

**The Effectiveness of Mandatory Fortification  
as a public health strategy to increase  
nutrient intakes,  
with reference to iodine and folate.**

**Expert public health advice**  
prepared for  
the Australian Health Ministers Advisory Council  
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**EXPERT PANEL**

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## ABOUT THE EXPERTS



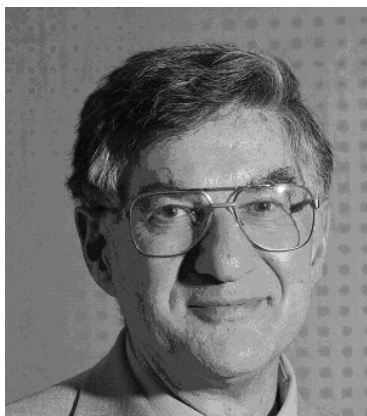
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## EXECUTIVE SUMMARY

It is our expert public health advice that mandatory fortification is the most effective public health strategy to increase nutrient intakes where:

- i there is evidence that current intake is detrimental to health (affecting either the whole population or a significant population sub-group),
- ii nutrient requirements can not be met by realistic dietary practices, and
- iii safety assessments demonstrate increasing intake is safe at levels likely to be experienced.

In considering strategies to increase iodine and folate intake, it is our expert public health advice that:

- Mandatory fortification represents the most effective public health strategy where safety can be assured and there is a demonstrated need.
- Voluntary fortification has many limitations and few benefits. It is inequitable, leads to uncertainty in the level of nutrient available for consumption creating significant problems for monitoring, sustainability is not guaranteed and, experience demonstrates it often fails.
- Dietary education and supplement use require a significant level of ongoing public health investment to support implementation, making them inefficient strategies. This is especially relevant for folate and iodine where membership of the target population is constantly changing (for example, with pregnant and lactating women).
- Those with higher socio-economic and educational levels have been shown to benefit most from dietary education and promotion of supplement use making these strategies inequitable.
- Promotion of iodine and folate supplements may provide a useful complementary strategy during pregnancy and lactation if requirements exceed levels that can be safely met through mandatory fortification.
- Dietary education is futile where a diet consistent with current nutrition recommendations cannot provide enough of a nutrient to meet requirements.
- Maintaining status quo is not an adequate public health response.

As there will never be complete scientific certainty about the effectiveness and safety of fortifying the food supply with specific nutrients, periodic review and comprehensive monitoring (food composition, nutrient intake, nutritional status and health outcomes) of any mandatory fortification program is essential. Integration with a comprehensive nutrition monitoring and surveillance system would provide the most efficient and effective approach.

## 1. BACKGROUND AND PURPOSE OF THIS PAPER

In May 2004 the Australia and New Zealand Food Regulation Ministerial Council (ANZFRMC) adopted a Policy Guideline on the Fortification of Food with Vitamins and Minerals. The guidelines contain *Specific Order Policy Principles for Mandatory Fortification* (Box 1). At the same meeting the Ministerial Council (ANZFRMC) noted the significance of issues associated with folate and iodine and indicated that they need to be considered within the joint food standards setting system, at the earliest possible time.

### **Box 1. Specific Order Principles for Mandatory Fortification**

The mandatory addition of vitamins and minerals to food should:

- i. be required only in response to demonstrated significant population health need taking into account both the severity and the prevalence of the health problem to be addressed;
- ii. be required only if it is assessed as the most effective public health strategy to address the health problem;
- iii. be consistent as far as is possible with the national nutrition policies and guidelines of Australia and New Zealand.
- iv. ensure that the added vitamins and minerals are present in the food at levels that will not result in detrimental excesses or imbalances of vitamins and minerals in the context of total intake across the general population.
- v. ensure that the mandatory fortification delivers effective amounts of added vitamins and minerals with the specific effect to the target population to meet the health objective.

Food Standards Australia New Zealand (FSANZ) is currently considering two proposals, P295 Consideration of Mandatory Fortification with Folic Acid and P230 Consideration of Mandatory Fortification with Iodine

To address part (ii) of the *Specific Order Principles for Mandatory Fortification*, FSANZ has sought policy guidance from the Food Regulation Standing Committee (FRSC). The Food Regulation Standing Committee, is currently seeking advice from the Australian Health Ministers Advisory Council (AHMAC) on whether mandatory fortification (e.g. with folic acid and iodine) represents the most effective public health strategy where there is a demonstrated public health need (eg to address prevention of neural tube defects and iodine deficiency).

