

## Chapter 13

### Iron-Calcium Fortified Fish Soup Powder: a Deterrent for Malnutrition

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Fortified fish soup powder was developed at ICAR-Central Institute of Fisheries Technology with the objective of improving mineral status (of calcium and iron) and hemoglobin content of anemic adolescent girls

#### Fast Facts about Malnutrition

##### General information

- Two billion people in the world suffer from various forms of malnutrition.<sup>1</sup>
- Malnutrition is an underlying cause of death of 2.6 million children each year – a third of child deaths globally.<sup>2,3</sup>
- 1 in 4 of the world's children are stunted<sup>4</sup>; in developing countries this is as high as one in three.<sup>5</sup> This means their bodies fail to develop fully as a result of malnutrition.
- Undernutrition accounts for 11 per cent of the global burden of disease and is considered the number one risk to health worldwide.<sup>5</sup>

##### Economic impact

- Adults who were malnourished as children earn at least 20% less on average than those who weren't.<sup>6</sup>
- Countries may lose two to three percent of their Gross Domestic Product (GDP) as a result of iron, iodine, and zinc deficiencies.<sup>7</sup>
- Estimates show annual investments of US\$ 347 million to provide micronutrients to 80 percent of the world's malnourished would yield US\$ 5 billion in improved earnings and healthcare spending.<sup>7</sup>
- It is calculated that each dollar spent on nutrition delivers between US\$ 8 and US\$138 of benefits.<sup>8</sup>

##### Micronutrient deficiencies

- **It is estimated half of anaemia cases are due to iron deficiency.**<sup>9</sup> Almost half of children in low- and middle-income countries – 47% of under-fives – are affected by anaemia, impairing cognitive and physical development.<sup>10</sup> Iron is a key component of micronutrient blends which are used in large-scale and targeted fortification programs.
- **Iodine deficiency is the greatest single cause of mental retardation and brain damage.** It can easily be prevented by adding iodine to salt.<sup>11</sup> Between 1990 and 2009, the number of households consuming iodized salt rose from 20% to 70%. Coincidentally, the number of countries in which iodine-deficiency disorders were considered a public health concern reduced by 43% between 1993 and 2007.<sup>12</sup>
- **Vitamin A deficiency causes early childhood blindness and increases the severity of infections and anaemia.** It affects an estimated 190 million pre-school aged children, and 19 million pregnant and breastfeeding women globally. Vitamin A can be added to

cooking oil as well as wheat and maize flour. It is also included in micronutrient powders.<sup>13</sup>

- **Zinc deficiency affects children's health and physical growth;** it is also essential for mothers during pregnancy. It is estimated to cause 4% of deaths in pre-school aged children in lower-income countries.<sup>5</sup> Zinc supplementation improves growth in stunted children and can be included in wheat flour, maize flour or rice.

**The Global Nutrition Report 2017** was presented at Milan in Italy recently and it emphasizes on the urgent need to integrate our actions on global nutrition if India hopes to meet its Sustainable Development Goals of Agenda 2030. `

- About 38 per cent of the children under five are affected by stunting
- 21 per cent of children under 5 have been defined as 'wasted' or 'severely wasted' – which means that they do not weigh enough for their height.
- Moreover, 51 per cent of the women of reproductive age suffer from anemia and
- 22 per cent of adult women are overweight.

While the report does indicate that India has shown some progress in addressing childhood stunting for children under the age of 5, **it presents worse outcomes in the percentage of reproductive-age women with anaemia,** and is off course in terms of reaching its targets for reducing adult obesity and diabetes.

The Millennium Development Goals (MDGs) India Country Report 2015 outlines India's progress and the challenges in achieving the goals and targets set at the United Nations Millennium Summit in September 2000 by 189 heads of States, including India, to adopt measures—to fight against poverty, hunger, illiteracy, gender inequality, disease and environmental degradation. To quote from the report " though there are impressive achievements in several sectors, all the MDGs are unlikely to be met". The most worrying aspect which should concern us is that the largest undernourished population in the world call India their home. The proportion of underweight children under 5 declined from 52% in 1990 to 33% by 2015, but is still far from the target of reducing it by half.

In India, nutrient deficient diets are a fact of everyday life for millions. It is a matter of grave concern that India is doing dismally on the nutrition front; according to the World Economic Forum, its Global Competitive Index with respect to infant mortality rate is a dismal 114/140. One of the reasons for the large prevalence of undernourished and underweight children with stunted growth in India is the mutli-micronutrient deficiencies that these children suffer from. It is our strong perception that even smallest of right kind of interventions may go a long way in improving this statistic. Current approaches to address malnutrition have serious limitations. Interestingly, fish is probably the most affordable source to provide almost 40 essential nutrients. A soup powder incorporating the nutritional goodness of fish and fortified with iron and calcium by taking into account WHO-recommended RDA values has been developed at ICAR-Central Institute of Fisheries Technology, Kochi.

