

## ***Double Fortification of Salt: Critical analysis and consensus building towards the development of guidance for countries***

### ***Seeking Authors for Background Papers***

#### Request for Expressions of Interest

Seeking individuals or institutions interested in taking the lead in the development of Background Papers (content below) for a global consultation on Double Fortified Salt (DFS).

#### Background

Several million people globally suffer from sub-optimal intake of vitamins and minerals, leading to micronutrient deficiencies, increased disease burden, stunted growth, cognitive impairment and increased risk of child mortality. Fortifying staple foods and condiments with essential vitamins and minerals has been proven to be a cost-effective and sustainable intervention for combating micronutrient inadequacies when implemented under the appropriate conditions. Fortification of salt with iodine is the most widespread fortification effort and one of the world's most impressive public health nutrition success stories – today, almost 110 countries have mandatory legislation for iodized salt<sup>1</sup> and 86% of the world's population has access to iodized salt<sup>2</sup>. Iodized salt has led to a dramatic decline in the number of countries with iodine deficiency and its debilitating impact on brain development, from 110 countries classified with sub-optimal iodine intake in 1993<sup>3</sup> to only 19 in 2017<sup>4</sup>.

Based on the success of salt iodization, and the unique qualities of salt as a vehicle for fortification, including its universal and relatively homogenous consumption, there has been interest within the global public health and nutrition community to examine the potential of fortifying salt with both iron and iodine (double fortified salt – DFS). To this end, an international consultative process is underway to review the available scientific evidence and experience with operationalization and implementation of DFS.

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<sup>1</sup> Global Fortification Data Exchange (2018) Available at: <https://fortificationdata.org/#data> (Accessed 27 April 2018)

<sup>2</sup> UNICEF (2017) *The State of the World's Children 2017: Children in a Digital World*. <https://www.unicef.org/sowc2017/> Accessed 27 April 2018.

<sup>3</sup> WHO (1999). Progress towards the elimination of iodine deficiency disorders (IDD). WHO/NHD/99.4, World Health Organization: Geneva, Switzerland. Available at: [http://www.who.int/nutrition/publications/micronutrients/iodine\\_deficiency/WHO\\_NHD\\_99.4/en/](http://www.who.int/nutrition/publications/micronutrients/iodine_deficiency/WHO_NHD_99.4/en/) (Accessed 26 April 2018)

<sup>4</sup> Iodine Global Network. (2017) Global Scorecard of Iodine Nutrition in 2017 in the general population and in pregnant women (PW). IGN: Zurich, Switzerland. 201, which are 7. Available at: <http://www.ign.org/scorecard.htm>. (Accessed 26 April 2018)

The objectives of this initiative are

1. to compile, review, and critically analyze available information about DFS experiences in order to define opportunities, risks, and challenges related to DFS
2. to develop evidence-based guidance for countries considering DFS.

The key outputs of this exercise will therefore be **multi-agency-endorsed guidance for countries considering DFS, supported by a series of Background Papers published in a peer-reviewed journal.**

## Seeking expressions of interest

An integral part of the process will be the preparation of a series of Background Papers to review available research, analysis and experience on the identified issues by interested authors with relevant expertise.

We are seeking potential authors who will take the lead on the preparation of these papers as a background to the final guidance document and will be published in a special Supplement of a journal. The attached concept note provides details on the proposed content for each of the background papers. The concept note also outlines the methodology, steps to be taken and proposed timeline, which are summarized here.

1. **Conduct internet desk-review** for all relevant published and unpublished research, studies or information on the topic.
2. **Interview relevant stakeholders** for further information or clarification as necessary
3. **Develop first draft of background paper** that:
  - a. summarizes and references all available information, research and experiences, and where appropriate, adopt relevant methods for systematic reviews and meta-analysis
  - b. analyzes and presents conclusions on critical issues of importance [see Table 1 in attached concept note]
  - c. draws conclusions on (i) opportunities for DFS, (ii) risks for DFS, and (iii) challenges for DFS, and (iv) conditions and requirements for when DFS would be feasible, successful and effective
4. **Circulate a first draft** of the background paper to the DFS Steering Group<sup>5</sup> for review
5. **Present a summary of findings at the 1<sup>st</sup> multi-stakeholder workshop**
6. **Revise background paper**, taking into consideration discussions at the 1<sup>st</sup> multi-stakeholder workshop, which may include including additional information or analysis requested.
7. **Circulate the second draft** of the background paper to the DFS Steering Group for final review
8. **Finalize background paper**, taking into consideration feedback received and format it into an article for publication in a peer-reviewed journal
9. Submit article for review, address comments by journal reviewers and **follow the article through the necessary process for publication.**

