

Folic acid in pregnancy: a need to obtain universal coverage

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Neural tube defects (NTDs) are conditions in which the central nervous system has an opening from early development, and they have been known to be prevented by adequate intake of folic acid during the early stages of pregnancy. Due to this evidence, many countries have implemented mandatory fortification of staple foods with folic acid to reduce the number of preventable NTDs. This paper aims to evaluate some of the current methods in place to achieve better/universal coverage of folic acid and to make recommendations on how to widen the coverage of folic acid use in pregnant women. This literature review concludes that the current Healthy Start programme used by the UK government to promote folic acid intake during pregnancy is wholly inadequate in preventing NTDs and mandatory fortification should be implemented to follow the success of other countries.

Introduction

The evidence for increased folic acid intake in pregnancy to reduce the number of neural tube defects (NTDs) in offspring has been known since the Vitamin Study by the Medical Research Council (MRC) in 1991.¹ Yet 2000 preventable NTDs were estimated in the UK from 1998 to 2012, and it is predicted that this number will continue to rise at a rate of 150 deaths per year.² Folic acid is a naturally occurring compound in healthy diets and is found in a variety of foods, including dark leafy greens, avocados, lentils and nuts.³ The National Institute for Health and Care Excellence (NICE) guidelines state women should take 400 µg of folic acid daily during pre-conception, and should continue to take folic acid tablets until the twelfth week of pregnancy.⁴ Women who are at higher risk of having offspring with NTDs are advised to take 5 mg of folic acid daily before conception and to continue to do this until the twelfth week of pregnancy. These recommendations are to prevent children being born with NTDs, such as spina bifida and anencephaly, which affect 5 in every 1000 births in the UK.⁵

How is folic acid intake promoted in pregnancy in the UK?

To investigate the approaches taken by the UK to promote folic acid intake in pregnancy, a literature search was conducted in November 2017 using the PubMed database (www.ncbi.nlm.nih.gov/pubmed) for primary research articles. Phrases such as 'folic acid', 'United Kingdom' and synonyms were used for the search. Articles included were limited to those with full-text availability and those written in the English language to ensure full comprehension. For basic definitions and government information, appropriate search engines and websites were used.

This search revealed that the current method used in the UK is targeted supplementation under the 'Healthy Start' programme. This programme was introduced in 2006 and is a statutory nutritional safety net for pregnant women and children under 4 years of age. It provides milk, fruit/vegetables and vitamins (A, C, D and folic acid), which are exchanged for vouchers.⁶ However, substantial evidence

suggests that this scheme is inadequate and has many shortcomings; these are discussed in more detail below.

Factors affecting the efficacy of the Healthy Start scheme

The uptake of the Healthy Start programme is extremely poor (estimated at 3–10%).⁷ Barriers to uptake include the delay associated with the application process, as well as the strict eligibility criteria, meaning that vulnerable individuals, such as asylum seekers and prisoners, have been excluded from the scheme, limiting its benefits and overall impact.⁸ Furthermore, women are expected to re-register subsequent pregnancies with the programme, instead of being retained in the system.⁸

In addition, NICE guidelines state that women should be taking folic acid before conception and up to 12 weeks after; however, the Healthy Start scheme only provides vitamins to women after 10 weeks of gestation, which means that the foetus is unprotected from abnormalities in the development of the central nervous system and spinal cord, which could lead to NTDs, and the supplements provided by the scheme have limited effects.⁹

Studies show uptake is lower in younger women, women for whom English is a second language and those from a low socioeconomic background.⁷ Moreover, the helpline that handles queries relating to the Healthy Start programme is associated with a charge, which may serve as a barrier for those seeking additional help.⁸

Regarding initial exposure to the scheme, women reported it being mentioned briefly in the first prenatal visit to their healthcare practitioner but complained that, due to the vast quantities of information given, they often forgot about it or remembered the scheme when it was too late.¹⁰ Furthermore, when healthcare professionals were asked if they mentioned the Healthy Start programme to pregnant women or during family planning conversations, many said that they did not, giving reasons such as lack of awareness of the scheme, uncertainty as to where women can access the supplements and, sometimes, a negative attitude towards use of supplements in pregnancy.⁹ In addition, relying heavily on healthcare professionals to promote the scheme means some women are left out of it, such as those who meet healthcare workers later in the pregnancy, after the therapeutic window for folic acid (i.e. after the first 12 weeks of gestation). When health professionals were asked how they chose to bring up the scheme with patients, many reported using the patient's geographical location as an indicator of whether the patient was potentially eligible, which could lead to a small number of patients with a low income who live in affluent areas not being informed of the scheme.⁸ In other studies, eligible, but non-participating parents were asked why they refused help; many reported that they felt a healthy diet negated the need for supplementation. This misconception highlights the need for healthcare professionals to address and carefully discuss with pregnant patients the risks that they may face from non-supplementation.¹¹

Participants and healthcare professionals reported, in numerous studies, that they disliked the essential countersignature by a healthcare professional on the application form for the Healthy Start scheme, as this made the application process more arduous.⁸ This process is necessary to show a link between public health initiatives and government priorities, and to ensure that healthcare professionals talk to pregnant patients about supplements and diet. However, it may be perceived as yet another hurdle for patients who do not see a healthcare professional in the early days of pregnancy.

