Prevention of Spina Bifida-F with Folic Acid Fortification of Staple Foods

World Health Assembly Resolution on Food Fortification

GAPSBi-F
Global Alliance for Prevention of Spina Bifida-F
I. **Spina bifida (SB)** is a common and devastating birth defect affecting babies **globally**

II. Majority of SB (SB-F) is associated with **low** maternal folate levels

III. SB-F can be prevented by **fortification of staple foods** (e.g., wheat & maize flour, rice, salt) with folic acid
IV. Folic acid fortification is a proven, safe, and cost-effective public health intervention, yet vastly underutilized worldwide.

V. Need for prompt global action to mandate folic acid fortification, through a World Health Assembly Resolution to prevent disability and death among children.
I. Spina bifida is a common and devastating birth defect affecting babies globally

- Every year, about 130,000 babies are born with SB globally, and 50% of them will die either during pregnancy or in early childhood
- Babies that survive have life-long neurologic impairment and require multiple surgeries
- Affected children and families are shunned, stigmatized, and suffer social and financial ruin in many countries
- Cost of medical care for SB is very high and cases are never curative
II. Majority of SB is associated with low maternal folate levels

• Adequate folate levels are needed in the mother’s blood before and in early pregnancy for proper development of fetal spine and brain.

• Most women of reproductive age do not have enough folate stores in the body, and this problem is pronounced in low- and middle-income countries.
III. SB-F can be prevented by fortification of staple foods with folic acid

• Folic acid fortification of staple foods is a public health intervention that reaches all women of reproductive age equitably, and at the right time, to prevent SB-F

• Countries with mandatory folic acid fortification policies have significantly lower prevalence of SB-F compared to countries with voluntary or no fortification policies
IV. Folic acid fortification is a proven, safe, and cost-effective public health intervention, yet vastly underutilized worldwide

- Folic acid (vitamin B9) is shown to prevent SB-F in randomized trials in the early 1990s

- As of year 2020, around 60 countries have implemented mandatory folic acid fortification of staple foods with adequate national reach to effectively prevent SB-F since 1998
IV. Folic acid fortification is a **proven**, safe, and cost-effective public health intervention, yet vastly underutilized worldwide.

Mandatory fortification of staples with folic acid has resulted in:

- **significant increases in blood folate concentrations** among women of reproductive age and eliminating folate deficiency anemia

- **significant reductions in SB-F prevalence** in many countries
IV. Folic acid fortification is a proven, **safe**, and cost-effective public health intervention, yet vastly underutilized worldwide.

There is **strong evidence for the safety** of providing folic acid through fortification of foods through multiple studies globally.

**No scientific evidence** on masking vitamin B12 deficiency, cancer, or other adverse health conditions in the populations of countries implementing food fortification as a public health intervention.
Folic acid fortification is a proven, safe, and cost-effective public health intervention, yet vastly underutilized worldwide.

National mandatory food fortification enables health equity in the population and highly cost-effective (estimated cost per death averted = 950 US$; cost per disability adjusted life year=15 US$)

Cost-effectiveness of folic acid fortification is similar to other life-saving interventions like rotavirus vaccines and bed nets for malaria.

One year of fortification can save 32B US$ in select low- and middle-income countries with a high potential to fortify.
IV. Folic acid fortification is a proven, safe, and cost-effective public health intervention, yet **vastly underutilized** worldwide.

Only 23% of all preventable SB-F globally are prevented after 30 years of knowing how to prevent these birth defects.

**Figure 2** Global status of folic acid-preventable spina bifida and anencephaly through mandatory folic acid fortification in 2019. No prevention = 0% prevention in countries consuming less than 20 mcg/day of folic acid from fortified flour; moderate prevention = 50% prevention for countries consuming 100 mcg/day on average (range, 20–150 mcg/day) of folic acid from fortified flour; high prevention = 100% prevention in countries consuming 200 mcg/day on average (≥151 mcg/day) or more of folic acid from fortified flour.
V. Need for **prompt global action to mandate folic acid fortification**, through a World Health Assembly Resolution to prevent disability and death among children

- **Inaction has led to millions of global child deaths** from SB-F which were preventable

- **The science and benefits are clear for food fortification to mandate public health policy**

- **Iodized salt has a high potential to be fortified with folic acid** to more women of reproductive age globally

**FIGURE 2** Prevention potential for PAP SBA through mandatory fortification of iodized salt with folic acid, stratified by degree of penetration of iodized salts in the households in 100 countries that had complete information for our analysis. Countries shaded in yellow have ≥80% households using iodized salt. Countries shaded in blue have <30% households using iodized salt. Countries shaded in gray have no information on household iodized salt consumption and thus excluded from our analysis.

**Salt fortification shows major promise to accelerate stalled SB-F prevention globally**
V. Need for prompt global action to mandate folic acid fortification, through a *World Health Assembly Resolution* to prevent disability and death among children

- Urgent need for *World Health Assembly Resolution* to move to change from stalled efforts of SB-F prevention - GAPSBi-F leading the cause

- **Champions** in governments, civil-society organizations, parents, physicians, and spina bifida organizations

- **Neurosurgeons** are great champions to lead mandatory fortification efforts globally and implement in action the *ISPN resolution*
Support for mandatory fortification of staples with folic acid

Editorial

A Resolution on Folic Acid Fortification

The North American Tetrology Society is committed to the prevention of birth defects and disorders of development in infants globally. The United States, like other countries, requires mandatory fortification of certain staple grains with folic acid. Since fortification was introduced in the United States in 1996, the National Institute of Medicine, including spina bifida and anencephaly (Centers for Disease Control and Prevention, 2011). The reductions in spina bifida and anencephaly occur before birth. (Boyne et al., 2007)) If all countries would require fortification of staple foods, we believe it would substantially decrease the global incidence of these severe to life-threatening birth defects. While each country will have to determine the best strategy for implementing such a plan, considering cultural preferences, financial and quality of life concerns, the Tetrology Society has developed the following resolution to support mandatory fortification efforts and hope that it can be used by fortification advocates worldwide to reduce the number of folic acid-preventable birth defects.