To expedite this, AHMAC have asked Tasmania to facilitate the preparation of a short paper by an expert panel to assist deliberations for the June 2005 AHMAC meeting.

The purpose of this paper is to:

- provide AHMAC with expert public health advice in relation to the most effective public health strategy to increase nutrient intake where there is a demonstrated need.
- assess the relative merits of alternative public health strategies that aim to increase nutrient intake.

The purpose of this paper is *not* to:

- describe the significance (severity and prevalence) of the public health impact of inadequate intake of folate and iodine.
- provide a safety assessment of the evidence of the health benefits and risks associated with iodine and folic acid fortification.
- address policy concerns such as industry impact, labelling, consumer choice or trade implications.

## 2. INTRODUCTION

Public health interventions to increase nutrient intakes in a population are required where:

- i there is evidence that current intake is detrimental to health (affecting either the whole population or a significant population sub-group),
- ii nutrient requirements can not be met by realistic dietary practices, and
- iii safety assessments demonstrate increasing intake is safe at levels likely to be experienced.

Iodine deficiency is a major public health problem globally. It is the largest preventable cause of brain damage in childhood (WHO, 2004). Concern in relation to current dietary intake of iodine in Australia and New Zealand has led to Food Standards Australia New Zealand releasing an initial assessment report (P230) on the consideration of mandatory iodine fortification in December 2004 (FSANZ, 2004a).

Neural tube defects are severe congenital malformations of the central nervous system and result from failure of closure of the neural tube during early foetal development. There is convincing evidence that enhanced folate intakes, through mandatory fortification with folic acid can reduce the risk of neural tube defects by between 19 and 78% (Honein et al 2001, Persad et al. 2002; Ray et al, 2002; Williams et al 2002, Lui et al, 2004). Greater reductions have occurred where rates were higher at baseline. In October 2004, Food Standards Australia New Zealand released an initial assessment report (P295) on the consideration of mandatory fortification with folic acid (FSANZ, 2004b).

In order to decide on the most effective public health strategy to increase nutrient intakes a range of strategies can be considered. Appraising intervention options and deciding on the preferred strategies are two key steps in the National Public Health Planning Framework (NPHP, 2000). These two steps involve identifying potential options and assessing the options against a set of agreed effectiveness criteria.

This paper outlines the findings of an expert panel assessment of the relative merits of alternative public health strategies that aim to increase nutrient intake. The process involved:

- Use of the National Public Health Planning Framework.
- Formation of an expert panel comprising leading public health experts, with expertise in folate, iodine and public health nutrition from New Zealand and Australia.
- Identification of case studies of public health interventions to increase nutrient intake.
- Generation of a set of criteria to assess strategy effectiveness.
- Assessment of strategies against criteria.
- Applying the findings to folate and iodine.

Members of the National Public Health Partnership were informed of the project and invited to comment on the final paper.

### 3. ASSESSMENT OF INTERVENTION OPTONS

#### 3.1 Intervention options

The range of public health interventions used to increase nutrient intakes in populations include:

- mandatory food fortification
- voluntary food fortification
- supplement use
- dietary education
- maintaining status quo

#### 3.2 Assessment criteria

Case studies of public health interventions to increase nutrient intake were identified from the literature (appendix 1). Key findings from the case studies were used to generate effectiveness criteria. These criteria were then used to assess intervention options in order to determine the most effective public health strategy to increase iodine and folate intake (Box 2).

<b>Box 2: Assessment criteria</b>	
Effectiveness:	Can nutrient requirements be met by the proposed strategy? Has the strategy been shown to work elsewhere?
Equity:	Does the strategy reach the population equally, specifically those most at risk?
Efficiency:	Can the strategy be implemented efficiently, considering opportunity costs?
Certainty:	Can a proposed strategy deliver adequate quantities of a nutrient to those who need it most?
Feasibility	Can the strategy be practically implemented? Are there technical barriers to implementation?
Sustainability:	Can ongoing implementation of the strategy be guaranteed?

#### 3.3 Relative merits of intervention options

##### *Mandatory food fortification*

Mandatory fortification implies regulatory control resulting in the following advantages:

- equity, with the greatest potential to reach the largest proportion of the population, particularly the socially disadvantaged.
- greater chance of ensuring certainty of the level of nutrients in foods compared with voluntary fortification. Certainty in levels of nutrients in foods makes monitoring levels of intake in the population more feasible and reliable.
- capacity to survive changes to food industry practices making it more sustainable than non regulatory approaches

##### *Voluntary food fortification*

Voluntary fortification programs have a number of inherent limitations.

