



# Nutrimix Units: A nutrition-focused initiative by Kudumbashree

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**The Amrutham Nutrimix** initiative in Kerala, India is a successful community-based response to child malnutrition. It has delivered a scientifically formulated nutrition supplement to over 850,000 children through more than 300 micro-enterprises. Implemented by state program Kudumbashree, the initiative integrates nutrition science, local governance, and economic empowerment. It has improved child health, generated stable incomes for rural women, and proven to be scalable and sustainable. Key lessons highlight the value of product diversification, decentralized production, and multi-sectoral collaboration, making it a replicable model for similar regions facing malnutrition and livelihood challenges.

## Food Science in Action:

- ✓ Food Processing
- ✓ Nutrition
- ✓ Food Safety
- ✓ Packaging Science

## Introduction

India is a fast-developing country with a large population of 1.46 billion people, roughly 17.8% of the global population.<sup>1</sup> Although it has achieved remarkable improvements in health and economic development, India continues to face serious challenges related to childhood malnutrition. The National Family Health Survey (NFHS-3) reported that 48% of children under five years were chronically malnourished and 43% were underweight nationwide.<sup>2</sup> Kerala, India's southernmost state, has a long-standing reputation for excelling in human development, sustainability, and social equity, and is often perceived as the most "developed." Yet, malnutrition among infants and young children remains a serious challenge. Surveys in the 1990s demonstrated a need for improved nutrition.

The Government of Kerala was quick to identify and acknowledge the need for advanced nutritional innovation. In 2004, the State initiated the Take Home Ration Scheme (THRS) under the Integrated Child Development Services (ICDS), aiming to provide nutritional supplementation to children under three years of age from Below

Poverty Line (BPL) households. The initial implementation relied on external suppliers which raised concerns about cost, quality and sustainability. At this junction, the Kudumbashree Mission, Kerala's flagship poverty eradication and women's empowerment program that was started in 1997, proposed a community enterprise model to manufacture and distribute these supplements. Thus, the Amrutham Nutrimix initiative was born as a decentralized, locally sourced, and women-led micro-enterprise model. Kudumbashree's involvement marked a significant shift: it brought in community-based women's self-help groups (SHGs) to produce a nutritious supplement tailored for local consumption. In essence, the Amrutham Nutrimix initiative is more than a nutritional intervention. It is a multidimensional model addressing the dual challenges of child malnutrition and women's economic marginalization through localized, participatory, and sustainable action.

The Amrutham Nutrimix initiative continues to be important in India and highlights the role of food science in addressing complex social problems through local capacity and empowerment.

## Response

### Food Science to Solve a Problem

Amrutham Nutrimix (Figure 1) is the brand name of a nutrition supplement that is produced and distributed by Kudumbashree in Kerala, India. The nutrition supplement was developed under the Kudumbashree which started in 1997 by the Kerala government for the purpose of eradicating poverty through women empowerment.<sup>3</sup> It is produced by Kudumbashree enterprise groups and supplied to anganwadies (pre-schools) within designated local areas. The project aims to establish 5- to 10-member activity groups from the Kudumbashree network under the Rural Micro Enterprise or Yuvashree scheme. Kudumbashree provides training, facilitates bank loans with a subsidy of ₹10,000 per member, and requires each unit to operate from a building of 1,500 – 2,500 square feet with access to drinking water. Based on performance, units may also receive a revolving fund covering 10% of project costs (₹20,000 – ₹25,000). Each unit is assigned to a specific panchayath or municipality and is responsible for meeting the food supplement requirements of all anganwadies in that area, with production quantities determined by orders from the anganwadi supervisor or the Child Development Project Officer (CDPO). The district

consortium procures wheat from the Food Corporation of India and other provisions in bulk and supplies them to the units. The units process, package, and distribute the final product to local distribution centers.<sup>4</sup>