Resolution: Global Total Prevention of Folic Acid-Preventable Spina Bifida and Anencephaly by 2024

Whereas, the mission of the Tetrology Society is to prevent birth defects and disorders of development in infants globally; Wherefore, there is compelling evidence that folic acid prevents a large proportion of spina bifida and anencephaly (NIH, Vitamin Study Group, 1991); Wherefore, there are epidemics of spina bifida and anencephaly in many countries, with prevalence that exceeds the expected prevalence of folic acid and preventable spina bifida and anencephaly in the United States (Berry et al., 1999; Berry et al., 1999; Youniss et al., 2004; Romano et al., 2012); Wherefore, governments in approximately 70 countries report mandatory folic acid fortification, resulting in approximately 60,000 fewer pregnancies affected with folic acid-preventable spina bifida and anencephaly each year (Hemstreet et al., 2011); Whereas, mandatory folic acid fortification has led to market reductions in folic deficiency and folic deficiency anemia in the US population (Shelbourne, 2013); Whereas, while there is no evidence demonstrating that folic acid fortification causes adverse health effects in a daily diet of 1000 calories, including a variety of foods and beverages (Centers for Disease Control and Prevention, 2011); In consideration of the above, the Tetrology Society recommends the following resolution to support mandatory folic acid fortification efforts:

The Tetrology Society Recommends

All governments institute mandatory folic acid fortification of a centrally prepared food (such as, but not limited to, wheat flour) or meal, rice, and maize flour or meal, to provide adequate amounts of folic acid per day. Wherein a global strategic plan for the total prevention of folic acid-preventable spina bifida and anencephaly by 2024 is written by 2015. Wherein the members of the Tetrology Society champion mandatory folic acid fortification in their home countries. The content of this document has been reviewed and fully supported by the council and the Public Affairs Committee of Tetrology Society. Submitted on behalf of the Tetrology Society, Public Affairs Committee Mary Heike Smith, Chair, Christopher Lau, Chair, Vitamin Action Committee, Tetrology Society, Mexico, 2017.

Reference


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The International Society for Pediatric Neurosurgery resolution on mandatory folic acid fortification of staple foods for prevention of spina bifida and anencephaly and associated disability and child mortality

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Letter to the Editor

The International Society for Pediatric Neurosurgery resolution on mandatory folic acid fortification of staple foods for prevention of spina bifida and anencephaly and associated disability and child mortality

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The International Society for Pediatric Neurosurgery (ISPNN) is committed to the improvement of the health and welfare of children requiring neurosurgical care throughout the world by scientific research and close international cooperation. ISPNN represents over 350 neurosurgeons from over 50 countries and publishes the professional journal Child’s Nervous System which is also the official journal of the European, Latin American, Brazilian, Turkish, Russian, Korean, Japanese and Chinese pediatric neurosurgical societies.

Neurosurgeons offer multiple surgeries for children born with spina bifida, the first of which is usually performed within the first day or two of life (1, 2). Because “factors affecting care and outcomes living with spina bifida vary widely by country, including the number of neurosurgeons available to provide surgical interventions,” many neurosurgeons are surprised by the high number of children born with spina bifida in their respective countries (3). If we could eliminate all folic acid-preventable cases of spina bifida, then the neurosurgeons could focus on timely treatment of all the non-preventable cases, i.e., spina bifida occurring due to genetic and other non-folic acid-related causes) and on children with other conditions in need of neurosurgical care.
Support for WHA resolution on food fortification and global mandatory food fortification with folic acid
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- International Society of Pediatric Neurosurgeons (ISPN)
- The G4 Alliance
- ReachAnother Foundation
- University of Minnesota Medical School Department of Surgery
- ChildKind International
- HEAL Africa
- International Federation of Surgical Colleges (IFSC)
- International Society of Surgery (ISS/SIC)
- Kenya Society of Anesthesiologists
- Korle-bu Neuroscience Foundation (KBNF)
- Mercy Ships
- Mobile Surgery International (MSI)
- Netherlands Society for International Surgery (NVTG)
- Operation Smile

- Physicians for Peace
- Royal Australasian College of Surgeons (RACS)
- Royal College of Surgeons in Ireland (RCSI)
- Spina Bifida and Hydrocephalus Care Foundation (SBH)
- University of Utah Center for Global Surgery
- World Federation of Neurological Societies (WFNS)
- World Surgical Foundation (WSF)
- Would Federation of Societies of Anesthesiologists (WFSA)
- International Federation for Spina Bifida and Hydrocephalus (IFSBH)
- Center for Spina Bifida Prevention Emory University


• Kancherla V, et al. Reducing the burden of anemia and neural tube defects in low- and middle-income countries: An analysis to identify countries with an immediate potential to benefit from large-scale mandatory fortification of wheat flour and rice. Nutrients 2021;13(1):244.


