



## Impact of mandatory fortification of bread and flour with folic acid in the Republic of Ireland

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Mandatory fortification of staple foods with folic acid is a feasible policy option for reducing the prevalence of neural tube defects (NTD). The objective of this study was to estimate the impact of addition of folic acid to bread or flour on reducing the risk of occurrence of NTD-affected pregnancies and on the possible risk of masking (undiagnosed) vitamin B<sub>12</sub> deficiency in older adults. Analyses were based on data from the National Adult Nutrition Survey (2008–2010) ([www.iuna.net](http://www.iuna.net)). Food composition data were updated to reflect current levels of folic acid in breads and fat spreads and estimates of folic acid intakes factored in an average of 25% for (voluntarily) fortified foods and supplements. Reduction in risk of occurrence of NTD-affected pregnancies was estimated from the increase in average daily folic acid intake in women aged 18–50 years<sup>(1)(2)</sup>. Possible risk of masking anaemia associated with (undiagnosed) vitamin B<sub>12</sub> deficiency in adults >50 years was assessed from the probability of exceeding the Tolerable Upper Intake Level (UL) for folic acid (1,000µg), and the magnitude of any possible excess. Usual intakes of folic acid were calculated via the NCI-method<sup>(3)</sup> using SAS<sup>®</sup> Enterprise Guide. DaDiet<sup>®</sup> Version 15.05 was used to investigate simulation scenarios for addition of folic acid to: 1) all breads at a level of 120µg/100 g (as consumed), 2) all breads at a level of 225µg/100 g, 3) all wheat flour at a level of 225µg/100 g, 4) scenario 3 but excluding folic acid intake from voluntarily fortified foods, 5) scenario 3 but excluding folic acid intake from supplements and 6) scenario 3 but excluding folic acid intake from voluntarily fortified foods and supplements.

Fortification scenario	Women 18–50 years (n = 485)			Adults > 50 years (n = 527)		
	Folic acid intake (µg/d)		% NTD Reduction	Folic acid intake (µg/d)		% > UL
	Mean	Increase		P <sub>95</sub>	P <sub>99</sub>	
Baseline <sup>a</sup>	114	0	0	409	681	0.1
Bread 120µg/100 g	191	77	17	489	695	0.1
Bread 225µg/100 g	262	148	31	623	822	0.2
Flour 225µg/100 g	266	152	32	592	774	0.1
Flour 225µg/100 g excluding FF <sup>b</sup>	204	90	20	455	594	0.0
Flour 225µg/100 g excluding Supp <sup>c</sup>	215	101	22	477	604	0.0
Flour 225µg/100 g excluding FF + Supp	153	39	8	328	408	0.0

<sup>a</sup>Baseline represents current intakes of folic acid from voluntarily fortified foods and supplements, including an additional 25% as average. <sup>b</sup>FF = Fortified foods, <sup>c</sup>Supp = Supplements

These fortification scenarios would reduce the risk of NTD-affected pregnancies by 8–32%, corresponding to an increase of 39–152µg in the mean daily folic acid intake of women of childbearing age. The risk of masking anaemia associated with (undiagnosed) vitamin B<sub>12</sub> deficiency in older adults would be negligible as the probability of exceeding the UL for folic acid, even by a small amount, is very low (≤0.2%). P<sub>95</sub> and P<sub>99</sub> intakes of folic acid did not exceed 623µg/d or 822µg/d, respectively, for any scenario. These levels of addition of folic acid to bread and flour would allow safe consumption of folic acid at current levels from other fortified foods and supplements. Currently foods that are voluntarily fortified with folic acid reduce the risk of occurrence of NTD-affected pregnancies by about 11–14%.

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