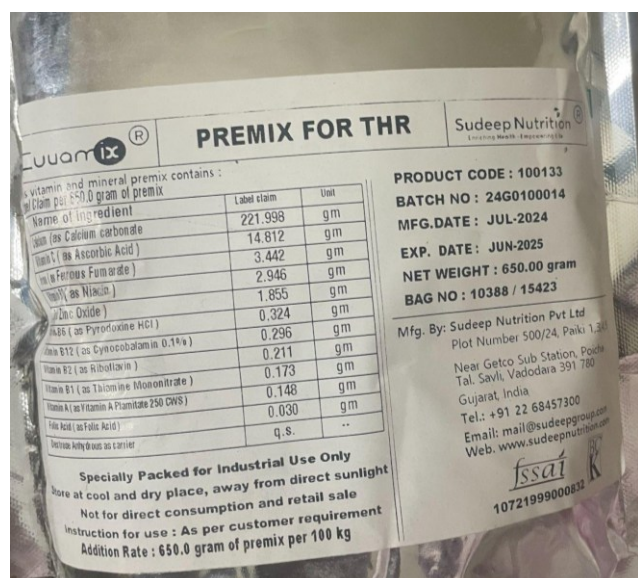
Amrutham nutrition supplement is a palatable and easily digestible complementary food with a good shelf life, providing essential nutrients required for children aged 6 months to 3 years. It is a ready-to-cook powder consisting of wheat, soybean, legumes, and jaggery (an unrefined sweetener) with a premix of vitamins and minerals (Figure 2). The premix is added to the blend at a specific ratio to ensure correct nutrition. Caregivers completely dissolve the nutrition supplement in milk or water and cook it to a paste.

### Manufacturing

The unit receives wheat from a government warehouse. The quality of the raw materials is ensured by inspection of the raw materials visually for the presence of fungus. The dryness of the raw materials is checked. If the presence of pests or mold is found, the raw material is sent back to the dealer. All raw materials are stored over a metal stand and away from the walls to prevent pests. Batch numbers are used to ensure



Figure 1. Amrutham Nutrimix supplement. Photo courtesy of Kavya Dileep.



**Figure 2.** Vitamins and minerals premix.  
Photo courtesy of Kavya Dileep.

first in first out. There are over 300 facilities that process Amrutham Nutrimix. Processing happens every three months. Processing steps in making the nutrition supplement start with cleaning the wheat or grain. Next, roasting, grinding, and cooling are conducted with great care at the right temperature. The product is then blended and packed into foil packets for distribution (Figure 3). Most of the processing is done manually. Motorized driers, mixers, and automated packaging machines are being considered for future process development on the line.

There is a Standard Operating Procedure (SOP) for processing and quality control. Workers are trained for 40 to 50 days on the proper Good Manufacturing Practices (GMPs) for processing the Nutrimix, such as: washing hands with soap and water before preparation, wearing protective gloves, cap, mask, and apron, and removing jewelry while working. All units had obtained the required licenses for food production, including panchayath license, food safety certification, legal metrology registration, small-scale industries (SSI) registration, and value-added tax (VAT) registration. In addition, 70 percent of the units had secured a central sales tax (CST) license.

Furthermore, all unit members possessed health cards, and 65 percent were covered by insurance at the time of the survey. Kudumbashree officials, in coordination with the Social Justice Department, regularly inspect the production units, and the units routinely send their products

for laboratory quality testing. The Kudumbashree District Mission Coordinator conducts monthly review meetings with unit leaders and quarterly general body meetings to assess performance, address challenges, and identify solutions. Additionally, Kudumbashree provides regular training to help units improve efficiency and diversify their product range beyond Amrutham. Moreover, owing to slow but steady achievements in food quality, two of Kudumbashree's Nutrimix units from Malappuram district secured ISO (International Organization for Standardization) Certification ISO 22000:2018 in Food Safety Management. Kudumbashree is also committed to ensuring quality of the Nutrimix Units by addition of grading and system improvement.<sup>5</sup>

Awareness of safe food preparation at home by the childcare centers. Caregivers were educated about proper food handling for food safety and cited keeping hands clean, separating raw and cooked food, and thoroughly cooking food.

