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Estimated cumulative incidence of intervention by children's social care services to age 18: a whole-of-England administrative data cohort study using the child in need census

Matthew A. Jay[1,*], Patricio Troncoso[2], Andy Bilson[3], Dave Thomson[4], Richard Dorsett[5], Rachel Pearson[1], Bianca De Stavola[1], and Ruth Gilbert[1]

Abstract

Introduction
Each year, children's social care (CSC) recognises around 3% of all children as children in need (CiN) of intervention, including those who receive a child protection plan due to risks of substantial harm and those who become looked after in state care. A previous cumulative estimate of the incidence of becoming CiN of 14% to age 5 indicates that the childhood lifetime incidence is likely very high.

Objectives
We aimed to estimate the cumulative incidence of referrals, social work assessments, being recognised as a CiN or made subject to a child protection plan (CPP) before age 18 in England.

Methods
The annual CiN census contains all-of-England longitudinal records of CSC referrals. Data collection began in 2008, meaning there is no cohort that can be followed up from birth to age 17 (i.e., before 18th birthday). Analyses revealed data quality issues before 2011/12. We estimated the above cumulative incidences in three cohorts and combined them, adjusting numerators to account for left-censoring. The three cohorts were children born in: (a) 2012/13, followed to age 5; (b) 2005/06, followed from age 6 age to 12; and (c) 2000/01, followed from age 13 to 17. We carried out sensitivity analyses to address possible bias induced by linkage error using one of two encrypted identifiers in the dataset.

Results
Of all children living in England, before turning 18, 35.4% were referred, 32.3% were assessed, 25.3% were recorded as CiN and 6.9% were subject to a CPP (37.5%, 34.6%, 26.0% and 7.1%, respectively, in sensitivity analyses).

Conclusions
By age 18, an estimated 1 in 4 children are identified by CSC as needing support at some point. Government should monitor the cumulative incidence of ever receiving CSC support with a view to addressing upstream health and social determinants.

Keywords
children's social care; child in need; social work; child in need census; cumulative incidence

*Corresponding Author:
Email Address: matthew.jay@ucl.ac.uk (Matthew A. Jay)

Introduction

Children's social care (CSC) provides a range of interventions to support children and families and to protect children from harm [1–3]. CSC departments, which across England are organised by local authorities (currently numbering 153), have a range of responsibilities to assess children and, if needed, intervene by providing services under a child in need (CiN) plan. Services may include provisions for disability (such as home adaptations), support to improve parenting capacity or short-term breaks ("respite care"). Children at risk of, or experiencing, abuse or neglect, should be investigated and may be subject to a child protection plan (CPP) or placed into state care [1–3].

The population of children served by CSC is large. Official Department for Education figures show that 4% to 5% of all children in England are referred to CSC each year [4]. Just over 3% of children are recorded as CiN on any given day, 0.4% are subject to a CPP, and 0.4% are placed into care [4]. These annual figures, however, do not reflect the extent to which all children are involved with CSC at some point across childhood. A high proportion of children who were ever a child in need implies a high proportion of families without sufficient resources to meet their needs privately, even if only temporarily. National monitoring of the cumulative incidence of ever being a child in need would inform debates on the place and purpose of CSC services and policies to tackle upstream determinants of social need and to improve support for parenting and children. Evidence on who was ever a child in need would also inform government interventions to mitigate the adverse health, development and economic outcomes for these children and as they become adults and parents themselves.

The cumulative incidence of receiving CSC services across childhood in England is not known. Bilson and Martin [5] used freedom of information requests (111/152 local authorities providing data) to estimate that 23% of children born in England in 2009 were referred to CSC at least once before age 5. Further, 17% of children received a social work assessment and 14% were recognised as a CiN over the same period. While these figures to age 5 alone are very substantial, the majority of CiN in any given year are aged over 5 years [4] and so the cumulative incidence to age 18 is likely to be significantly higher.

All-of-England administrative data can be used to estimate cumulative incidences. For example, Mc Grath-Lone et al [6] used the children looked after return [7] to find that 3.3% of all children born in England in 1992–1994 entered out-of-home care at least once before turning 18. The children looked after return only includes children who become looked after in state care. A separate dataset, the CiN census [8], includes information on all children referred to, assessed, and found to be CiN by CSC departments. In an analysis for the Department for Education, Troncoso [9] used this dataset to replicate Bilson and Martin's [5] estimate and found that 19% of children born in 2009/10 were referred to CSC at least once before turning five. Using a more up-to-date extract of the CiN census, we aimed to estimate the cumulative incidence of being referred, assessed, found to be a child in need or made subject to a child protection plan (CPP) before age 18.