- Voluntary fortification typically does not require food manufacturers to notify when they are fortifying and as such it is difficult to qualify and quantify the practice and extent of fortification. This makes it difficult to estimate the effects of fortification as well as identify potential over-consumers. Hence, monitoring becomes expensive, complex and unreliable.
- Voluntary fortification carries the risk that not all of the population will be equally exposed to fortified products making it inequitable. The vitamin D case study from the 1960s (Cheney, 2000) demonstrates how voluntary fortification can result in ongoing inadequate nutrient intakes coexisting with excess nutrient intake.

- Lack of a legislative framework can support inaction. Hence, investment is needed in ongoing promotion of the program both to industry and within government making voluntary fortification inefficient.

### ***Supplement use***

Supplement use can appear an attractive option where increasing nutrient intake is required in a defined population sub-group. However,

- If supplements are required in the early stages of pregnancy the target population can be missed when pregnancies are unplanned and not detected early. In Australia and New Zealand rates of unplanned pregnancies are as high as 50%.
- Experience shows that supplement use most benefits those with high educational and socio-economic status and therefore is inequitable.
- Supplement use requires a significant level of public health resources for ongoing promotion, especially where membership of the target group is constantly changing as with pregnant and lactating women. This ongoing implementation cost is inefficient and diverts resources away from other public health priorities.
- Voluntary fortification is often used by the food industry to market *premium products*, with higher costs (and profits) that are more likely to be purchased by wealthier consumers.

### ***Dietary education***

- Dietary education can only be effective if there is a sufficient level of the nutrient in the food supply to meet the needs of the population through currently recommended dietary practices.
- Dietary education, like supplement use, requires a significant level of public health investment for ongoing promotion especially where membership of the target group is constantly changing as with pregnant and lactating women.
- Dietary education most benefits those with higher socio-economic and educational levels and is therefore inequitable.

### ***Maintaining status quo***

- Where there is a demonstrated public health need which can't be met by maintaining status quo, this is not an acceptable public health response and it meets none of the assessment criteria.

## **4. STRATEGIES TO INCREASE IODINE AND FOLATE INTAKE**

### **4.1 Iodine**

Iodine, a mineral, is an essential nutrient required for normal thyroid function, growth and development. Iodine deficiency results in a ranged of adverse affects collectively known as Iodine Deficiency Disorders. Iodine deficiency is a major public health problem globally. It is the largest preventable cause of brain damage in childhood.

Australia and New Zealand have international obligations to prevent iodine deficiency. Both countries are signatories to the 1990 United Nations sponsored Declaration for the Survival, Protection and Development of Children that states *that every child has the right to an adequate supply of iodine to ensure its normal development* (United Nations, 1990), and to the goal agreed at the UN General Assembly Special Session for Children of *Achievable sustainable elimination of iodine deficiency disorders by 2005* (UNGASS, 2002).



Many developed countries have adopted iodine fortification programs, predominantly salt iodisation, with or without mandatory provisions. Whilst improvements have been observed where voluntary fortification has been adopted, concerns remain about sustainability in the absence of legislative measures.

Internationally, authoritative bodies recommend that the primary, if not the only, strategy that is effective and sustainable to eliminate iodine deficiency is universal salt iodisation (ICCIDD, UNICEF, WHO, 2001). The WHO has recently reaffirmed this strategy in a series of recommendations (January 2005, Expert Technical Consultation) *that where salt iodisation has been effective for at least two years with salt adequately iodised and widely consumed, it can be expected that the iodine needs of women of child-bearing age and pregnant and lactating women are covered by their diet and that the iodine stored in the thyroid gland is sufficient to ensure adequate hormonal synthesis and secretion.* The WHO is currently preparing a statement recommending iodine supplementation during pregnancy and lactation in areas of the world where universal salt iodisation is not practiced or is ineffective. The WHO recommendations for women living in such areas are:

- women of child-bearing age should be given a daily oral dose of 150µg of iodine as potassium iodide
- pregnant and lactating women should be given a daily oral dose of 250µg of iodine as potassium iodide
- children ages 0-6 months should be given iodine supplements only if the mother was not supplemented during pregnancy or if the child is not being breast fed. The supplements should be given as soon after birth as possible. The WHO also states that exclusive breast-feeding should be promoted for the first 6 months of life.

