Take-Home Rations

A Compendium

TINI
The India Nutrition Initiative
An initiative of TATA TRUSTS

sightandlife

Imprint

Editors

Kalpana Beesabathuni
Global Lead — Technology and Entrepreneurship, *Sight and Life*

Priyanka Kumari
Program Coordinator, *Sight and Life*

Madhavika Bajoria
Manager — Nutrition Integration, *Sight and Life*

Desk & Field Research and First Draft Support

Alex Burns, Alex Hardin, Danielle Minnett, Nayantara Bhandari
Johns Hopkins University Research Team

Design, Concept, Layout, Graphics and Final Artwork

Anne Milan
Design Specialist, *Sight and Life*

Editing and Proofreading Support

Kalyani Prasher

Acknowledgements

We would like to sincerely thank all the people and organisations that contributed their reports to be summarized for the Compendium. A particular "thank you" goes to Dr. Rajan Sankar, TINI-Tata Trusts, for making this publication possible and to Sri Alok Kumar, IAS, NITI Aayog, Government of India for providing us with invaluable information and insights for this Report. We would also like to thank all the other key stakeholders from the government, industry and not-for-profit organizations who took time out to be interviewed for this Compendium. This includes Sameer Saxena, H P Rathod and Priyang Bhatt (Amul, GCMMF), Sandip J Patel and Deepak R Sharma (Amul Dairy, Kaipa District Union), Parth Bahuguna (CHAI), Basanta Kar, Abhishek Jain (JVS Foods), Dr. Shariqua Yunus (WFP), Arijit Chakrabarty and Deepti Gulati (GAIN), Dr. Ishaprasad Bhagwat (Tata Trusts). We owe a debt of gratitude to Srujith Lingala, Puja Tshering and Pavithra Balasubramanian from *Sight and Life* for their invaluable editorial support and Mark Milan for his design support.

Contributing Organizations

Clinton Health Access Initiative
Parth Bahuguna
pbahuguna@clintonhealthaccess.org

Global Alliance for Improved Nutrition
Deepti Gulati
dgulati@gainhealth.org

Pharos Global Health Advisors
Robert Hecht
roberthecht@pharosglobalhealth.com

Sight and Life
Kalpana Beesabathuni
kalpana.beesabathuni@sightandlife.org

The India Nutrition Initiative, Tata Trusts
Dr. Rajan Sankar
rsankar@tatatrusts.org

World Food Programme
Shariqua Yunus
shariqua.yunus@wfp.org

Sight and Life Foundation
PO Box 560034, Bangalore, India
info@sightandlife.org
www.sightandlife.org

TINI
The India Nutrition Initiative
An initiative of Tata Trusts

sightandlife

Contents

foreword

Dr. Rajan Shankar
Director, The India Nutrition Initiative
An initiative of Tata Trusts

"In the COVID-19 affected world, Take-Home Rations represent an opportunity to deliver fortified, nutritious, non-perishable food that goes beyond simply filling bellies."

Malnutrition in India - Looking Beyond Just Filling Bellies

Nutrition is fundamental to human health and development. Addressing malnutrition saves lives, reduces inequalities, and builds strong and resilient individuals, families, communities and, eventually, countries. During the last two decades, India has improved nutrition outcomes – between 2005 and 2019, prevalence of stunting among children who are under five years old fell from 48 percent to 34.7 percent and that of underweight fell from 43 to 33.4 percent[1,2]. However, much more needs to be done. About 40.6 million children remain stunted— one-third of the global stunting burden. Achieving the country's National Nutrition Mission's (NNM) Vision 2022 targets, which aim to decrease undernutrition by 3 percent each year and cut anemia among children and women by a third over the next two years, will require a lot of work.[2]

One key set of actions at the heart of the NNM is to reform the nationwide Integrated Child Development Services's (ICDS) Supplementary Nutrition Program (SNP), especially its Take-Home Rations (THR) scheme. The THR program aims to provide children from 6 to 36 months old, as well as pregnant and lactating women, with a fortified supplementary food product for home use. THR takes up a big share of the ICDS budget: State and central governments spend more than Rs 13,500 crore (about $2 billion) annually on the program.[2]

THR is more crucial now than ever before – the COVID-19 pandemic has disrupted food systems all across India, reducing the general availability of nutritious, micronutrient-rich foods. With millions losing access to locally-produced fresh meals, THR represents an opportunity to deliver fortified, nutritious, non-perishable food that goes beyond simply filling bellies. By strengthening THR programming, we can support the growth and development of children and pregnant and lactating women, and ensure that we don't lose the gains made over the last two decades.