### Consumer Response

A study conducted by Subhashree et al., 2014 showed encouraging findings on consumer behaviour and food preferences.<sup>6</sup> The study found Nutrimix products to be underutilized due to monotony in taste and preparation, often being served only as porridge. In response, the researchers developed and tested 20 innovative local recipes incorporating Amrutham Nutrimix, including both sweet and savory items such as vegetable rolls, sweet balls, murukku (a type of savory, crunchy snack), ela ada (a type of steamed rice cake), and steam cakes. These were evaluated by a sensory panel of young mothers in a semi-urban anganwadi center in Kottayam, Kerala followed by nutrition education sessions to raise awareness of malnutrition and the benefits of using Nutrimix in a variety of food preparations.

Some of the key findings are as follows:

- Based on overall scores, the six best products were the vegetable roll (most preferred), mixture, onion vada (onion fritters), amruth kheer (a type of rice pudding), ela ada, and sweet balls.
- Nutritional analysis confirmed that all the products were rich in calories, protein, iron,



**Figure 3.** Manufacturing plant in Kottayam: grinding and mixing unit (left) and automated packaging machine (right). Photo courtesy of Kavya Dileep.

calcium, meeting India's recommended daily allowances (RDA) set by [Indian Council of Medical Research](#) (ICMR) of nutrients for preschoolers, making them suitable for addressing severe acute malnutrition.

- The cost of the recipes was low (₹0.50 to ₹3 per 100g), making them highly affordable for low-income families. (1 ₹ = 0.011 USD)
- The nutrition education component significantly improved participants' knowledge (pre-test score: 30, post-test: 44) about Amrutham Nutrimix and its nutritional significance in children, suggesting behaviour change was achievable.

### Empowering Women and Expanding the Program

Equipping the women to undertake income generating activities through the formation of microenterprises can enable women to become self-sufficient economically. Microenterprise involves identification of innovative activities suited to the specific environment in which poor people are living. Kudumbashree has established microenterprise units in the state for the production and supply of Amrutham nutrition supplement. These units are supplying the supplementary food to the anganwadi network.<sup>4</sup>

At first, Kudumbashree distributed the nutrition supplements in two districts until the Government of Kerala allowed Kudumbashree to provide the nutrition supplement to anganwadi children of all 163 ICDS blocks in the state to prevent children from malnutrition.

Research indicates that views on women's empowerment have evolved, with women moving from roles as production employees to participation in economic activities, and eventually to seeking work rights and control over income.<sup>7</sup>

### Results

The Amrutham Nutrimix has made significant improvements in the health, nutrition and socio-economic dimensions of Kerala. According to data from the Economic Review 2013, "The nutrition program under ICDS benefited nearly 855,000 children in the age group of 0 to 6 years during 2012."<sup>8</sup> A case study conducted by the State Planning Board in 2015 noted that in Thrissur district alone, over 85,000 kilograms of the supplement were produced and distributed monthly, reaching approximately 100 local government units. And that's just the story of 1 out of 14 districts in the State of Kerala.<sup>4</sup> As of 2025, there are over 300 units under Kudumbashree that are manufacturing and distributing Amrutham Nutrimix, producing around

18,000 metric tons of products every year. Over the years, each unit has demonstrated high efficiency and innovation, including the introduction of diversified Nutrimix-based products to promote consumption among children.

From January 2017 to December 2018, the United Nations World Food Programme (WFP), in collaboration with the Government of Kerala, implemented a pilot project on the fortification of Amrutham Nutrimix, which revealed marked improvements in key micronutrient deficiencies among children aged 6 to 36 months in Wayanad district.<sup>9</sup> The intention was to ensure sustained improvements in the nutritional status of children aged 6 to 36 months and enable its expansion to other regions of the state.