Methods

Data sources

CSC services in England are run by 153 local authorities, exercising various powers and duties under the Children Act 1989. Children can be referred to CSC by a number of agencies including self-referral by the family, though the most common referral sources are police, schools and healthcare [4]. Different local authorities have different service configurations but, broadly speaking, among children with officially recorded referrals, most receive a social work assessment and, of children who receive an assessment, most are considered "in need" [4, 8]. A subset of children is referred due to safeguarding concerns. The result of a safeguarding investigation may be that the child is made subject to a CPP, which should specify what should be done to keep the child safe, or the local authority may instigate care proceedings to receive the child into state care [1]. Some children may be "referred" to CSC but are seen through early help or other local authority services, and are not recorded in the CiN census [8, 10]. Additionally, where a child is referred but not assessed (or assessed and found not to be in need), they may be eligible for other services, though data on such services are also not available.

Our deidentified copy of the CiN census [8] was a complete extract from 1 October 2008 to 31 March 2018 covering data from all CSC departments in England. Data were available on referrals, whether children were assessed by a social worker, whether the child was recognised as a CiN and whether the child was subject to a CPP. Children who are legally recognised as CiN because they are looked after in state care are included in the CiN census, though information identifying them as such is not available. Data are collected annually and can be analysed longitudinally using identifiers described below. We cleaned the data according to Supplementary File 1.

Study design

Because the CiN census began in October 2008, there was not a single cohort that could be followed from birth to age 18. Additionally, analyses of data quality (Supplementary File 2) revealed an undercount of events in the years before financial year 2011/12, especially for under-5s. Consequently, reliable data for birth cohort approaches are only available from 2011/12. We therefore adopted an approach akin to an accelerated longitudinal design [11] by combining cumulative incidence estimates in three separate open cohorts (Figure 1). Children did not have to be born in England (birth place is not collected in the CiN census). These cohorts were: 1) children born in 2012/13 (all financial years, April to March), followed to age 5 (i.e., to the day before their 6th birthday); 2) children born in 2005/06, followed from age 6 age to 12; and 3) children born in 2000/01, followed from age 13 to 17.

Cumulative incidence

We examined the cumulative incidence of (all to age 18): (a) being referred to CSC; (b) being assessed by a social worker; (c) being recorded as a CiN; and (d) being as subject to a CPP. Whether a referral of a child resulted in an assessment was determined by reference to a variable in the CiN census

Figure 1: Data coverage and observation period for each cohort
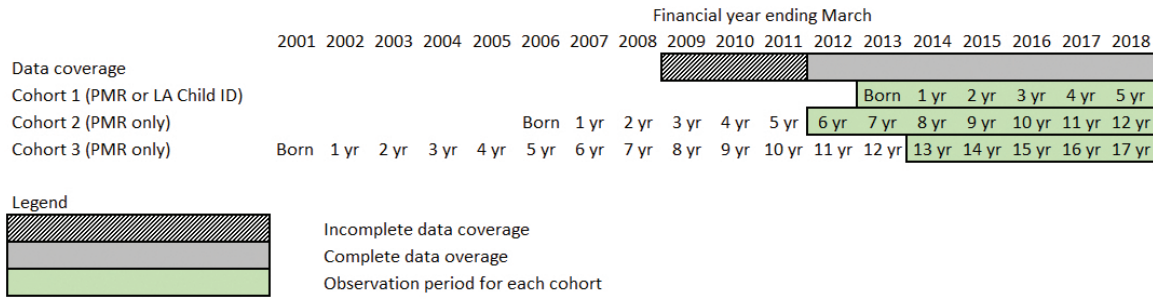
that indicated further action (i.e., an assessment) was required following referral. CiN status for a child was determined with reference to variables indicating that further action from the referral was required and that the reason for closure was not code RC8 (assessed but found not to be in need). In other words, the child must have been referred to CSC, assessed by a social worker and found to be in need. Being subject to a CPP was determined according to a non-missing record of a CPP start date.