Advancing the Goal

To elevate and maintain the health of women and give more children a healthy start to life, we must ensure that they have access to the nutrients they need, at all stages of life. Now is the time to examine the THR program critically and inform the efforts to improve it – and to this end, we invited all organizations active in THR programs to share their knowledge. Their efforts include pilot studies and documenting various THR models in seven states: Bihar, Gujarat, Kerala, Madhya Pradesh, Odisha, Rajasthan and Telangana. This Compendium was compiled by our partners, *Sight and Life* Foundation and Nutrition for Development Foundation (N4D), to synthesize these contributions and describe the evidence, experience, and learnings of THR in simple terms.

- *THR has the potential to fill the critical nutrient gaps in ICDS*
- *THR can be produced locally through centralized and decentralized models*

This Compendium is addressed to those policy makers, organizations and individuals most concerned with making a real and enduring improvement in addressing nutrient deficit of ICDS beneficiaries. The report includes:

1. An overview of what has been accomplished to date in different settings (centralized models, decentralized models)
2. Practical guidance to support policymakers and implementers as they consider the deployment of THR in their respective states

To assist state governments ascertain the best course of action, this Compendium identifies and lays out feasible fixes that they can adopt. We begin with an overview of the THR program, its formulation and composition, governance and management, and production models. These are summaries of policy briefs developed by Tata Trusts - The India Nutrition Initiative and Pharos

Global Advisors. We end with an Afterword, co-authored by myself and Kalpana Beesabathuni of *Sight and Life*, which urges states to "RISE" –

Refine THR composition and formulation,
Improve THR production and distribution,
Strengthen THR monitoring and accountability, and
Enhance the THR policy environment.

This will help policymakers to elucidate the opportunities and ensure consistency of program goals and efficacy in execution.

In between, we have documented a rich set of emerging good practices and lessons learned in the Experience section of this Compendium. In the article "Governance and Accountability: Experience of Odisha" on page 68, Niti Aayog explores how the state has developed guidelines that improve contracting, quality management, and monitoring of THR access for beneficiaries. Meanwhile, the Clinton Health Access Initiative (CHAI) write about how Madhya Pradesh has worked with the National Institute of Nutrition to revise and update their THR recipe, improving formulation and composition[2] in their article "Nutrition Matters: Reformulation in Madhya Pradesh" on page 53. CHAI has also developed, for the first time, an investment case, on page 57, for the decentralized model in Madhya Pradesh, which gives us a good understanding of the cost drivers and revenue needed to make the model sustainable.

We also have valuable learnings from two starkly different models in Telangana and Kerala, which have been equally successful in delivering good nutrition to their beneficiaries. The centralized production in Telangana has successfully utilized micronutrient fortification, as described by Global Alliance for Improved Nutrition (GAIN) in their article "Telangana Foods: A State Enterprise Model" on page 41, while Kerala's Kudumbashree system has implemented quality testing for THR even within a decentralized model, as documented by WFP in "A Cluster Model in Kerala: Experience of Kudumbashree" on page 63. During my time at GAIN, we ideated, tested, piloted diverse models from Telangana Foods to "The Banswara Model: An Experience from Rajasthan" and "Operational Guidelines: A Case Study from Bihar", insights of which are described from page 78 and page 83. Finally, the Amul-THR model has been documented by *Sight and Life*, in partnership with a research team from Johns Hopkins University on page 46. In the piece "A Public-Private Partnership in Gujarat: The Amul Case Study" they write about how, despite some challenges, the Amul model has been successful in catering to nearly 42 million beneficiaries with high-quality fortified THR in customized packaging, within a year of being operational. JVS Foods and *Sight and Life's* field study in Rajasthan offer practical guidance on addressing challenges in decentralized models on page 73. Most importantly, we salute the frontline heroes, anganwadi staff, who persevere to ensure THR reaches the beneficiaries during the lockdown – see an inspiring story from Telangana on page 45.

