

## Exam style question – Folic acid

### Introduction

This activity is about the important public health issue of reducing the incidence of neural tube defects, including spina bifida, by increasing folic acid in the diet prior to conception.

It is adapted from the SPU1 2006 exam.

a		<ul style="list-style-type: none"> <li>something that increases the <u>probability/chance</u> of getting the disease (HSW Gb)</li> </ul>	for 1 mark	1
b	i	pre 1993 <ul style="list-style-type: none"> <li>variable/ a downward trend</li> </ul> post 1993 <ul style="list-style-type: none"> <li>slight downward trend</li> </ul> <b>Q asks for trend, not value</b>	for 1 mark each	2
	ii	<ul style="list-style-type: none"> <li>improved diet/ living standard</li> <li>folic acid taken/women took advice</li> <li>screening and abortion (HSW Bc)</li> </ul>	any 2 for 1 mark each	2
	iii	<ul style="list-style-type: none"> <li>other factors not ruled out by information provided</li> <li>only very slight improvement in England</li> <li>no change/ worse in Norway</li> <li>Ireland stronger trend after introduction</li> <li>only 3 countries</li> </ul> <b>Max 1 if they say strong evidence</b> (HSW Bc, Bd)	any 2 for 1 mark each	2
c	i	<ul style="list-style-type: none"> <li><math>10.6 - 7.6 = 3.0</math> / <math>4130 - 3020 = 1110</math></li> <li><math>\frac{3.0 \times 100}{10.6} = 28\%</math> / <math>\frac{1110 \times 100}{4130} = 27\%</math></li> </ul> <p style="text-align: center;">28.3%                      26.9%      (calc %)</p> <b>full marks for correct answer alone</b> <b>0 for 30% with no correct working</b>	for 1 mark each	2
	ii	<ul style="list-style-type: none"> <li>28%/ 27% close to 30% / can be rounded to 30%/ supports claim</li> <li>newspaper claims slightly larger reduction than data</li> </ul> <b>0 if they have 30% with no working in (i)</b> <b>if error made in calculation allow reasonable answer based on their % reduction</b> <b>Do not allow 37% approx= 30%</b>	for 1 mark	1

(d) The marking scheme for this section includes an overall assessment for the quality of written communication. There are no discrete marks for the assessment of written communication but quality of written communication will be one of the criteria used to assign the answer to one of the three levels.

<b>Level</b>	<b>Descriptor</b>	<b>Mark range</b>
	An answer will meet most of the criteria given in the level descriptor	
3	<b>Good</b> Claims supported by an appropriate range of evidence Good use of information or ideas about science, going beyond those given in the question Argument well structured with minimal repetition or irrelevant points Accurate and clear expression of ideas with only minor errors of grammar, punctuation and spelling	<b>5 - 6</b>
2	<b>Modest</b> Claims partially supported by evidence Good use of information or ideas about science given in the question but limited beyond this The argument shows some attempt at structure The ideas are expressed with reasonable clarity but with a few errors of grammar, punctuation and spelling	<b>3 - 4</b>
1	<b>Limited</b> Valid points but not clearly linked to an argument structure Limited use of information or ideas about science Unstructured Errors in grammar, punctuation and spelling or lack of fluency	<b>1 - 2</b>
0	<b>Incorrect or no response</b>	<b>0</b>

Examples of the sort of information or ideas that might be used to support an argument

yes

- many people do not plan pregnancy
- B12 deficiency can be prevented in other ways
- data indicates that advice alone not very effective
- reduction in US greater than in advice only countries
- warnings can be provided for epileptics

no

- everyone should have better diet
- not very effective in US/only prevented a quarter of US cases
- people should take responsibility/government cannot prevent all risks
- need more information on how many epileptics/B12 deficient

**Total 6**

(HSW Ge, Gf, Hj)

March 2010

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About 540 babies are born in Britain each year with Neural Tube Defects, NTD, because the nervous system of the fetus has failed to develop normally. Most of these babies die in the first few weeks of life; others are permanently handicapped. Low intake of folic acid in the mother's diet is known to be a major *risk factor*, particularly in the first three weeks after conception. Folic acid is found in fruit and green vegetables.

