SCALING UP THE PRODUCTION AND DISTRIBUTION OF FORTIFIED SALT IN INDIA

IRON-BOOSTING SALT BEING MASS PRODUCED AND IMPROVING THE HEALTH OF MILLIONS OF WOMEN AND CHILDREN

WHAT CANADIAN AND INDIAN COLLABORATORS ACHIEVED:

- ✓ A proven technology to prevent anemia, which is primarily a women's health issue, on a mass scale
- ✓ Private sector capacity to mass manufacture double fortified salt (DFS) with iodine and iron
- ✓ A cost-effective and sustainable way to distribute DFS to tens of millions of people for regular daily use

BY THE NUMBERS

- DFS is currently being distributed to more than 50 million people in 3 Indian states
- A full-scale commercial plant was built, commissioned, and subsequently expanded to produce enough premix to create 300,000 tons (or 300 million 1 kg bags) of DFS, enough to meet the needs of nearly 100 million people.
- 10 salt processors now have a collective DFS production capacity of nearly 500,000 tons
- ~ 60 million 1 kg bags of DFS have been produced and distributed through 8000+ Fair Price Shops, with the principle purchasers being women
- ~8500 fair-price shop owners were trained on the rationale and benefits of using DFS.
- 2 more states, Jharkhand and Madhya Pradesh, have followed Uttar Pradesh with the launch of similar programs to distribute DFS at subsidized prices. More states are expected to follow.
- Uttar Pradesh's state government is spending more than $8 million/year to purchase DFS and make it available to low-income consumers through the Public Distribution System (PDS), which has a fair-price shop in nearly every village
- It costs less than CAD$0.25/person/year to add iron to salt
- Over 10,000 village women health workers were trained to promote the health benefits of DFS

THE IMPACT:

Several key factors contributed to the project's success in rapidly scaling up the production and distribution of DFS: strong government backing for DFS at the national and state levels; inclusion in the PDS; leveraging the massive consumer reach of iodized salt; and a strong partnership between public, private and civil society organizations with a 15-year history of collaboration. DFS began reaching 50 million people in India in 2018, up from zero in 2016. This highly cost-effective model was first demonstrated across 10 districts in Uttar Pradesh—the first state in India to supply DFS through its PDS. JVS Foods, which licensed the technology, established production facilities to make the iron premix in mass quantities for designated salt producers to blend it with iodized salt. Tata Trusts, and Indian philanthropic organization, is working with the state governments to establish procurement and distribution systems for DFS. Bulk procurement of the salt and its distribution through the PDS is now broadly available at an affordable price to consumers, especially the poor.

THE CHALLENGE:

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Iron deficiency is the most widespread form of malnutrition in the world, afflicting nearly two billion people globally, primarily women and children. In India, iron deficiency is to blame for more than 200,000 maternal deaths each year, and the rates of anemia are staggering – 53% of women ages 15-49, and 58% of children ages 6-49 months. Hundreds of millions of women worldwide are iron deficient, causing decreased energy levels and cognitive functioning. Two decades of research in Canada produced a solution. Scientists developed a double fortification process to mix iron, which combats anemia, with iodized salt. Iodized salt is well established around the world, consumed by 5 billion people daily (80% of the population in India), and is considered one of the great public health successes of the 21st century. The challenge was to develop a cost-effective and sustainable way to reduce iron deficiency and anemia at scale. Fortunately there is political will to combat anemia and malnutrition in India, which has adopted the country's first formal national nutrition mission.

TRANSLATING RESEARCH INTO ACTION

Scaling up the production, distribution, and consumption of DFS

"Almost 30 – 40% people report some change of colour in food. But I encourage them to purchase and use DFS and also tell them about its benefits. Even in my home the food is cooked using DFS. I tell people it is completely safe and healthy for you."
Fair Price Shopkeeper from Kharkhoda, Meerut District

- The DFS technology was transferred from the University of Toronto to JVS Foods in Jaipur, India
- A full commercial premix plant was built from scratch and commissioned, following pilot trials that improved the quality and physical characteristics of the premix, while reducing production costs. A further expansion of the plant's capacity is currently underway.
- Leading salt producers have retrofitted their plants to manufacture DFS at scale, creating almost 500,000 tons of DFS production capacity within 2 years.
- The Food Safety & Standards Authority of India has drafted a national technical standard for DFS production (finalization pending).
- Uttar Pradesh's state government has authorized the inclusion of DFS in its PDS (which previously did not distribute salt) and subsidized its cost to low-income consumers in districts with the highest levels of anemia. Two additional states have since launched similar programs Jharkhand (25 million people) and Madhya Pradesh (10 million people). Several other states are also considering adopting the model.
- 15 million people in 10 districts in Uttar Pradesh have been consuming DFS regularly.