Figure 1 below provides a summary of suggestions for improvement of the current Healthy Start scheme.

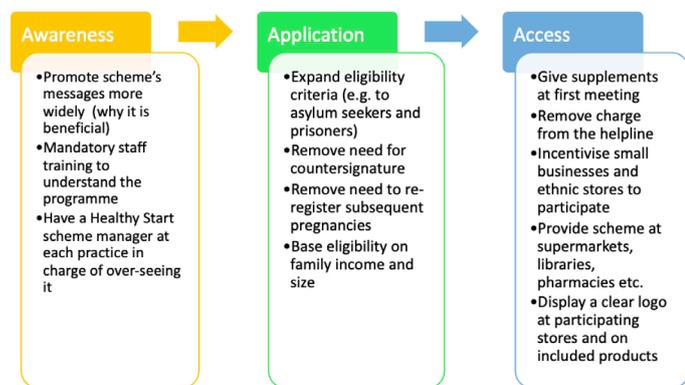


Figure 1. Suggestions for improvement of the Healthy Start scheme.

The American experience

In America, mandatory fortification of grain products with folic acid was introduced in 1998, adding 140 µg per every 100 g.¹² Despite this, the US Food and Drug Administration (FDA) Advisory Committee recommends increased folic acid intake, promoting this by using billboards to display shocking images of babies with NTDs, and featuring mothers of different ethnic backgrounds and ages that are usually left out of the Healthy Start programme because they tend not to consume these fortified goods.¹⁰ It is hoped that this approach allows all population sub-groups to be given protection from NTDs. It also recommended that, for younger women, including those with teenage pregnancies, who tend to be less receptive to supplementation advice, the supplements should be a 'healthy lifestyle choice'.¹⁰

Mandatory fortification in the UK

Mandatory flour fortification with folic acid was recommended by the UK Scientific Advisory Committee on Nutrition (SACN) in 2006.⁶ The main argument for this was that one in six pregnancies are unplanned.¹³ Therefore, women who do not know that they are pregnant and do not intentionally take folic acid preconceptionally, will not leave their children susceptible to NTDs. In addition, a study in 2011 by Barbour et al investigated why some pregnant women did not take folic acid supplements; reasons included hectic schedules, nausea, peer influences and unplanned pregnancies.¹⁴ Mandatory fortification may help to solve this problem. Figure 2 illustrates barriers to universal coverage under the current Healthy Start scheme.

Conversely, there are reasons why mandatory fortification with folic acid has not been implemented by the UK government. For example, having a high folic acid intake along with a vitamin B12 deficiency could mask the symptoms of anaemia, which could be life-threatening.¹⁵ It may also be possible that women from low-income backgrounds may not consume enough of the grains or fortified products to adequately benefit from this. In addition, there are concerns that excess consumption of folic acid could lead to an increased risk of certain cancers; however, this claim has been refuted by a meta-analysis.¹⁶ It has also been claimed that the daily

recommended intake of 400 µg of folic acid cannot be reached by fortification alone and that supplements are necessary,¹⁷ indicating that fortification is unnecessary. These issues have been addressed by the SACN who recommend certain steps to ensure people are protected from the over-consumption of folic acid,⁶ such as:

- Restriction of voluntary fortification
- Modification of supplement guidance for pregnant women
- Continued monitoring of the long-term impacts of folic acid fortification

Mandatory fortification in other countries

America, Costa Rica, South Africa, Chile, Canada and Argentina are some of many locations that have implemented a mandatory approach to folic acid fortification and have reported decreases in the number of NTDs, ranging from 19–55%.^{18,19} In South Africa, it was found that, not only did the number of NTDs decrease after mandatory fortification, but the economic cost related to the prevention of these conditions outweighed the cost of implementing folic acid fortification.²⁰ In 2004, a meta-analysis found that increasing the current dose of folic acid from 0.4 mg to 5 mg could help to prevent 80% of all NTDs.²¹ Such studies recommend that mandatory folic acid fortification is a strategy that all countries should implement. In contrast, in New Zealand, the main reason why folic acid fortification has not been introduced is because many see it as 'mass medication', which restricts consumer choice.^{11,22} Overall, however, mandatory folic acid fortification has been beneficial, not just in decreasing the number of NTDs, but also according to cost-benefit analyses.²⁰

Social	Economic	Other
<ul style="list-style-type: none"> • Lack secure housing • First language is not English • Teenage pregnancies 	<ul style="list-style-type: none"> • Unstable income • Cannot call helpline (charged) 	<ul style="list-style-type: none"> • Health professionals are unaware of scheme or have little knowledge of how it works, or have a negative attitude towards folic acid supplements

Figure 2. Barriers to universal coverage of folic acid supplementation: the exclusion of potentially eligible families.

