Experimental Statistics). 2020-2021 Crown Copyright © 2021	Total number of children aged 2½ years in the quarter/year.	Variables were taken for each quarter of the fiscal year, and for annual data.
		Number of children who received a 2-2½ year health and development review	
		Percentage of children who received a 2-2½ year health and development review	
		95% confidence interval	
		Total number of children who received a 2-2½ year health and development review by the end of the quarter/year	
		Number of children who received a 2-2½ year health and development review using Ages and Stages Questionnaire (ASQ®-3)	
		Percentage of children who received a 2-2½ year health and development review using Ages and Stages Questionnaire (ASQ®-3)	
		95% confidence interval	

Appendix 3: ASQ®-3 scoring submissions in 2020-21

Table 1. Number and percentage of total local authorities (n=149) that submitted data on ASQ-3 scoring across all domains to the interim reporting by quarter in fiscal year 2020-2021.

	Local authorities that submitted ASQ® scores		Local authorities that submitted those performing at or above expected level	
	N	%	N	%
Q1	135	90.6	128	85.9
Q2	142	95.3	135	90.6
Q3	143	96.0	135	90.6
Q4	142	95.3	134	89.9
Annual	135	90.6	135	90.6

Table 2. Percentage of local authorities (n=149) that submitted data on ASQ®-3 scoring in each domain to the interim reporting by quarter in fiscal year 2020-2021.

	Communication		Gross Motor		Fine Motor		Problem Solving		Personal-Social	
(%)	Total	Expected or above expected	Total	Expected or above expected	Total	Expected or above expected	Total	Expected or above expected	Total	Expected or above expected
Q1	90.6	86.6	90.6	85.9	90.6	85.9	90.6	85.9	90.6	85.2
Q2	95.3	91.3	95.3	90.6	95.3	90.6	95.3	90.6	95.3	90.6
Q3	96.0	91.3	96.0	90.6	96.0	90.6	96.0	90.6	96.0	90.6
Q4	95.3	89.9	95.3	89.9	95.3	89.9	95.3	89.9	95.3	89.9
Annual	91.3	91.3	90.6	90.6	90.6	90.6	90.6	90.6	90.6	90.6