The Nutrimix was fortified with 11 nutrients—iron, calcium, vitamin A, zinc, thiamine, riboflavin, niacin, vitamin B6, vitamin C, folic acid, and vitamin B12 (Table 1). Micronutrient overages were included to compensate for potential losses during heating (before consumption), as well as losses that might occur during storage, processing, or handling. Iron was encapsulated to prevent adverse interactions with calcium.

Both intervention and control areas showed a decline in deficiencies of folate, vitamin A, and vitamin B12, with the intervention area showing a better performance in these parameters:

- Vitamin A deficiency showed the most decline with a reduction of 35.7 percentage points (from 94.3% to 58.6%) in intervention villages and a corresponding decline of 24.1 percentage points (from 90.0% to 65.9%) in the control areas.
- Folate deficiency fell from 19.8% to 3.7% in the intervention group (decreased by 16.1 percentage points), whereas in the control area, the decrease was by 13.7 percentage points (from 17.3% to 3.6%).
- Vitamin B12 deficiency decreased by 10.8 percentage points (from 16 % to 5.2%) in intervention sites and by 9.4 percentage points (from 13.6% to 4.2%) in control areas.
- Anemia prevalence dropped modestly by 6.7 percentage points in the intervention area; the control area saw a 5.3 percentage-point improvement.
- In the intervention area, the proportion of children with elevated C-Reactive Protein

**Table 1.** Micronutrient composition of the premix for Nutrimix fortification.<sup>9</sup>

Micronutrient	Salt	Level of micronutrients per daily serve size of the THR (Amrutham)
Calcium	Calcium Carbonate	300 mg
Iron	Ferrous Sulphate Dried	4.5 mg
Zinc	Zinc Oxide	2.5 mg
Vitamin A	Vitamin A Palmitate 250 CWS	200 mcg
Thiamine	Thiamine Hydrochloride	0.25 mg
Riboflavin	Riboflavin	0.3 mg
Niacin	Nicotinic Acid	4 mg
Vitamin B6	Pyridoxine Hydrochloride	0.45 mg
Vitamin C	Ascorbic Acid	20 mg
Folic acid	Folic Acid	40 mcg
Vitamin B12	Cyanocobalamin 0.1%	0.4 mcg

(CRP) levels decreased by 4.2 percentage points (from 9.8% to 5.6%). In contrast, the control area saw a slight increase of 0.7 percentage points, rising from 7.2% to 7.9%.

As a result of this experimental daily intake of Nutrimix, significant improvement was also observed:

- Mean daily consumption of Nutrimix rose from 57.9 g to 91.7 g (target is 135 g).
- The proportion of children consuming Nutrimix daily increased from 41.7% to 62.8%.
- Awareness of nutrient fortification soared; 91% of caregivers recognized the ration was fortified, and nearly 90% perceived benefits.
- Cooking demos and diverse recipe promotion increased caregiver knowledge and interest, aiding acceptance.

This fortification initiative was a huge success. Caregivers expressed satisfaction with the mix, particularly after the introduction of diversified recipes. One mother from the Panamaram panchayat shared: “My child used to refuse porridge, but now she enjoys the sweet balls I make with Nutrimix. Her health has improved.” With assistance from WFP, the fortified Nutrimix model was scaled across Kerala. This was

confirmed by the Kottayam unit that was interviewed by the FSRD team. They informed that the current formula they manufacture in their facility is the Nutrimix recipe that was further enhanced/fortified by the scientists of Central Plantation Crops Research Institute (CPCRI).<sup>10</sup>

Beyond just the nutritional impact, there has been significant economic empowerment of rural women (Figure 4). Safia Rehumathulla, the group secretary of Kudumbashree unit in Thalappuram Panchayat, Kottayam district, proudly proclaimed in the interview with the FSRD team that members earn a monthly income of at least ₹20,000, which is a significant leap from previous levels of financial dependency. Some units that survived setbacks like the 2018 Kerala floods rebuilt operations and continued production, showing the initiative's inherent resilience and sustainability as well as the integrity of the women entrepreneurs.<sup>10</sup>