International iodine fortification experience has been summarised by Food Standards Australia New Zealand in the initial assessment report for P230 (FSANZ, 2004a).

- USA has voluntary salt iodisation and the Centre for Disease Control has agreed to continue iodine monitoring in its ongoing surveys.
- Canada has universal salt iodisation however no regular monitoring program exists.
- Germany has voluntary salt iodisation that is regularly monitored. However, concerns have been expressed that iodine status is continually under threat in the absence of legislative measures (Remer & Neubert, 1998) and recommendations have been made that universal salt iodisation become mandatory.
- Switzerland has a voluntary salt iodisation program that covers 90% of all salt use both commercially and in households. Iodine status is monitored at five yearly intervals.
- Denmark has universal salt iodisation that became mandatory in 2000. Monitoring has been planned for 2004 and 2005.
- In the Netherlands table salt and salt used in the bread industry and in pasta products is iodised. Use of iodised salt by the baking industry is voluntary but widely practiced.
- The Peoples Republic of China has implemented USI with over 90 % of households using iodised salt, all salt used for food preparation is iodised and they have a national surveillance program in place.

In Australia an interim iodine fortification program has been implemented in Tasmania to address iodine deficiency. The program involves voluntary use of iodised salt by the baking industry. Given its voluntary nature, concerns remain about sustainability, reach and cost of the program (Seal, 2004). Specifically;

- Changes in the cost of iodised salt, or, in baking practices, such as increased reliance on premixes from outside Tasmania, could result in reduced bakery participation.
- Non-participating bakeries in rural areas where reliance on one outlet for bakery goods is high, might lead to isolated pockets of deficiency. A population-wide monitoring program would be unlikely to identify such isolated pockets.
- The costs of a voluntary program are likely to be higher than a mandatory program. Monitoring and ongoing promotion of the program to industry, and, encouraging consumers to *ask for* bread baked with iodised salt, diverts limited resources from other public health priorities.

Box 3 summarises the assessment of options to increase iodine intakes.

- Mandatory fortification represents the most effective public health strategy to increase iodine intakes in Australia and New Zealand where the additional intake is considered safe, and there is a demonstrated need and meets all assessment criteria.
- Experience, in Germany, Thailand, Vietnam and Tasmania has shown that with voluntary iodine fortification programs concerns remain about sustainability, cost, equity and capacity to monitor due to uncertainty of levels of iodine in food.
- Supplementation of pregnant and lactating women would clearly be effective at increasing iodine intake among women who took supplements. Experience shows that promotional strategies to recommend supplement use most benefits those with higher educational and socio-economic levels and are therefore inequitable. Ongoing promotion is required into the future to ensure women who become pregnant are made aware of the need for supplementation which impacts on efficiency and sustainability. However, supplementation may provide a useful complementary strategy to mandatory fortification if requirements for pregnancy and lactation can't be met without exposing the remainder of the population to unreasonable high levels of intake.
- Dietary education is not an option to correct iodine deficiency, as there is insufficient iodine in the food supply to meet needs through recommended dietary practices.
- Maintaining status quo would have no effect on increasing iodine intake and is not an adequate response where there is evidence of deficiency.

<b>Box 3: Assessment of potential public health strategies to increase iodine intake</b>					
	Mandatory Fortification	Voluntary Fortification	Supplements	Dietary Education	Maintaining status quo
Effectiveness	✓	✓	✓ (may missed early pregnancy due to unplanned pregnancies)	X	X
Equity	✓	X	X	X	na
Efficiency	✓	X (cost of ongoing implementation)	?	X	na
Certainty	✓	X	✓ (although supplements vary in dose)	X	na
Feasibility	✓	✓	✓	X	na
Sustainability	✓	X	X	X	na

na= not assessed

## 4.2 Folate

Folate is a water-soluble B-group vitamin. Enhanced folate intake in pregnancy in the form of folic acid has been shown to reduce rates of neural tube defects by between 19 and 78% depending on the baseline rates (with the greatest gains where neural tube defect rates are initially high).

Folate fortification is adopted in many countries because of its potential to reach the largest proportion of women of childbearing age prior to conception, in doses thought to be effective. A number of countries have fortified the food supply with folic acid. Mandatory fortification is practiced in the US, Canada, the majority of South American countries and countries from Africa and Asia. The UK, Australia and New Zealand allow voluntary fortification of certain foods with folic acid.