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<sup>5</sup> Members of the DFS Steering Group include:

Omar Dary (USAID), Rafael Flores-Ayala (US CDC), Greg Garrett (Global Alliance for Improved Nutrition), Rishi Kansagra (Purebond), Noor Khan (Nutrition International), Roland Kupka (UNICEF), Venkatesh Mannar (The India Nutrition Initiative), Rey Martorell (Emory University), Meera Shekar (World Bank), Luc Laviolette (World Bank).

Iodine Global Network members coordinating the DFS consultation include Jonathan Gorstein, Karen Codling, Robin Houston, and Becky Tsang

## Timeline – key dates

- **15 August 2018:** Identify and contract authors
- **1 March 2019:** First draft of background papers 1-4 submitted to Steering Group for review
- **Mid-late April 2019:** Background paper results and conclusions presented at first multi-stakeholder workshop
- **Mid-late October 2019:**
  - Second draft of background papers (taking into account feedback by Steering Group and comments during workshop)
  - First draft of proposed Guidance for Countries Considering DFS submitted to Steering Group for review by mid-late September 2019.
- **November 2019:** Second multi-stakeholder workshop
- **December 2019:**
  - Background papers finalized
  - Background papers converted into journal articles
  - Submission into journal for publication

## Remuneration

As compensation, we will provide an honorarium of \$US 5,000 for each paper. Some of the background papers may require travel to collect data or interview stakeholders. Requests for traveling and other activities outside the desk review will be considered, if accompanied with justification and a proposed budget.

We will also support the attendance of the lead author to the first technical workshop to present the key results and observations.

## Criteria for potential authors

Individuals with extensive experience and background in the area of focus, in accordance with the specific content to be covered for each of the papers. It is important that the evidence compiled is done so critically and objectively without any bias. Authors will be asked to review and sign conflict of interest statements indicated that they have no vested commercial or other interests in DFS which may compromise the integrity of their contribution.

Expressions of interest should include a detailed background of the lead author and the name of any additional authors, including CV, previous work and experience in the field and availability for the assignment within the timeframe indicated above. Please send to Becky Tsang (DFS Project Coordinator) at [btsang@ign.org](mailto:btsang@ign.org).

**All expressions of interest should be received by Friday, July 27, 2018.**

## Background Papers: Overview

This section provides an overview of the key areas which will be reviewed in preparation for the first workshop. Four background papers will be prepared to compile and analyze available information and experiences on DFS. The purposed and content of each paper are summarized below and are elaborated on in Table 1.

### Background Paper 1: Identification and discussion of technical and investment requirements and programmatic issues in production of DFS

The technical requirements for food fortification vary in complexity depending on the food matrix and the nutrient added to it. Biologically effective forms of the nutrient need to be added to the food vehicle in forms and quantities that do not interact with the food vehicle or impact the product's acceptance, while contributing substantively to nutrient intake. Effective DFS production requires use of salt of certain quality, choice of correct iron fortificant, correct dosage of iron and iodine fortificants, dry addition of the iron fortificant, wet or dry addition of iodine fortificant, homogenous mixing and packaging, storage and transport that protects the nutritional content and quality of the final product. In addition, iron fortification of salt should occur without impacting the performance and acceptance of salt iodization. As more than one form of iron fortificant is available for DFS production these requirements may differ depending on the iron fortificant.

This background paper should present and discuss the above **technical and equipment requirements for sustainable production and quality assurance of quality DFS**, including the minimal characteristics of salt, requirements of dilution and mixing of the fortificant, conditions for production and storage of the fortificant, etc. These requirements should be considered for each of the available iron fortificants and provide estimates of cost for the various components. In addition, it should suggest in which contexts or countries the above-mentioned requirements can be met.