Details for how the cumulative incidences were estimated can be found in Supplementary File 3. In summary, we counted the observed number of first events in each cohort as numerators and we used Office for National Statistics mid-year population estimates as denominators. For cohorts 2 and 3, we adjusted the numerators to account for left censoring, that is, potential recurrent events from the unobserved periods. These were based on a combination of estimated recurrence rates and observed events as shown in Supplementary File 4. Estimates from the three cohorts were then combined.

Record linkage

To avoid double counting children with events at different ages or in different parts of England, we linked children's longitudinal records using one of two identifiers within the dataset. Children's records can be linked using an identifier assigned by the local authority (encrypted before being shared with researchers), the LA-child ID, or, alternatively, the anonymised Pupil Matching Reference (PMR). Neither is perfect. The LA-child ID is unique only to the local authority that assigned it and is not transferred if a child moves between authorities. The PMR, by contrast, is usually assigned when a child starts school or state-funded nursery (pre-school). It is nationally unique and persists when a child moves but only 70% of children in the dataset had a PMR (higher for school-aged children and lower for children under 5 and over 15: Supplementary File 2).

In our main analyses, where events were of children aged 5+, we used data only from children who had a PMR. Where events were under 5 years of age, we used the PMR if it was available, and the LA-child ID where it was not. Because about 10% of records of school-aged children had no PMR recorded (Supplementary File 2), this method excludes a proportion of school-aged events from the numerator. We therefore carried out sensitivity analyses whereby we re-estimated the cumulative incidences using the PMR where it was available and the LA-child ID where it was not, regardless of age. This ensures that records are not excluded due to missing PMR

but introduces a risk of missed links leading to inflation of the numerator.

All analyses were conducted in R with the *data.table* and *ggplot2* packages. Statistical disclosure rules stipulated a minimum cell count of 10 (below which values are suppressed), that all frequencies be rounded to the nearest 10 and that all percentages be rounded to one decimal place.

Results

Demographic data of children who were referred, assessed, found to be in need and made subject to a child protection plan are presented by each financial year in Supplementary File 5. Results from the main and sensitivity analyses are summarised in Table 1, with detailed breakdowns in Supplementary Files 6 and 7. We estimated that of all children living in England, 35.4% are referred to CSC, 32.3% receive a social work assessment, 25.3% are recognised as CiN and 6.9% are subject to a CPP at least once before turning 18. In sensitivity analyses using records with a PMR where available, otherwise the LA-child ID, regardless of age, these figures were similar at 37.5%, 34.6%, 26.0% and 7.1%, respectively.

Discussion

We estimated that a third of all children in England are referred to CSC at least once before turning 18, that a quarter of all children living in England are recognised by CSC services as a CiN and that 6.9% are subject to a CPP. Our findings indicate that CSC departments see a significant segment of the population across childhood. As expected, these findings are very substantially higher than the Department for Education's official cross-sectional estimates of 3% CiN and 0.4% subject to a CPP each year [4].

Comparison with other studies in the United Kingdom

Our findings agree closely with Bilson and Martin's [5] prior estimates to age 5 of 14% being recognised as CiN and 3.5% subject to a CPP. Our respective estimates to age 5 were 14.2% and 4.1%. We are aware of no other published estimates of cumulative receipt of CSC services in England using administrative data across childhood [12], with the exception of Troncoso's estimate of referral to age 5 of 19%

Table 1: Estimated cumulative incidence of being referred, assessed, recognised as a child in need or subject to a child protection plan in England before age 18 (followed from 2012 to 2018)

	Referred	Assessed	Child in need	Child protection plan
Main analyses: records with PMR only if over 5, otherwise PMR where available or LA-child ID				
Cohort 1 (birth to 5)	20.4%	19.1%	14.2%	4.1%
Cohort 2 (6 to 12)	12.3%	11.2%	8.5%	2.1%
Cohort 3 (13 to 17)	7.4%	6.5%	4.9%	0.8%
Total	**35.4%**	**32.3%**	**25.3%**	**6.9%**
Sensitivity analysis: records with PMRs if available, otherwise LA-child ID, regardless of age				
Cohort 1 (birth to 5)	21.1%	19.7%	14.6%	4.2%
Cohort 2 (6 to 12)	15.0%	13.3%	9.9%	2.2%
Cohort 3 (13 to 17)	6.8%	6.0%	3.8%	0.8%
Total	**37.5%**	**34.6%**	**26.0%**	**7.1%**

Supplementary File 6 for detailed breakdowns for the main analyses and Supplementary File 7 for the sensitivity analyses.

using the CiN census [9], which is similar to our estimate of 20.4%.