Conclusions

The current Healthy Start scheme to promote folic acid supplementation in pregnancy in the UK is not reaching pregnant women in an efficient manner.²³ The overwhelming conclusion is that mandatory fortification is the best method to achieve universal coverage of folic acid to prevent NTDs. However, the improvements suggested here should be adopted to enhance the Healthy Start programme until mandatory fortification is implemented.

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References

1. MRC Vitamin Study Research Group. Prevention of neural tube defects: results of the Medical Research Council Vitamin Study. *The Lancet*, 1991; 338(8760):131-137.
2. Jessiman T, Cameron A, Wiggins M, et al. A qualitative study of uptake of free vitamins in England. *Archives of Disease in Childhood*, 2013; 98:587-591.
3. Scottish Government, Health, Social Services and Public Safety and NHS Wales (2012) Delivering a Healthy Start for pregnant women, new mums, babies and young children. Available from: www.healthystart.nhs.uk/wp-content/uploads/2012/06/404296_HS52A_DeliveringHealthyStart_acc.pdf. Accessed: 8 October 2019
4. National Institute for Health and Care Excellence (NICE) (2017) Maternal and child nutrition (2008) NICE guideline. Available from: www.nice.org.uk/guidance/ph11/resources/surveillance-report-2017-maternal-and-child-nutrition-2008-nice-guideline-ph11-pdf-6053755922629. Accessed: 8 October 2019
5. Walker D. Fortification of flour with folic acid is an overdue public health measure in the UK. *Arch Dis Child*, 2016; 101:593
6. Scientific Advisory Committee on Nutrition (2017) Update on folic acid. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/637111/SACN_Update_on_folic_acid.pdf. Accessed: 8 October 2019
7. Peake J, Copp A, Shawe J. Knowledge and periconceptional use of folic acid for the prevention of neural tube defects in ethnic communities in the United Kingdom: systematic review and meta-analysis. *Birth Defects Research Part A: Clinical and Molecular Teratology*, 2013; 97(7):444-451.
8. Lucas PJ, Jessiman T, Cameron A, et al (2013). Healthy Start Vouchers Study: the views and experiences of parents, professionals and small retailers in England. Available from: www.bristol.ac.uk/media-library/sites/sps/migrated/documents/finalreport2.pdf. Accessed: 8 October 2019
9. The Scottish Government (2017) The Healthy Start Scheme: an evidence review. Available from: <http://dera.ioe.ac.uk/25802/1/00497237.pdf>. Accessed: 8 October 2019
10. Grosse SD, Waitzman NJ, Romano PS, et al. Reevaluating the benefits of folic acid fortification in the United States: economic analysis, regulation, and public health. *AJPH*, 2005; 95(11): 1917-1922
11. Rofail D, Colligs A, Abetz L, et al. Factors contributing to the success of folic acid public health campaigns. *Journal of Public Health*, 2011; 34(1):90-99.
12. Crider K, Bailey L, Berry R. Folic acid food fortification—its history, effect, concerns, and future directions. *Nutrients*, 2011; 3(12):370-384.
13. Wald N, Law M, Morris J, et al. Quantifying the effect of folic acid. *The Lancet*, 2001; 358(9298):2069-2073.
14. Barbour R, Macleod M, Mires G, et al. Uptake of folic acid supplements before and during pregnancy: focus group analysis of women's views and experiences. *Journal of Human Nutrition and Dietetics*, 2011; 25(2):140-147.
15. Borman B, Poynter M. When enough is not enough: folic acid fortification in New Zealand. *The New Zealand Medical Journal*, 2014; 127(1399):83-84.
16. Vollset S, Clarke R, Lewington S, et al. Effects of folic acid supplementation on overall and site-specific cancer incidence during the randomised trials: meta-analyses of data on 50 000 individuals. *The Lancet*, 2013; 381(9871):1029-1036.
17. Angeles-Agdeppa I, Paulino L, Ramos A, et al. Government-industry partnership in weekly iron-folic acid supplementation for women of reproductive age in the Philippines: impact on iron status. *Nutrition Reviews*, 2005; 63(12):116-125.
18. Hertrampf E, Cortés F. National food-fortification program with folic acid in Chile. *Food and Nutrition Bulletin*, 2008; 29(Suppl 2):S231-S237.
19. Martorell R, de Romaña D. Components of successful staple food fortification programs: lessons From Latin America. *Food and Nutrition Bulletin*, 2017; 38(3):384-404.
20. Sayed A, Bourne D, Pattinson R, et al. Decline in the prevalence of neural tube defects following folic acid fortification and its cost-benefit in South Africa. *Birth Defects Research Part A: Clinical and Molecular Teratology*, 2008; 82(4):211-216.
21. Baggott J, Oster R, Tamura T. Meta-analysis of cancer risk in folic acid supplementation trials. *Cancer Epidemiology*, 2012; 36(1):78-81.
22. Oakley G. Balancing benefits and harms in public health prevention programmes mandated by governments. *BMJ*, 2004; 329(7456):41-43.
23. Attree P. A critical analysis of UK public health policies in relation to diet and nutrition in low-income households. *Maternal and Child Nutrition*, 2006; 2(2):67-78.