### Background Paper 2: Evidence of efficacy, effectiveness, and safety of DFS in improving reducing anemia, iron deficiency anemia, iron deficiency, and iodine deficiency

Several studies have been completed on the biological impact of DFS, using different iron fortificants. These provide important insights to the optimal formulation of DFS, particularly with respect to the iron fortificant and the anticipated impact. A recent paper has systematically reviewed and undertaken a meta-analysis on the impact of DFS on hemoglobin concentrations and anemia prevalence, stratified by population groups, fortificants used, and other variables<sup>6</sup>. This background paper will build on the above-mentioned review **to summarize the efficacy, and if available, effectiveness of DFS on four key outcomes; anemia, iron deficiency anemia, iron deficiency, and iodine deficiency, stratified by relevant variables such as iron/iodine dosage, iron fortificant compound, baseline anemia, iron and iodine intake and status, edible salt intake and population group**. The review should consider whether DFS can reduce the burden of iron deficiency while also improving iodine status and summarize the potential contribution of DFS towards meeting the physiological requirements for both iron and iodine.

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<sup>6</sup> Ramirez-Luzuriaga M. et al. Impact of Double Fortified Salt with iron and iodine on hemoglobin, anemia and iron deficiency anemia; a systematic review and meta-analysis. *Advances in Nutrition*, 2018

## Background Paper 3: Evaluation of experiences to date in large-scale programs that distribute DFS

There has been limited experience with production and distribution of DFS at scale. In India, the government has issued recommendations to use DFS as part of their public distribution system (PDS), which supplies subsidized essential food and non-food items to poor households, as well as through the Mid-Day Meal program (MDM) and the Integrated Child Development Scheme (ICDS). The PDS in India attempts to reach vulnerable families, providing a logical strategy to combat anemia, which is of higher prevalence in poorer families. Several states in India have started to implement these policies. In addition, small amounts of DFS produced by the private sector on a voluntary basis are available in some countries. This background paper will review all available experiences in production and distribution of DFS for all potential delivery platforms, with the objective of summarizing experiences to date and forming conclusions on **necessary conditions for successful implementation of DFS**. For each delivery platform, this paper should identify the justification to produce DFS, managerial and logistical arrangements in DFS production and distribution, necessary inputs by stakeholders, including costs, and describe trends and reach of coverage.

## Background Paper 4: Compare the advantages, disadvantages and potential public health impact of DFS on iron status to the fortification of other food or condiment vehicles

It is well established that fortification of staple foods and condiments is highly effective at improving public health. Salt is widely and extensively consumed and therefore its population penetration is large. However, the amount of salt that is daily consumed is small and it limits the quantity of micronutrients that could be delivered through it. Moreover, several other food fortification programs already exist in many countries, and therefore any salt fortification program should complement them. This paper will analyze the opportunities, risks, and challenges of considering salt as an appropriate vehicle of other micronutrients beyond iodine and compare its advantages and disadvantages with other fortification vehicles.

A number of food vehicles and condiments have been used for iron fortification, and there is considerable experience with different iron fortificants and their compatibility with different vehicles. For each variant of an iron-fortified food vehicle, the cost-effectiveness of fortification depends on the anticipated effect on the product, costs (of production and to consumers) expected bioavailability, population coverage, and ultimately the contribution towards meeting dietary iron needs. For each vehicle, the effectiveness also depends on the usage of the product—its coverage and frequency of use, which drives the potential impact.

DFS must be examined in the context of these complex issues. The rationale for this background paper is to provide a **summary of the benefits, risks and challenges of iron fortification of different vehicles using different iron fortificants**. By summarizing the experience with iron fortification of other vehicles, it will be easier to assess the relative cost-benefit of DFS. The review should provide some discussion on the pros and cons of selecting a given vehicle—recognizing that consumption patterns alone may dictate the optimal vehicle that can achieve widespread enough use to justify fortification.