In 1994 an expert panel of the NHMRC recommended that folate intakes in women of child bearing age should be increased. To achieve this increase, the panel recommended that fortification of staple foods should be introduced as an initial step. Assessment would then be required to determine whether mandatory fortification was warranted.

Voluntary fortification with folic acid was introduced in Australia in 1995 and in New Zealand in 1996. Evaluation of voluntary fortification in Australia has demonstrated that relatively few of the recommended foods have been fortified with folate, limiting the potential impact on population folate intakes (Abraham and Webb, 2001). At the time of the evaluation there was a call for greater effort to improve implementation before effectiveness could be assessed (Abraham and Webb, 2001). However, it appears that a lack of a legislative response has resulted in inaction with little, or no progress since that time.

Prior to the introduction of voluntary fortification, South Australia undertook to actively promote increased dietary intake of naturally occurring folate from food sources with little success (Brown et al 1997, cited in Chan et al, 2001).

Western Australia has invested heavily in promoting supplement use for peri-conceptual women. Evaluation demonstrates that only 30-40% of pregnant women take supplements with the greatest uptake among those with high educational and socio-economic levels (Bower et al, 1997). Subsequent analysis of trends in neural tube defects suggests that whilst rates improved in the non-indigenous population, indigenous Australians showed no improvement (with rates now double those of others – a clear demonstration of inequity) (Bower et al, 2004).

Box 4 summarises the assessment of options to increase folate intakes.

- Mandatory fortification meets all the assessment criteria and represents the most effective public health strategy to increase folate intakes in Australia and New Zealand where the additional intake is considered safe, and there is a demonstrated need.
- Experience, in Australia and New Zealand with voluntary folic acid fortification has shown that a lack of legislative measures appears to have resulted in inaction.
- Voluntary fortification is less likely to reach those people who chose cheaper brand products, as they are the foods that are less likely to be fortified.
- Supplementation of pregnant and lactating women would clearly be effective at increasing folate intake among women who took supplements. Experience shows that promotional strategies to recommend supplement use most benefits those with higher educational and socio-economic levels and are therefore inequitable.

Ongoing promotion is required into the future to ensure women who become pregnant are made aware of the need for supplementation which impacts on efficiency and sustainability. However, supplementation may provide a useful complementary strategy to mandatory fortification if requirements for pregnancy and lactation can't be met without exposing the remainder of the population to unnecessary high levels of intake.

- Dietary education has not proven to be effective, and is unlikely to be effective, as recommended intakes of folate are substantially higher than the amount available from a healthy diet.
- Maintaining status quo would have no effect on increasing folate intake and is not an adequate response where there is a demonstrated public health needs and safety can be assured.

<b>Box 4: Assessment of potential public health strategies to increase folate intake</b>					
	Mandatory Fortification	Voluntary Fortification	Supplements	Dietary Education	Maintaining status quo
Effectiveness	✓	✓	X (required in early pregnancy but large % unplanned)	X	X
Equity	✓	X	X	X	na
Efficiency	✓	X (ongoing implementation costs)	?	X	na
Certainty	✓	X	✓ (although supplements vary in dose)	X	na
Feasibility	✓	✓	✓	✓	na
Sustainability	✓	X	X	X	na

na= not assessed

## 5 MONITORING - a critical component

The *Australia and New Zealand Food Regulation Ministerial Council Policy Guideline on the Fortification of Food with Vitamins and Minerals* states that for mandatory fortification programs:

*any agreement to require fortification should require that it be monitored and formally reviewed to assess the effectiveness of, and continuing need for, the mandating of fortification.*

...and for voluntary fortification programs:

*a permission to voluntary fortify should require that it be monitored and formally reviewed in terms of adoption by industry and the impact on the general intake of the vitamin/mineral.*

It is our expert public health advice that monitoring of fortification program as stated in the Guidelines is a critical component of any public health strategy in order to protect public health and safety. Periodic review and comprehensive monitoring of food composition and intake, nutrient intake, nutritional status and related health status are needed to:

- assess safety and efficacy
- detect any unanticipated negative effects to ensure the program is doing more good than harm
- review ongoing need for a fortification program.

Monitoring is best achieved by linking to a comprehensive national nutrition monitoring and surveillance system. The alternative is for each fortification program to establish a unique monitoring system. It is our expert public health advice that the latter option will result in fragmentation and inefficient use of monitoring resources.

In New Zealand a rolling program of national nutrition surveys have been established which should provide a sound basis for the development of appropriate monitoring systems for fortification programs with marginal additional investment.

