

The impact of low-allergy formula prescribing on children's oral health in Bradford

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Context: Since 2010, the prescription of low-allergy infant formula has increased 3.8 fold¹. In the UK, 9% of infants are prescribed these formulas. A quarter will only have one prescription, but the rest will be prescribed approximately 200L over an 8-month period. This costs the NHS around £75 million per annum. Many infants will then transition to commercial non-diary premium alternatives as toddlers. However, 9 in 10 of these children do not have cow's milk allergy and do not need these prescriptions². Moreover, low-allergy formulas typically substitute lactose with glucose syrup and other free-sugar carbohydrates, posing a potential risk to children's oral health.

Tooth decay is the most common non-communicable disease in the world³. In Bradford, 36% of children have decay by the age of five. The effect of dietary sugar on the development of decay is well-established⁴. The sequelae of decay includes pain, dental infection, disturbed sleep, school absence, and a reduced quality of life⁵. For many young children, dental treatment is only possible under general anaesthetic in hospital. In England, decay is the most common reason for children, aged 5-9 years, to be admitted to hospital⁶. As part of a Yorkshire NHS Secure Data Environment project, we linked all children's dental general anaesthetic data in Bradford (2016-2024, n=5898) to the Bradford Secure Data Environment (including Born in Bradford birth cohort and Connected Bradford).

Aim: To estimate the causal effect of prescribed low-allergy infant formula on children undergoing a dental general anaesthetic by 6-years-old.

Project Description: The Bradford Secure Data environment includes "Born in Bradford" a family of birth cohorts (including over 20,000 child participants since 2007) and "Connected Bradford" a population based connected dataset involving over 800,000 Bradfordians. These linked datasets, afford the unique opportunity to explore research questions that transcend health using records collected by different organisations and professionals.

Dental general anaesthetic data is now linked. Prescription codes for low-allergy formula products have been validated by collaborators from Imperial (Dr. Boyle). With leadership from Dr Mason (Head of Research Data) and the wider Bradford data team, data coding will be developed to identify participants with a recorded low-allergy formula prescription who subsequently attended for a dental general anaesthetic. Large language models (LLM) hosted internally within the Bradford Secure Environment will support data searching, validation and cleaning. LLMs will be used to find 30+ different prescription low-allergy formulas from primary care records across 800 millions rows of data.

Mason (dRTP) and the supervisory team (Dental [Day, Giles], Epidemiology [Feltbower], Paediatric Allergy [Boyle] and Data Analytics [Mon-Williams]) will work with the intern to build a comprehensive data management plan and data analysis strategy. A directed acyclic graph will be developed to inform a causal analysis approach to data analysis.

Overarching goals: The internship will provide a supportive and secure environment, providing the intern with opportunities to develop their skills using high performance computing to manage and analyse large, complex datasets. With the intern as an author, a high-quality research paper will be drafted. Moreover, the project is novel to the Bradford Secure Data Environment as the intern will answer the research question using both BiB and Connected Bradford datasets.

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2. Allen, H. I. *et al.* Prevalence and risk factors for milk allergy overdiagnosis in the BEEP trial cohort. *Allergy* **80**, 148–160 (2025).
3. World Health Organisation. *Global Oral Health Status Report: Towards Universal Health Coverage for Oral Health by 2030*. <https://www.who.int/publications/i/item/9789240061484> (2022).
4. Moynihan, P. J. & Kelly, S. a. M. Effect on caries of restricting sugars intake: systematic review to inform WHO guidelines. *J Dent Res* **93**, 8–18 (2014).
5. Gilchrist, F., Marshman, Z., Deery, C. & Rodd, H. D. The impact of dental caries on children and young people: what they have to say? *International Journal of Paediatric Dentistry* **25**, 327–338 (2015).
6. Office for Health Improvement and Disparities. *Short Statistical Commentary for Hospital Tooth Extractions in 0 to 19 Year Olds 2025*. <https://www.gov.uk/government/statistics/hospital-tooth-extractions-in-0-to-19-year-olds-2025/short-statistical-commentary-for-hospital-tooth-extractions-in-0-to-19-year-olds-2025>.