Optimizing technology and production processes for consumer acceptance and nutritional impact

"The salt that was sold at the PDS shops previously was bad and had impurities in it. I threw away the salt and gave it to the cattle. The salt that is supplied now at the shops is good and I know it has iron it. I thought all salts contain iron. Now that I know that it is added externally. If I have to choose from a high quality market salt and salt sold in PDS that has iron, I will choose the one which has iron."
Village Woman from Kharkhoda, Meerut District

- Developed and refined a microencapsulation-based technology to produce iron premix, that solved the problem of unwanted interactions that occur when iron and iodine interact (iodine evaporates, iron becomes less effective, the salt turns black and has a metallic taste).
- Refined the premix to make it more acceptable to consumers (e.g., taste, smell, colour).
- Laboratory sensory trials and community-based field trials found DFS with Encapsulated Ferrous Fumarate (EFF) to be acceptable; another survey found that over 85% of women would use the salt in their daily cooking.

- Randomized controlled trials showed that EFF formulation of DFS was effective in reducing anemia in school children, and in decreasing iron deficiency among women tea pickers.
- Collaborated with JVS to optimize EFF premix for use in large-scale production (e.g., reducing production costs of premix).

Informing decision makers to actively promote DFS to salt processors and consumers

"The DFS contains both iodine and iron. Jharkhand's people, mostly women, suffer from iron deficiency. The DFS salt will help fight against anemia."
Saryu Rai, Minister of Parliamentary Affairs and Food and Supply Department, State of Jharkhand

- Senior policy makers in the governments of Uttar Pradesh, Jharkhand, and Madhya Pradesh implemented large-scale DFS programs; they also agreed to open their state's PDS to DFS to allow sensitive scientific effectiveness studies, including the collection of blood samples.
- Several salt processors have retrofitted their production facilities to add DFS production capacity.
- Large national private sector brands are carrying out internal testing of DFS samples for potential commercial distribution outside the PDS.
- The National Consultation on Anemia, hosted by the All India Institute of Medical Sciences New Delhi and India's Ministry of Health and Family Welfare, concluded that a daily intake of 10 grams of DFS can contribute to reducing anemia. This recommendation will inform the government's policy and guide programming related to the prevention and treatment of anemia, especially in women and children.
- Information on the health benefits of DFS has been communicated with consumers through various channels, often in collaboration with national and state governments (e.g., large signs at retail shops, village presentations, village health workers).
- National policymakers issued a circular requesting the use of fortified foods in state programs, and setting a technical standard for DFS that allowed it to be used.
- At the national level, the project has been promoted by the Ministry of Women and Child Development and the Ministry of Health and is guided under the auspices of the Food Standards and Safety Authority of India.

Ensure sustainable DFS production and distribution capabilities of local stakeholders

"I have been trained on DFS last year. I know it has iron and iodine and is good for health. I tell that to people when I visit their homes. Earlier people were resistant to buy the DFS but now most of them are using it."
Babita, Community Health Worker from Kharkhoda, Meerut District

- The state's subsidization of DFS through the large-scale PDS programs ensures the model's economically sustainability for private sector producers.
- All 3 states (Uttar Pradesh, Jharkhand, and Madhya Pradesh) subsidized both the EFF premix and the cost of the salt, making DFS available at less than half the market price of iodized salt.
- Field reports show that 100% of the DFS stocks in the stores are being bought each month by consumers.
- Surveys found high enthusiasm for roll-out of DFS via the PDS; Uttar Pradesh (pop: ~205 million) and Madhya (pop: ~83 million) have expressed interest in expanding their DFS programs to their entire states.

WHAT'S NEXT?

Major population-based studies are underway to examine the health impact of DFS among millions of people in India. Economists at the St. John's Research Institute in Bengaluru, India are calculating the economic impact of DFS use. More work is needed to promote DFS among consumers. A digital marketing campaign to send voice messages to consumers' mobile phones regarding DFS is in the works with the UP government, which is starting to digitize its PDS. Further, the

national government's Food Safety and Standards Authority is in the process of issuing a circular on the basics of DFS. Meanwhile, the research team is developing ways to encapsulate or add other micronutrients, including folic acid, vitamin B12, and zinc. They are also working on adding iron to tea.

LEARN MORE ABOUT THIS PROJECT:

Project abstract: https://www.idrc.ca/en/project/scaling-production-and-distribution-double-fortified-salt-india

KEY OUTPUTS

POLICY BRIEF

Reducing anemia in Indian women and children.

ACADEMIC PAPERS

Impact of Double-Fortified Salt with Iron and Iodine on Hemoglobin, Anemia, and Iron Deficiency Anemia: A Systematic Review and Meta-Analysis. Ramírez-Luzuriaga MJ, Larson LM, Mannar V, Martorell R. Advances in Nutrition. 2018 May 1;9 (3):207-218. doi: 10.1093/advances/nmy008 .

Characterizing the pH-Dependent Release Kinetics of Food-Grade Spray Drying Encapsulated Iron Microcapsules for Food Fortification. Pratap Singh, A., Siddiqui, J. & Diosady, L.L. Food Bioprocess Technol (2018) 11: 435. https://doi.org/10.1007/s11947-017-2022-0

VIEW ALL RELATED PROJECT OUTPUTS IN THE IDRC DIGITAL LIBRARY

https://idl-bnc-idrc.dspacedirect.org/browse?type=project&value=108123

QUICK FACTS

Project location(s): India

Institutions: Institutions: University of Toronto (Canada); St. Johns Research Institute (India)

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