In Australia a plan for an ongoing nutrition monitoring and surveillance system is being developed through the Strategic Intergovernmental Nutrition Alliance. However, this will require appropriate investment to ensure it is fully implemented and sustained.

## **6. CONCLUSION**

Assessed against the criteria of effectiveness, equity, efficiency, certainty, feasibility and sustainability, mandatory fortification is the most effective public health strategy to increase nutrient intakes where:

- i there is evidence that current intake is detrimental to health (effecting either the whole population or a significant population sub-group),
- ii nutrient requirements can not be met by realistic dietary practices, and
- iii safety assessments demonstrate increasing intake is safe at levels likely to be experienced.

Where there is a demonstrated need and safety can be assured, mandatory fortification would represent the most effective public health strategy for increasing folate and iodine intakes. Supplement use for pregnancy and lactation may still be a useful complementary strategy where requirements exceed levels that can easily be met through mandatory fortification.

As there will never be complete scientific certainty about the effectiveness and safety of fortifying the food supply with specific nutrients, periodic review and comprehensive monitoring (food composition, nutrient intake, nutritional status and health outcomes) of mandatory fortification is essential.

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## APPENDIX 1: CASE-STUDIES

<i>Intervention</i>	<i>Main findings</i>	<i>Source</i>
<b>Voluntary fortification</b> of fruit drinks, biscuits ready-to-eat cereals, cocoa mixes to be added to milk, dried and evaporated milk and margarine with vitamin D in Canada in the mid 1960s, to prevent rickets.	A study of vitamin D intakes in 1000 Ontario children aged 1 week to 5 1/2 years found 5% of children got no additional sources of vitamin D, a little over 10% got less than 200IU a day, and then the majority got 400 or more. However, 70% of these kids got more than 400IU a day of vitamin D and about 2%, more than 1800IU.	Reported in Cheney, 2000.
<b>Dietary promotion</b> of foods high in folate in South Australia.	No significant improvement in folate intake concluding it is difficult to obtain sufficient folate to meet recommendations from naturally occurring folate.	Brown et al 1997 in Chan et al, 2001.
Folate <b>supplement use</b> promoted to peri-conceptual women in Western Australia 1992-95.	Despite active promotion only 30-40% of pregnant women took folic acid supplements. Supplement was strongly correlated with socio-economic and educational level. Supplement use in the peri-conceptual period is ineffective for unplanned pregnancies that account for almost half of the pregnancies in Australia and New Zealand.	Bower, et al 1997.
<b>Voluntary fortification</b> of folic acid in Australia and New Zealand of a range of products including: flour, breakfast cereals, fruit and vegetable juice, bread, savoury biscuits and pasta.	Dietary modelling suggest small (11-13%) improvements in folate intake but insufficient to meet requirements. Estimations hampered by lack of up-to-date information on available fortified foods.	Abraham & Webb, 2001
<b>Mandatory fortification</b> of flour with thiamine was introduced in 1991 in Australia with the aim of reducing rates of Wernicke's Encephalopathy (WE).	Significant reduction in WE since mandatory fortification of flour with thiamine. However, monitoring has been inadequate to allow appropriate evaluation of this public health strategy.	Harper et al. 1998.
<b>Voluntary fortification</b> with iodine in Thailand and Vietnam.	National assessments of iodine fortification programs found the major impediments to progress of optimal iodine nutrition in both of these countries was the lack of a strong legislative framework to ensure that all salt for human consumption is iodised.	ICCIDD, UNICEF, 2004
<b>Combined mandatory and voluntary fortification:</b> Germany mandatory use of iodised salt in table salt, combined with voluntary provisions for use of iodised salt in manufactured goods which needed to be separately labelled.	Without appropriate legislative measures to enforce universal salt iodisation as recommended by WHO, the insufficient iodine status in Germany could become a never-ending story.	Remer and Neubert 1998.
<b>Mandatory fortification</b> of flour with folate in Canada and US.	Reduction of rates of NTDs between 19 and 78% to levels between 1 and 2 per 1000 births.	Honein et al 2001, Persad et al. 2002; Ray et al, 2002; Williams et al 2002, Lui et al, 2004.
<b>Voluntary fortification</b> of bread with iodine through use of iodised salt in bread making in Tasmania, Australia.	Small but significant increase in urinary iodine concentration. However, given the programs voluntary nature, concerns remain about sustainability, reach and cost.	Seal et al, 2003