Table 1. Key issues to be addressed in each background paper

Background Paper	Key issues to be examined
<p><b>1. (Questions 1-3): Identification and discussion of technical and investment requirements and programmatic issues in production of DFS</b></p>	<ul style="list-style-type: none"> <li>• Explanation and conclusions on technical requirements for iron fortificant in DFS to minimize interaction of iron with salt and iodine; which iron fortificants are recommended, including summary of potential organoleptic changes that can occur</li> <li>• Present cost comparison of different iron compounds and information on current or potential future suppliers, and compare those with the case of iodine</li> <li>• Undertake a hypothetical costing of large scale production of DFS taking into consideration above requirements, including implications on the cost of salt given its low margins.</li> <li>• Summarize information and conclusions on necessary salt quality for DFS for different recommend iron fortificants</li> <li>• Summarize information and conclusions on technical and investment requirements for production of DFS including scale/ sophistication of salt factory, process and equipment for production of DFS, internal quality assurance requirements and distribution, storage and packaging requirements</li> <li>• Draw conclusions to which above-mentioned requirements can be met in salt factories around the world or necessary conditions for successful production of quality DFS</li> <li>• Are there any indications or conditions under which the success of salt iodization could be compromised or jeopardized by DFS?</li> <li>• Identify contexts or countries, particularly in Asia and Africa, where above necessary technical and investment requirements for DFS can be met.</li> <li>• List of remaining questions/further research needed</li> </ul>
<p><b>2. (Questions 4-6): Evidence of efficacy, effectiveness and safety of DFS in reducing iron deficiency, anemia associated to iron deficiency, and iodine deficiency</b></p>	<ul style="list-style-type: none"> <li>• Summary of efficacy and effectiveness of DFS on reduction of iron deficiency, iron deficiency anemia and iodine deficiency in reproductive age women and young children, in relation to iron fortificant used and dosage, and magnitude of the iron deficiency of the population</li> <li>• Summary of technical issues and organoleptic issues encountered in efficacy and effectiveness studies</li> <li>• Summary of potential contribution of DFS to iron requirements of different target groups, the iron requirement gap, taking into account current and potential average edible salt intakes</li> <li>• Summary of evidence for interactions between iron and iodine and necessary conditions to avoid interactions, including the physical characteristics of raw salt used</li> <li>• What are the necessary preconditions (e.g. biological, technological, programmatic) for high efficacy, effectiveness and safety of these interventions?</li> <li>• What are implications for DFS in relation to evolving epidemiology and evidence that iron deficiency and contribution of iron deficiency to anemia may not be as high as previously estimated?</li> <li>• List of remaining questions/further research needed</li> </ul>

Background Paper	Key issues to be examined
<p><b>3. (Questions 7-9): Evaluation of experiences to date in large-scale programs that distribute DFS</b></p>	<ul style="list-style-type: none"> <li>• Present scale, extent and duration of distribution of DFS through social safety net programs, voluntary fortification by the private sector and mandatory fortification globally</li> <li>• Summarize coverage and evidence of impact on reduction of iron deficiency, iron deficiency anemia and iodine deficiency</li> <li>• Summarize acceptability of DFS by consumers</li> <li>• Summarize implementation details of largest programs – how was it initiated, costs and who pays, source and process of selection of iron fortificant for premix, how is production achieved, how is coverage/ distribution achieved, how is quality assurance undertaken, what technical or programmatic issues have been experienced</li> <li>• Draw conclusions on necessary conditions or requirements for successful distribution of DFS through all delivery platforms</li> <li>• Summarize lessons learnt or implications for production and distribution of DFS</li> <li>• List of remaining questions/further research needed</li> </ul>
<p><b>4. (Question 10): Compare the advantages, disadvantages and potential public health impact of DFS on iron status with the fortification of other food or condiment vehicles</b></p>	<ul style="list-style-type: none"> <li>• What staple foods and condiments have been fortified with iron and what iron fortificants were used</li> <li>• What has been the scale of implementation of iron fortification of different foods.</li> <li>• What are consumption patterns and trends of different staple foods and condiments that could potentially be fortified with iron</li> <li>• Comparison of amount of iron delivered by different iron fortified staple foods</li> <li>• What is the evidence of impact on reduction of iron deficiency and anemia from fortification of different staple foods</li> <li>• Comparisons of impact of different iron fortified staple food taking into account amount of food vehicle commonly consumed and additional iron provided</li> <li>• Comparison of total cost, relative cost (percent of the fortified food price), and cost-benefit of iron fortification of different staple foods</li> <li>• Discussion of technical and industrial requirements for iron fortification of different staple foods, including organoleptic considerations</li> <li>• Draw on lessons learnt from salt iodization and wheat flour fortification efforts globally to summarize key facilitating factors for universal mandatory fortification for public health benefit (such as availability and consumption patterns of food vehicle, industry structure, price of fortification, acceptability of fortified product)</li> <li>• List of remaining questions/further research needed</li> </ul>