Harnessing Partnerships for THR Strengthening in India

This Compendium on THR compiles and curates the latest evidence based experience from the states, and key insights and roadmap. It aims to serve as an important resource for decision-makers and implementers, thereby driving the reform and strengthening of THR. We are deeply grateful to all the organizations who have contributed to this Compendium. A particular "thank you" goes to *Sight and Life* and N4D for making this publication possible. It is my hope that this Compendium is a first step for all the partner organizations in joining forces to support THR strengthening efforts in our country.

Take-Home Message

There is no turning back. For the first time in decades, there is a renewed focus on the THR program as one of the centerpieces of the government's ambitious NNM commitments and targets, making this an opportune moment for states to strengthen and re-imagine supplementary nutrition. Given the program's broad reach and established presence in communities across the country, policymakers should take advantage of this opportunity to improve nutrition for the millions of beneficiaries who consume THR.

It's time to RISE and shine.

Reference

1. Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council. 2019. Comprehensive National Nutrition Survey (CNNS) National Report. New Delhi.
2. Ryan Schwarz, Robert Hecht, Kelly Flanagan, and Rajan Sankar. How India can improve its Take-Home Rations program to boost child and maternal nutrition. 1 October 2018. Internet: https://www.brookings.edu/blog/future-development/2018/10/01/how-india-can-improve-its-take-home-rations-program-to-boost-child-and-maternal-nutrition/ (accessed 8 April 2020)

Glossary

Anganwadi Centre (AWC)

AWCs are child care centers which were implemented by the Government of India in 1975 in order to deliver the various health, education and nutrition services that comprise the Integrated Child Development Services program.

Anganwadi Worker (AWW)

AWWs are the staff who run and oversee activities at AWCs.

Child Development Program Officer (CDPO)

The CDPO is a state-level official of the Government's Integrated Child Development Services program who is mandated with overseeing activities at the sector level.

Behavior Change Communication (BCC)

BCC is an interactive process of an intervention in which communication strategies are used to promote positive behaviors and practices, particularly in regards to health and nutrition. BCC cultivates environments to achieve nutrition goals by sustaining positive and desirable behavioral outcomes.

Food Corporation of India (FCI)

FCI is an organization created and administered by the Government of India with governance structures through the state level. It is housed within the Ministry of Consumer Affairs, Food and Public Distribution.

Government of India (GoI)

GoI is the central government of the country.

Indian Council of Medical Research (ICMR)

ICMR is the apex body in India for formulation, coordination and promotion of biomedical research. It is funded by the Government's Department of Health Research and housed in the Ministry of Health and Family Welfare.

Infant and Young Feeding Practices (IYFP)

IYFP are recommended behaviors so that infants and young children can increase their chances of survival as well as promote optimal growth and development, especially in the critical window from birth to 2 years of age. Ideally, infants should be breastfed exclusively for the first six months of life and continue to be breastfed up to two years of age and beyond. Starting at six months, breastfeeding should be combined with safe, age-appropriate feeding of solid, semi-solid and soft foods.

Integrated Child Development Services (ICDS)

The ICDS is a government program which provides health, nutrition and education services for children as well as pregnant and lactating women. It was launched in 1975 with the goal of impacting the first 1,000 days of life.

Integrated Child Development Services-Common Application Software (ICDS-CAS)

The ICDS-CAS is a technological system that was designed to strengthen the supply chain and service delivery of ICDS services. It was created and launched by the Ministry of Women and Child Development in order to ensure better delivery as well as implement data-based decision making. The ICDS-CAS is used by a variety of stakeholders including state officials as well as AWWs.

International Food Policy Research Institute (IFPRI)

IFPRI is a research institute which provides research-based policy solutions to sustainably reduce poverty as well as combat hunger and malnutrition around the world.

Ministry of Women and Child Development (MWCD)

The MWCD is a body within the GoI that focuses on the formulation, implementation and administration of the policies, regulations and laws relating to women and child development.

National Nutrition Mission (NNM)

The NNM is the Prime Minister's overarching scheme and

flagship program for nutritional goals in India. It was launched by the GoI in 2018 with benchmark targets set for 2022. It is often referred to as “POSHAN Abhiyaan” as well.

One-time password (OTP)

An OTP is a password that is valid for only one login session or transaction, on a computer system or other digital device. Typically, OTPs have a short-term expiration.

Protein Digestibility-Corrected Amino Acid Score (PDCAAS)

PDCAAS is a method of determining the quality of a protein using both the amino acid requirements of humans and their ability to digest it.

Pregnant and Lactating Women (PLW)

PLWs are women who are pregnant or lactating. They are one of the target beneficiaries of the ICDS program.