The Amrurtham Nutrimix initiative changed the lives of multiple women. One such popular success story is of Smt. Bhageerathi of Palakkad district. From being a postgraduate who couldn't succeed in getting a job to forming a successful 'Ammu Foods' Nutrimix unit, she serves as an inspiration for many rural women. In order to manage the unit more effectively, she went on to earn an MBA in Human Resources, a post-



**Figure 4.** Team members of Kudumbashree unit in Thalappuram Panchayat, Kottayam district. Photo courtesy of Kavya Dileep.

graduate degree in Social Welfare Administration, and a PGDCA. Her drive and resilience pushed her to create a software for digitalizing the accounts of Nutrimix units in Palakkad. Her enterprise, Ammu Foods, now produces 10 tons of Nutrimix and 12 tons of Arogya (supplementary nutrition for pregnant women and lactating mothers) Mix monthly, along with Nutrimix biscuits and puttu powder, achieving an annual turnover of ₹2.5 crores. As of 2019, she built her own home, enrolled in a PhD program, and continues to inspire as a role model for women entrepreneurs across the state.<sup>11</sup>

## Lessons Learned

The Amrutham Nutrimix initiative highlighted multiple key challenges and lessons essential for scaling and replication:

1. One of the early challenges was low acceptability of the Nutrimix porridge among the children due to its monotony in taste and preparation. This was eventually mitigated through interventions like the study conducted by Shubhashree et al., 2014 that provided multiple innovative recipes to better incorporate the Nutrimix product.
2. Kudumbashree units faced cash flow issues due to delayed reimbursements from government agencies. Ensuring smoother financing systems is vital for enterprise sustainability.<sup>10</sup>
3. The quality of the wheat received goes down after cleaning. In these cases, the team needs to buy more wheat from outside sources to make up for the loss. Such cases cause delays in production.
4. A challenge that workers faced in particular was the non-availability of a cooler for roasted ingredients. Without a cooler, the cooling process consumes more time. But now the issue has been resolved after the introduction of the standardized premix packets.
5. A disaster-resilient supply chain is necessary. Kerala is often hit by floods which disrupts distribution, highlighting the need for storage buffers and contingency planning. However, local production often allows for quicker recovery.

## Next steps

Amrutham Nutrimix initiative has undoubtedly seen widescale success over the years since its initial implementation. Building on the insights from its success, the following steps and recommendations can strengthen and scale the impact:

1. In lieu of the low profit margin issues within several units, the Nutrimix units can branch out to sell value-added products in local markets. This would enhance income for SHG members and promote wider community nutrition. The Kottayam Kudumbasree unit is considering grinding different types of millets which is a step in the right direction.
2. Further collaborations with universities and food science institutes to help improve taste profiles and mode of preparations might be helpful.
3. One effective way to tackle cashflow challenges is by making sure payments are made on time and that SHGs have access to steady financial support. This can be done by setting up revolving funds or dedicated working capital provisions, which help them manage day-to-day expenses, keep their projects running smoothly, and avoid unnecessary financial stress.
4. The success of the Amrutham Nutrimix program can be replicated in other states to tackle the malnourishment issue across the country as a whole. It would be a great initiative to be included under Poshan Abhiyaan as part of national inclusion. Poshan Abhiyaan (National Nutrition Mission), launched in 2018, is India's flagship program to improve nutrition for children (0 to 6 years), adolescent girls, and pregnant and lactating women by reducing stunting, undernutrition, anemia, and low birth weight through technology, convergence, and community engagement.

Overall, the Amrutham Nutrimix initiative represents a compelling model of inclusive development, demonstrating the role that the right usage of food science and technology can play in empowering women and nourishing children.

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