- ❑ Iron is an important constituent of hemoglobin which carries oxygen from the lungs to the rest of the body.
- ❑ Iron helps in maintaining a healthy immune system and aids in energy production
- ❑ Calcium keeps bones and teeth strong, thereby supporting skeletal structure and function
- ❑ Calcium plays key roles in cell signaling, blood clotting, muscle contraction and nerve function

Innovation at ICAR-CIFT is backed by sound science and research. The fortified fish soup powder has undergone rigorous biochemical and microbiological quality assessment in addition to sensory evaluation. Feeding studies in albino rats have been conducted to determine the effect on growth and well-being of the animals. The compositional analysis reveals the biochemical richness of the product with special reference to its protein, fat and mineral content all of which contribute significantly to an individual's nutritional status. A variant of the product- a ready to drink fish soup with retort pouch technology that has a stable shelf life of 6 months at ambient temperatures has been developed and perfected.

Integrated Child Development Scheme (ICDS), Jowai, West Jaintia District Hills District, Meghalaya and Health Department, Jowai, Child Development Project Officer, Thadlaskein Block, Jowai, and ICAR-CIFT Scientists met on the On November 21, 2016, on the occasion of World Fisheries Day to chalk out a one month program of distributing fortified fish soup to adolescent girls selected to improve their hemoglobin levels and health status. Fifty adolescent girls, age ranging from 11-16 whose blood hemoglobin levels were 9 or below, were selected from three villages. Preliminary baseline data with respect to their age, height, weight, Mid Upper Arm Circumference were recorded.

Following this the subjects were provided with 100 ml of hot soup freshly prepared with 10 g of Fortified Fish Soup Powder once every day for 30 days in a community setting. The intervention was closely monitored by ICDS officials and community workers for the entire period of study. All the girls were gathered each day and a health worker given the charge of preparing the soup powder with freshly added vegetables ensured that each girl got her soup every single day. These strategies ensured 100% compliance. Blood hemoglobin analysis post intervention showed that all the adolescent girls recorded a statistically significant rise in blood hemoglobin levels as indicated in the statement below.

STATEMENT SHOWING THE PARTICULARS OF THE SELECTED ADOLESCENT GIRLS FOR IMPLEMENTATION OF FISH POWDER SOUP UNDER AMLAREM ICDS PROJECT

Sl. No	Name of Adolescent Girls	Age	Village	Weight	Height in Inches	Mid-arm Circumference	Hemoglobin level before	Hemoglobin level after 1 Month	Remarks
1	Mardimi Taring	12	Thangbuli	34	4.58	8	10.8	11	The number of 28 selected Adolescent Girls for the Fish Soup Powder has showed an increase in the HB level but 7 numbers of Adolescent Girls shown that their HB level remained the same.
2	Vani emi Buzm	11	Thangbuli	29	4.49	7.5	11	11	
3	Rivasnor Suting	12	Thangbuli	28	4.50	7	10.8	10.8	
4	Dikimah Manner	12	Thangbuli	35	4.45	8	9.4	12	
5	Pynshagan Pohlong	11	Thangbuli	45	4.45	9	9.4	10.8	
6	Kyrshahorlang Dkhur	18	Thangbuli	35	4.42	8	8	9	
7	Cheris Langshiang	15	Thangbuli	49	4.60	9	7.8	9.2	
8	Shimki Rongngi	11	Thangbuli	28	4.49	7	9.4	9.4	
9	Ishta Kassar	11	Thangbuli	28	4.00	7	9.4	9.4	
10	Manharu Buzm	11	Thangbuli	35	4.42	8.5	9.4	9.4	
11	Laminan Rongngi	13	Thangbuli	30	4.50	7.5	8	9	
12	Nidaknei Bataw	11	Thangbuli	35	4.50	8	10.8	11	
13	Olidaki Buzm	12	Thangbuli	44	4.58	9	9.4	10	
14	Diyahng Khyriem	14	Thangbuli	25	4.50	6.5	10.8	10.8	
15	Safetecare Pohlong	12	Thangbuli	28	4.50	7	9.4	11	
16	Buzm Lakhoon	14	Thangbuli	48	4.60	9	8.5	9.4	
17	Deisi Sorong	16	Thangbuli	40	4.59	8.5	11	11	
18	Hasina Malad	14	Umlackhur	42	5.00	8	8	9	
19	Pietty Malad	12	Umlackhur	35	4.59	8	9	12.5	
20	Warisa Pohlong	11	Umlackhur	29	4.40	7	8	12.5	
21	Sabina Sorong	13	Umlackhur	40	4.42	8	9.4	10.8	
22	Deimonni Sumar	13	Umlackhur	35	4.42	8	7.8	10.8	
23	Lamare Buzm	15	Umlackhur	44	4.58	9.5	10.8	11	
24	Rilang Khyriem	12	Umlackhur	38	4.58	8.5	10	10.8	
25	Wanjuh Buzm	14	Umlackhur	30	4.42	8	10.8	11	

District Programme Officer  
ICDS (Cell) West Jaintia Hills  
District Jowai.

Child Development Project Officer  
ICDS Project Amlarem  
West Jaintia Hills District



Screening of Adolescent Girls at Jarain PHC, Amlarem, West Jaintia Hills District, Meghalaya prior to the start of the intervention study using the fortified fish soup powder.



Adolescent girls of Mihmyntdu Lumpyrdi A.W.C under Thadlaskein Block, West Jaintia Hills District, Meghalaya consuming the fortified fish soup powder as part of the intervention study.



Adolescent girls of Thangbuli Village Amlarem Block, West Jaintia Hills District, Meghalaya consuming the fortified fish soup powder as part of the intervention study.

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