Using freedom of information requests to local authorities in Scotland, Bilson and Macleod [13] estimated that 3.8% of children in Scotland born August 2012 to July 2013 were on the child protection register by age 5. This is the similar to our estimate for children being made subject to child protection plans in England by age 5 of 4.1% and to Bilson and Martin's [5] and Bilson and Munro's [14] estimates for England using freedom of information requests.

There is limited evidence from cohort and panel studies. Maxwell and others [15] in reviewing research data resources for social work, found that a range of cohorts, such as the Longitudinal Study of Young People in England, the Millenium Cohort Study and the National Child Development Study, contained questions relating to CSC services. In all cases, numbers of children in contact with CSC services were in the 100s and studies only collected limited retrospective data at specific waves. For example, Henderson et al [16] used the Longitudinal Study of Young People in England, in which parents were asked whether they had been in contact with their council's social services in relation to their children's behaviour at home or school (aged 13-14 years at study inception). Parents were asked the same question once per year over three waves, with 387 to 615 (3%-4% of 15,770) reporting such contact each wave, and 1,184 (8%) ever reporting contact over the three waves. In addition to relatively small samples, such studies are also subject to selection and attrition biases, which may be severe. Teyhan et al [17], for example, report that, of 12,868 participants in the Avon Longitudinal Study of Parents and Children, 137 linked to the children looked after return and 209 to the CiN census. Among those without linkage to these datasets, just under 60% had maternal questionnaires returned at age 12. This compares to around 35% for those who linked to the CiN census and under 20% for those who linked to the children looked after return.

International literature

Studies from Australia, the USA, New Zealand and Canada have used administrative data to estimate the cumulative

incidence or cumulative prevalence of contact with children's services (Table 2). Given differences in service configurations, direct comparison with England is difficult. In all studies, the focus was on the child protection system and/or substantiated maltreatment. In England, however, the remit of CSC is much broader: child protection is only a subset of England's CSC activity. Nonetheless, the international studies, like ours, find high cumulative incidences of contact with their respective services. For example, the latest data from Australia show that in New South Wales and South Australia [18], around 40% of children are subject to a child protection notification before age 14 and a quarter to a third are subject to a screened-in notification. Over 10% were subject to an actual child protection investigation and 6% to 8% were recorded as having substantiated maltreatment (which is perhaps closest to England's child protection plan). Therefore, although no other study provides a directly comparable estimate to ours, our findings show that England is similar to other countries in having very high proportions of children receiving some form of social care intervention across childhood and early adolescence.

Limitations

The Department for Education collects only limited personal identifiable information in the CiN census [34], with the consequence that longitudinal linkage must rely on one of two encrypted identifiers in the dataset, the LA-child ID and PMR. As noted above, neither is perfect. Without personal identifiers such as name, address and date of birth, it is not possible to examine the reliability of the LA-child ID. Whereas all data in the CiN census may be subject to missed links, thereby biasing incidence estimates upwards, this is likely to particularly affect data on referrals where local authorities may possess poorer quality data. This could be caused, for example, where there is no follow up required or carried out and therefore the local authority does not hold accurate identifiable information to link an apparently new referral to an old one already held for the same child in their database. This may be particularly challenging where a child or parent changes name (e.g., due to marriage) or moves property. The result is that the same

Table 2: Summary of studies from other jurisdictions that provide data on the cumulative incidence of contact with children's social care (results are presented for the overall population unless only disaggregated results are available)