Program Officer (PO)

The PO is a state-level official of the Government’s ICDS program who is mandated with overseeing activities at the block level.

Quality control (QC)

QC is a system of maintaining standards in manufactured products by testing a sample of the output against the specification.

Quality assurance (QA)

QA is the maintenance of a desired level of quality in a service or product, especially by means of attention to every stage of the process of delivery or production.

Recommended Dietary Allowance (RDA)

RDA is a system of nutrition intake recommendations for optimal health.

Severe Acute Malnutrition (SAM)

SAM is defined by a very low weight for height, typically below -3z scores of the median World Health Organization growth standards. SAM is the most extreme and visible form of undernutrition and accompanied by muscle wasting.

Supplementary Nutrition Program (SNP)

The SNP encompasses the nutrition services of the ICDS program of the GoI. Within SNP the government offers take-home rations as well as hot cooked meals for children.

Self-Help Group (SHG)

SHGs are composed of local women throughout India as part of the ICDS program. SHGs are responsible for producing and distributing take-home rations to AWCs. The GoI implemented the SHG model in order to incorporate women’s empowerment initiatives into the ICDS.

Take-Home Ration (THR)

THRs are energy-dense micronutrient fortified food blends that are provided to children and PLW through the ICDS program, as part of the SNP. The goal of THR is to fill the nutrition gap in the diets of beneficiaries.

World Health Organization (WHO)

WHO is a specialized agency of the United Nations that is concerned with world public health.

context

Overview of Take-Home Rations

This is an abridged article based on the Pharos Global Health Advisors' policy brief for Tata Trusts - The India Nutrition Initiative. Reproduced with permission.

Key messages

- India's Supplementary Nutrition Programme receives INR 15,000 crore in funding from the central government, making it one of the largest such initiatives in the world, reaching 8.5 crore children under six & 2 crore pregnant and lactating women. It has three components: hot cooked meals and a morning snack in the Anganwadi Centers and Take-Home Rations for home use.
- In 2000, the Government of India restarted its Integrated Child Development Services programme to all states, and in 2006, the Supreme Court ruled for universal access. Universalization, coupled with financial expansion in 2009, has resulted in improved coverage across states as well as increased reach for a wide range of marginalized groups.
- To fill the nutrient gap, the Supplementary Nutrition Programme mandated the provision of fortified blended supplementary food products called Take-Home Rations for home use for children under three years, pregnant and lactating women and, in some states, adolescent girls.
- The Take-Home Ration program has made great strides over the last 20 years, but enduring challenges must be tackled in order to meet nutrition goals and ensure that all children and pregnant and lactating women are given adequate supplementary foods for healthy development.

The Architecture of the Integrated Child Development Services

India is home to one-third of the world's stunted children (4.7 crore) and half of the world's wasted children (2.6 crore), while nearly 41% of Indian children less than five years old are anemic.[1,2] To combat malnutrition, the Government of India (GoI) launched the Integrated Child Development Services (ICDS) in 1975, which offers a variety of nutrition and health services in order to impact the first 1,000 days of life.[4] This timeframe is imperative for preventing long-term consequences associated with malnutrition, particularly during pregnancy, and later as infants transition out of breastfeeding.[3] Housed within ICDS is the Supplementary Nutrition Programme (SNP) that aims to fill the gap in nutrition amongst children under six as well as pregnant and lactating women (PLW). The SNP is supposed to provide hot cooked meals and micronutrient-fortified and energy-dense food called Take-Home Ration (THR) across the country. Specifically, the program stipulates that THR should meet 50% of the daily Recommended Dietary Allowance (RDA) per beneficiary.[5] Today, the GoI allocates over $2 billion annually to the SNP, making it one of the largest supplementary feeding programs in the world.[3,5] In total, ICDS serves ~8.5 crore children under six and ~2 crore PLW.[6] Namely, the THR program has three categories of beneficiaries: children 6 to 36 months old, children 6 to 72 months with severe acute malnutrition (SAM) and PLW. India's ICDS program is directed and executed by the Ministry of Women and Child Development (MWCD). The central government stipulates guidelines, RDA standards and cost norms, based on criteria outlined by the Indian Council of Medical Research (ICMR). Through MWCD, these guidelines are distributed to the country's 29 States and 7 Union Territories. Each state has the liberty to generate distinct THR products and ingredients, using the central government's standards and guidelines as a reference.[3] However, this devolution of responsibilities creates large variations in THR products and delivery models between states.