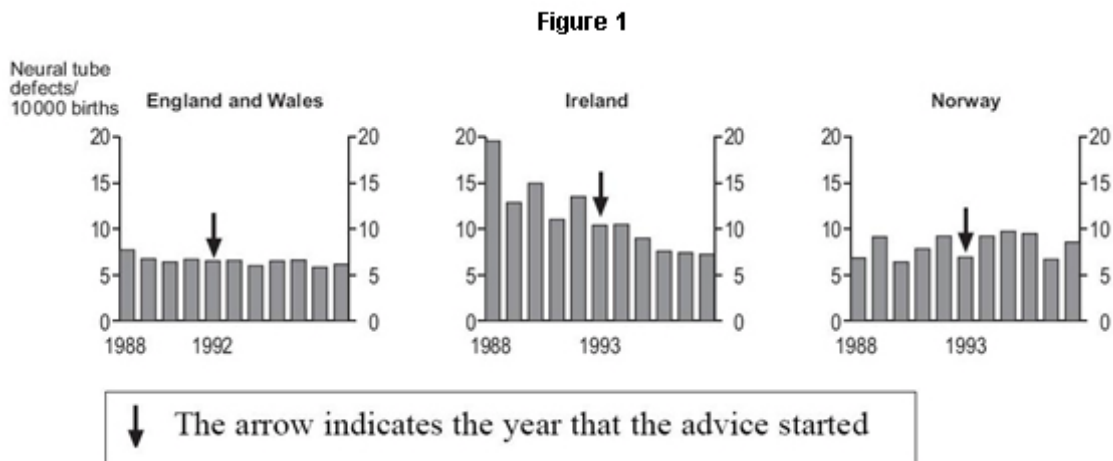
(a) What is meant by the term *risk factor*?

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(1 mark)

One way to reduce the risk is for all women planning to become pregnant to start taking folic acid supplements before they conceive. Figure 1 shows how the incidence of NTD changed in three countries before and after widespread advice to do this



(a)(i) Describe the trend in the incidence in NTD in Ireland before and after 1993.

before 1993

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after 1993

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(2 marks)

(ii) Suggest **two** different possible explanations for the trend in the incidence of NTD in Ireland since 1993.

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(2 marks)

(iii) How strong is the overall evidence in Figure 1 that giving advice on taking folic acid before conception reduces the incidence of NTD? Justify your answer.

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(2 marks)

Another way to reduce the risk of NTD is to add folic acid to everyone's food. In 1998 the US Government made it compulsory to add folic acid to flour and other cereal products. Figure 2 shows the incidence of NTD cases in the USA before and after the ruling.

**Figure 2**

	<b>NTD per 10,000 live births</b>	<b>Total NTD (USA)</b>
1995-1996 When folic acid was <b>not</b> added to flour	10.6	4,130
1999-2000 When folic acid was added to flour	7.6	3,020

(b) A newspaper article claimed that adding folic acid to flour led to a 30% reduction in NTD cases in the USA.

(i) Calculate the percentage reduction in NTD rate shown in figure 2.

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(2 marks)

(ii) How well does your answer support the newspaper claim?

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(1 mark)

(c) In 2000 the UK Government considered whether to add folic acid to flour in Britain. Some of the other risks and benefits of folic acid that they considered are;

- It can interfere with drugs taken for epilepsy
- It masks vitamin B12 deficiency in older people. This can lead to nerve damage, unless those at risk have additional medical checks.
- It may reduce the risk of heart disease.

Do you think the UK Government should take an active role in reducing individual risk and require folic acid to be added to flour as has been done in the US? Explain your answer.

Quality of written communication will be taken into account in awarding marks.

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(6 marks)

**Total marks 16**