Study (year)	Jurisdiction & time frame	Results
Australia		
Pilkington et al (2024) [18]	New South Wales, births 2005-2019; South Australia, births 1991-2019	To age 14 (New South Wales / South Australia): Notification: 38.6% / 40.0% Screened-in: 31.2% / 25.6% Investigation: 10.4% / 10.4% Substantiation: 8.8% / 6.1%
Harrap et al (2023) [19]	Western Australia, births 2000-2013	Among Aboriginal children to age 16: Notification: 52% Investigation: 46% Substantiation: 28%
Falster et al (2020) [20]	New South Wales, children starting school in 2009 or 2012	To age 5: Screened-in: 13.8% Investigation: 7.8% Substantiation: 3.2%
Segal et al (2019) [21]	South Australia, births 1986-2017	To age 18 (estimates depend on birth year): Among non-Aboriginal children: Investigation: 6.0% to 7.8% Substantiation: 3.2% to 3.7% Among Aboriginal children: Investigation: 34.1% to 39.4% Substantiation: 19.3% to 25.2%
Bilson et al (2013) [22]	Western Australia, births 1990-1991	To age 18: Among all children: Notification: 13.3% Investigation: 8.4% Substantiation: 3.8% Among Aboriginal children: Notification: 41.7% Investigation: 28.0% Substantiation: 15.4%
Delfabbro et al (2010) [23]	South Australia, births in 1991, 1998, 2002	Notification: Among Aboriginal children: Cohort 1991 to age 16: 56% Cohort 1998 to age 9: 57% Cohort 2002 to age 5: 54% Among other children: Cohort 1991 to age 16: 19% Cohort 1998 to age 9: 15% Cohort 2002 to age 5: 10%
United States		
Yi et al (2023) [24]	All states except Georgia, Pennsylvania, Rhode Island and West Virginia, 2015-2020 (synthetic life tables pooled across this period)	To age 18 (depending on state): Maltreatment investigation: 14% to 63% Maltreatment substantiated: 3% to 27%
Putnam-Hornstein et al (2021) [25]	California, 1999-2017	To age 18: Maltreatment investigation: 26.3% Maltreatment substantiated: 10.5%

Continued

Table 2: Continued

Study (year)	Jurisdiction & time frame	Results
Edwards et al (2021) [26] (plus replies in [27] and [28])	Twenty most populous counties across different states, 2014-2018	To age 18: Maltreatment investigation: 34.5% Maltreatment substantiated: 9.2%
Kim et al (2019) [29]	Twenty-eight states and the District of Colombia, 2003-2016	To age 12: Maltreatment reports: 32.4% Maltreatment substantiated: 10.1%
Kim et al (2017) [30]	All states, 2003-2014	To age 18: Maltreatment investigation: 37.4% Maltreatment substantiated: 11.8%
Wildeman et al (2014) [31]	All states, 2004-2011	To age 18: Maltreatment substantiated: 12.5%
New Zealand		
Rouland et al (2018) [32]	New Zealand, births in 1998	To age 18: Notification: 23.5% Substantiation: 9.7%
Canada		
Esposito et al (2023) [33]	Québec, births in 2000	To age 17: Child protection report retained (i.e., services agree report falls within jurisdiction): 18.2% Confirmation of "facts found": 16.4% Substantiation (finding of security or development being compromised): 10.1%

CSC children's social care; CPP child protection plan.

child within an authority could be assigned different identifiers and therefore erroneously counted more than once. On the other hand, it is known that not all "referrals" are recorded as referrals in the CiN census [8], which would serve to depress incidence estimates. For children who do receive services, these factors are less likely to be an issue as more detailed identifiable information will be held by the authority.

A remedy to these problems would be for the Department for Education to mandate collection of personal identifiers within the CiN census, and to do so retroactively. This would enable creation of a single, nationally unique, encrypted identifier within the CiN census, making it easier to eliminate double counting. Retroactive collection of personal identifiers would also enable assessment of linkage quality across children's records within CiN, which would improve the quality not only of research using the CiN census, but also the Department for Education's own uses of the data, such as their re-referral statistics [4] and use of early help [35]. This could further result in positive feedback loops to local authorities to improve their source data, especially as validation checks are applied at data submission from the local authority to the Department for Education [34].

Holding identifiers would also enable linkage of the CiN census to other datasets for all children, which is currently only possible for the subset of children with a PMR via the National Pupil Database (NPD) [8, 36–38]. Indeed, NPD data have been shown to be of very high quality as evidenced by 99% linkage rates between NPD and the Hospital Episode Statistics using personal identifiers in the Education and Child

Health Insights using Linked Data project [39], suggesting that where PMR is currently available in the dataset, it is likely to represent a high quality matching variable.