Under the 2017 Supplementary Nutrition Rules, Monitoring and Review Committees at the national, state, district, block and Anganwadi Centre (AWC) levels are responsible for monitoring and reviewing proper sanitation, supply, and functioning of THR distribution within AWCs. Meanwhile, it is the responsibility of District Project Officers (DPOs) and Child Development Project Officers (CDPOs) to ensure the quality of the supplementary nutrition with reference to food safety norms

and food composition.[7]
Originally, states were responsible for funding their own SNPs. Due to limited funding coverage by states, it was decided in the year 2005-06 that the GoI would pay for 50% of the expenditures incurred. However, in the year 2009-10 the GoI modified payment proportions to reflect actual funding requirements by different states (Table 1). So, some states continue to pay in 50:50 ratio, while for others, the central government bears all or 90 per cent of the supplementary nutrition costs.[8]

Scaling Up and Universalization

In 2013, reviews of effective nutrition interventions estimated that scaling up a set of proven nutrition-specific interventions could reduce stunting globally by 20% and reduce child mortality by 15%.
ICDS was expanded to all states in the year 2000, and soon after in the year 2006, the Supreme Court of India ruled for universal access to ICDS services. The goal of universalization was to reach the most marginalized and malnourished children and PLW through the establishment of 14 lakh ICDS centers across India.[9] Then in 2009, financial expansion was implemented as well as the rights-based framework for supplementary food. Finally, in 2012, the Supreme Court ordered that THRs should be manufactured through processes that safeguard infection through any form of contamination, preferably through an automated facility.[9]

Not only has universalization allowed for improved coverage across all states, but also enhanced reach for a wide range of marginalized groups. The reach of supplementary food across India is illustrated in figure 1 below. Nevertheless, research conducted by Chakrabarti et al. also demonstrates that while service-use has increased significantly, the expansion of services has failed to reach the poorest quintiles, particularly in the poorer states and states with high burden of undernutrition.[9] These shortfalls indicate that performance of THR production and distribution in high-poverty states could lead to continued exclusions if facilities are not strengthened. Further, inadequate reach of beneficiaries amongst the poorest quintiles is compounded by the challenge of reaching remote rural areas.

"Finally, in 2012, the Supreme Court ordered that THRs should be manufactured through processes that safeguard infection through any form of contamination, preferably through an automated facility."

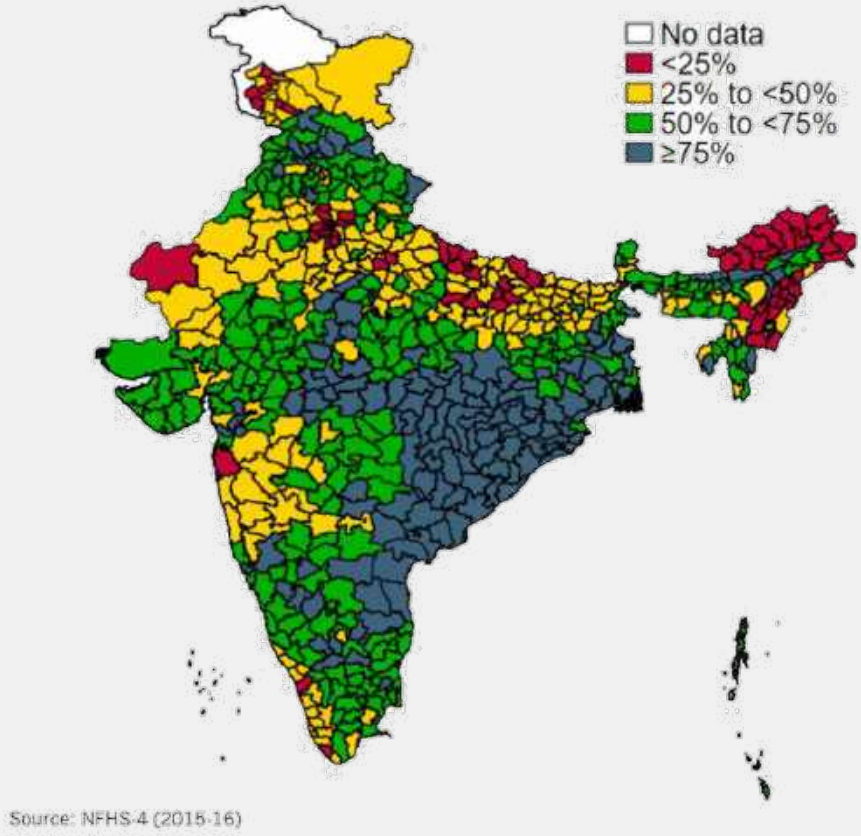
The National Nutrition Mission

Given these persistent challenges and gaps, in 2018 the GoI launched the National Nutrition Mission (NNM) which aims to strengthen the ICDS framework, systems and functions as well as converge nutrition activities

