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INTRODUCTION

Low folate levels increase the risk of a pregnancy being affected by a serious Neural Tube Defect (NTD) (anencephaly, spina bifida, and encephalocele). Pregnant women have been advised to supplement their daily diet with 400 µg folic acid prior to and in the first 12 weeks of pregnancy for three decades but despite this, 89% of women of child-bearing age in England have serum folate levels insufficient to prevent an NTD¹. In September 2021, the UK government announced the mandatory fortification of non-wholemeal wheat flour with folic acid (vitamin B9) to reduce the prevalence of NTDs².

The National Congenital Anomaly and Rare Disease Registration Service (NCARDRS), collects, quality assures, curates and analyses individual data on pregnancies, fetuses, babies, children and adults with congenital anomalies and rare diseases across the whole of England. Prior to the inception of NCARDRS, congenital anomalies were recorded by regional registers that were operating across some areas of England, covering up to 32% of births in England. These regional registers were incorporated into NCARDRS, and registration expanded geographically; national coverage has been in place since 2018.

AIM

- Assess the trends in the total birth prevalence of NTDs in England from 2000-2019 by combining NCARDRS data (2015-2019) with data from the regional registries (2000-2015).
- Examine trends for NTD prevalence, as well as separately for anencephaly and spina bifida, the most common forms of NTD.
- Present a baseline from which the impact of folic acid fortification on NTDs can be evaluated

Table 1 Years of data, regions and data sources included in the analysis.

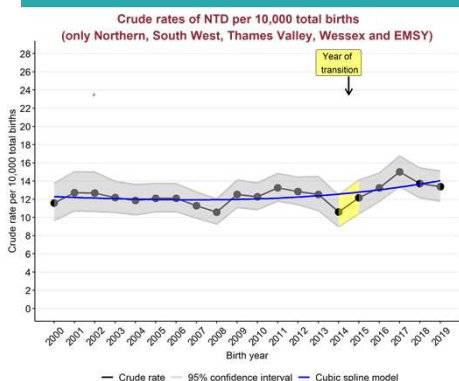
Region	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
South West																					
Wessex																					
Thames Valley																					
North																					
East Midlands & South Yorkshire																					

Legend: Data not available (grey), Legacy registers (blue), NCARDRS (green)

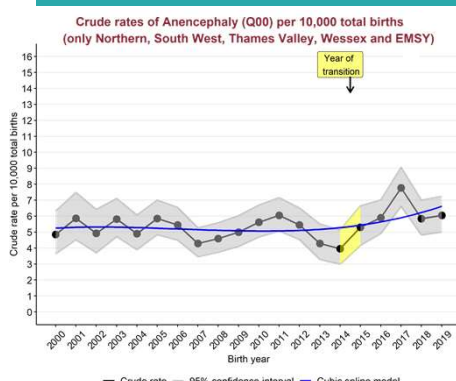
MATERIALS AND METHODS

- Confirmed /probable NTDs identified antenatally, at birth or in childhood were extracted from the NCARDRS national data management system and the respective legacy regional databases.
- Babies that were liveborn or stillborn, resulted in a termination of pregnancy with a diagnosed fetal anomaly at any gestation (TOPFA) and late miscarriages (20-23 weeks' gestation) were included.
- The analysis was restricted to the five regions that were collecting data before NCARDRS was established and had at least 10 years of consecutive data collection prior to this (Table 1).
- Prevalence rates over time were plotted for NTDs as a group and for the subgroups of anencephaly and spina bifida.
- Trend analysis was performed using restricted cubic splines and Poisson regression with region as a random effect used to account for heterogeneity between the registers.

All NTDs 2000-2015



Anencephaly 2000-2015



Spina bifida 2000-2015

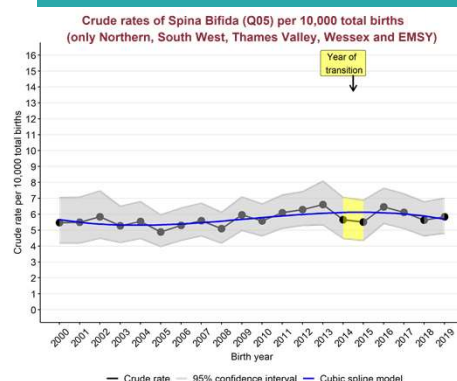


Table 2 Regionally-adjusted Poisson regression model

	Time period	IRR (95%CI)	P value
NTDs	2000-2004	Ref.	
	2005-2009	0.979 (0.895-1.071)	0.640
	2010-2014	1.037 (0.946-1.136)	0.437
	2015-2019	1.136 (1.039-1.242)	0.005
Anencephaly	2000-2004	Ref.	
	2005-2009	0.97 (0.85-1.12)	0.716
	2010-2014	1.02 (0.88-1.17)	0.818
	2015-2019	1.21 (1.06-1.38)	0.005
Spina bifida	2000-2004	Ref.	
	2005-2009	0.99 (0.87-1.13)	0.885
	2010-2014	1.11 (0.97-1.27)	0.122
	2015-2019	1.10 (0.96-1.25)	0.174

RESULTS AND CONCLUSIONS

- NTD prevalence was higher in the period since the establishment of NCARDRS in 2015 when it was 13.6 (12.9-14.4) per 10,000 total births compared with the period before this when it was 12.1 (11.7-12.5) per 10,000. No downward trend over time was detected.
- While the prevalence of NTDs and anencephaly was higher during 2015-2019 compared to any other time period, the prevalence of spina bifida has remained relatively stable over time (Table 2).
- The rate of anencephaly has risen from 5.16 (95% CI 4.9-5.44) cases per 10,000 total births between 2000-2014 to 6.23 (95% CI 5.74-6.75) cases per 10,000 total between 2015-2019. This may reflect improved ascertainment rather than a true increase in prevalence.
- Congenital anomaly registration in England is now national and standardised prior to the implementation of fortification. The birth prevalence of NTDs can be monitored systematically and consistently pre- and post-fortification allowing the impact of this intervention to be evaluated in a rigorous way.

REFERENCES

- Public Health England 2020. National Diet and Nutrition Survey Rolling programme Years 9 to 11 (2016/17 to 2018/19)
- Folic acid added to flour to prevent spinal conditions in babies Press Release. DHSC. 20 Sept 2021

ACKNOWLEDGEMENTS

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