Another limitation lies in the fact that we combined estimates from three separate cohorts. Our method assumes that there was no change in the underlying cumulative incidence of CSC service receipt across these cohorts. This assumption is supported by general stability in the proportions of children who are referred to social care and assessed as being in need since 2013 [3]. In terms of child protection, while there was a significant increase in the numbers of children investigated over this time period, the rate at which children were made subject to child protection plans increased only slightly [3, 5]. Similarly, while we made efforts to avoid double counting induced by left-censoring by estimating recurrence and adjusting numerators accordingly, these estimates, too, assume consistency across cohorts and age (the latter assumption is supported by Troncoso's analysis of re-referrals [9]). Further, we were unable to investigate how our cumulative incidence estimates would vary by deprivation (it is expected to be significantly higher among poorer children [40]) as no such data are available in the CiN census. Additional research could focus on sex/gender and ethnicity, though this would require an investigation into the completeness and reliability of the gender/sex and ethnicity data in the CiN census and for the denominator population derived from the decennial census, especially given known problems with ethnicity data quality in other datasets such as the Hospital Episode Statistics [41–43].

Future estimates will be affected by a decrease in CSC activity during the COVID-19 pandemic [44], which would reduce estimates for children living through this period. Estimates for future cohorts will also be affected by changes in CSC practice, especially due to very large increases in the use of child protection investigations found by Bilson and Munro between 2011/12 and 2016/17 [14].

Finally, we were unable to account for death and emigration as potential competing risks. While death after infancy is very rare and unlikely to substantially affect results, not accounting for emigration may have upwardly biased estimates.

Recommendations and conclusions

The consequence of the limitations in the identifiers is that it is difficult to estimate with exactitude the cumulative incidence of CSC activity in England using the CiN census. This will still be the case even when sufficient data have been collected to follow a single cohort from birth to age 18 (which, counting from 2011/12, will be in 2029/30). We recommend that the Department for Education review what personal identifiers it collects from local authorities on all children referred to CSC to enable complete future and retroactive data linkage and improved understanding of their circumstances through childhood.

Nonetheless, it is certain that very high proportions of children are referred to, assessed and recognised as needing services by CSC in England. Our findings support a shift of CSC services towards early help [45]. The high cumulative incidence of CiN also raises questions about the extent to which government policies on employment, benefits, housing, healthcare, education, social care and justice support or challenge nurturing and upbringing of children. Needs might be more effectively addressed by targeting the socio-economic and structural factors beyond individual or family circumstances that lead a large minority of children to become in contact with CSC services.

Acknowledgements

Statement of conflicts of interest

None declared.

Ethics statement

This study was approved by the UCL Research Ethics Committee (17025/001) and registered with our Research & Development Office (20PE04) and Data Protection Officer (Z6364106/2020/03/27). Data were shared with us by the Department for Education under a data sharing agreement. Data were deidentified and stored in the Office for National Statistics Secure Research Service, which offers walled-garden protections according to the Five Safes framework. Office for National Statistics staff checked all outputs to ensure compliance with statistical disclosure rules. These included a minimum cell count of 10 (below which values are suppressed), that all frequencies be rounded to the nearest 10 and that all percentages be rounded to one decimal place.

Data availability statement

The authors are unable to share the data used in this project. Their access to the data was terminated on project completion in accordance with their data sharing agreement with the Department for Education. Researchers wishing to gain access to an extract of the child in need census can submit an application to the Department for Education: https://www.gov.uk/guidance/apply-for-department-for-education-dfe-personal-data. R code created for this project can be found at https://github.com/UCL-CHIG/csc-cumulative-incidence.

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Abbreviations

CiN:	child(ren) in need
CPP:	chid protection plan
CSC:	children's social care
LA-child ID:	local authority-child identifier
NPD:	National Pupil Database
PMR:	Pupil Matching Reference

Supplementary Files

Please browse Full Text version to see the data of Supplementary Tables 1–7

1. Supplementary File 1: data cleaning

2. Supplementary File 2: data quality and completeness

3. Supplementary File 3: detailed statistical methodology

4. Supplementary File 4: numerator discounts applied.

5. Supplementary File 5: demographics

6. Supplementary File 6: main analysis detail

7. Supplementary File 7: sensitivity analysis detail