TABLE 1: Current Central-to-State Payment Ratios, with information from MWCD, n.d.

Central-to-State Payment Ratio		
100:0	90:10	50:50
• Andaman and Nicobar Islands • Chandigarh • Dadra and Nagar Haveli • Daman and Diu and Lakshadweep	• Assam • Arunachal Pradesh • Mizoram • Manipur • Meghalaya • Nagaland • Tripura • Sikkim • Himachal Pradesh • Jammu and Kashmir • Uttarakhand	• Delhi • Puducherry • All other States and Union Territories

FIGURE 1: Proportion of women with children under five years of age who received foods supplements during pregnancy throughout India



Top 10 districts (%)	
Subarnapur (OR)	96.9
Nuapada (OR)	96.6
Baudh (OR)	96.5
Kandhamal (OR)	95.7
Balangir (OR)	95.6
Belgaum (KA)	95.5
Bargarh (OR)	95.4
Nabarangapur (OR)	95.2
Dhamtari (CT)	95.1
Khandwa (MP)	94.7

Bottom 10 districts (%)	
Mon (NL)	3.0
East (DL)	3.3
West Siang (AR)	3.4
Dibang Valley (AR)	3.8
North (DL)	4.4
West Kameng (AR)	4.8
Mewat (HR)	4.8
Dimapur (NL)	5.1
Palwal (HR)	5.2
Longleng (NL)	5.2

at all the levels of the government (central, state, and local). Within the NNM, State Program Management Units oversee nutrition agendas and activities, Convergent Action Plans are developed to execute nutritional strategy and coordination across stakeholders, and district and state-level officers regularly review data and targets.[5]

Nutrition targets in India are based on a wide range of frameworks and organizational strategies. For instance, the United Nations' Sustainable Development Goals (SDGs) significantly influence ICDS targets given that at least twelve of the seventeen SDGs contain indicators are related to nutrition.[10] Within the NNM framework, the GoI aims to reduce all forms of undernutrition by 2030. Specifically, three indicators were conceptualized by the GoI with targets for 2022. First, reduction of underweight children below five (35.7% to 20.7%). Second, reduction in prevalence of anemia in children below five (58.4% to 19.5%). Lastly, reduction in prevalence of anemia in PLW 15 to 49 years old (53.1% to 17.7%).[10]

Key milestones

The milestones of THR program under ICDS programme is illustrated in table 2.

Looking Forward

The GoI has made tremendous investments in scaling-up the SNP program and universalizing THR access. As such, SNP coverage has increased from 26.3% in 2006 to 48.1% in 2016.[3] Further, between 2005-06 and 2016-18, prevalence of stunting declined from 48% to 34.7%, underweight from 42.5% to 33.4% and wasting from 19.8% to 17%.[2] This data indicates that the THR program has made great strides over the last two decades, but enduring challenges must be tackled in order to meet nutrition goals and ensure that all children and PLW are given adequate supplementary foods to support their healthy development.

TABLE 2: Key milestones of the SNP programme

Year	Milestones
1975	ICDS launched in 33 blocks with 4891 AWCs; SNP was an integral part of it.
1978	ICDS Scheme discontinued.
2000	ICDS scheme restarted in all states catering to 6 lakh AWCs.
2004	Commercial contractors excluded from THR production ruled by the Supreme Court of India.
2005	Up to 50% of the expenditures borne by by States/UTs are supported by Central Govt.
2006	Universal access to ICDS services ruled by the Supreme Court of India. Minimum nutrition provision to be guaranteed by ICDS and decentralisation of THR production involving local SHGs and mahila mandals mandated.
2009	Financial expansion and revised nutrition and feeding norms implemented. Cost-sharing pattern between Central and North-Eastern states changed from 50:50 to 90:10 ratios.
2012	Supreme Court emphasized on quality and safety standards during THR production and role of automated machines in it. Further, it underscored the importance of micronutrient fortification and certification of SNP under ICDS scheme in various states. They ruled that THR should only be produced by competent groups who comply with the Revised Norms, regardless of whether they are SHGs, Mahila Mandals, Village Community or a manufacturer.
2016	The difference in odds of reaching beneficiaries amongst scheduled castes and tribes and general castes declined from 2 times to 1.45 times.
2018	GoI launched the National Nutrition Mission (NNM) with THR program as the centrepiece of ICDS strengthening

References

1. Fanzo, Jessica, Corinna Hawkes, Emorn Udomkesmalee, Ashkan Afshin, Lorena Allemandi, Obey Assery, Phillip Baker, et al. 2018 Global Nutrition Report: Shining a Light to Spur
2. Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council. 2019. Comprehensive National Nutrition Survey (CNNS) National Report. New Delhi
3. Vaid, Abhilasha; Avula, Rasmi; George, Nitya Rachel; John, Aparna; Menon, Purnima; and Mathews, Pratima. 2018. A review of the Integrated Child Development Services' Supplementary Nutrition Program for Infants and Young Children: Take home ration for children. POSHAN Research Note 7. New Delhi: International Food Policy Research Institute (IFPRI). http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/132804
4. Avula, Rasmi, Esha Sarswat, Suman Chakrabarti, Phuong Hong Nguyen, Pratima Matthews, and Purnima Menon. District Level Coverage of Interventions in the Integrated Child Development Scheme during Pregnancy, Lactation and Early Childhood in India, Insights from the National Family Health Survey. New Delhi, India: International Food Policy Research Institute, POSHAN Data, 2018
5. Schwarz, Ryan, Emily Briskin, Kelly Flanagan, Nina Dodd, Shan Soe-Lin, and Robert Hecht. Opportunities and Challenges in the Integrated Child Development Services' Take-Home Rations Program - Overview, Policy Brief 1. New Delhi, India: TataTrust, 2018a
6. Integrated Child Development Services (ICDS), Ministry of Women and Child Development, Governent of India, Status report of ICDS; https://icds-wcd.nic.in/Qpr0314forwebsite23092014/qpr0314supplementarynutrition.pdf
7. Supplementary Nutrition Rules (2017). The Gazette of India. Part III—Maintenance of Standard and Quality of Meal, Their Enforcement and Monitoring
8. MWCD, n.d. Integrated Child Development Services (ICDS) Scheme. Official Website. https://icds-wcd.nic.in/icds.aspx
9. Chakrabarti, Suman, Kalyani Raghunathan, Harold Alderman, Purnima Menon, and Phuong Nguyen." India's Integrated Child Development Services Programme; Equity and Extent of Coverage in 2006 and 2016." Bulletin of the World Health Organization (Apr 1, 2019). https://www.ncbi.nlm.nih.gov/pubmed/30940984
10. Nourishing India: National Nutrition Strategy, Government of India. New Delhi, India: NITI Aayog, 2018. https://niti.gov.in/writereaddata/files/document_publication/Nutrition_Strategy_Booklet.pdf

Formulation and Composition

This is an abridged article based on the Pharos Global Health Advisors' policy brief for Tata Trusts - The India Nutrition Initiative. Reproduced with permission.

Key messages

- The dietary guidelines of the Integrated Child Development Services mandate inclusion of 50% Recommended Dietary Allowance of nine micronutrients in Take-Home Rations. However, this is not sufficient as beneficiaries consume much less due to intra-household sharing of the product.
- The current guidelines for Take-Home Rations may be reviewed and revised to incorporate the most updated micronutrient and macronutrient guidance by World Health Organisation.
- All states should considering having at least one Take-Home Ration product formulated for children (6 to 36 months) and one for pregnant and lactating women.
- In order to effectively enforce the requirement for adequate micronutrient fortification in Take-Home Rations, universal access to micronutrient premix should be considered in all states and for all producers.
- Iron, folate and zinc content should be increased in Take-Home Ration formulation and vitamins B_6, B_{12} and D should be incorporated.
- States should undertake evaluations of micronutrient deficiencies.
- Take-Home Rations should contain high-quality protein determined by protein digestibility-corrected amino acid score, while the sugar content should be reduced significantly to improve nutritive value.

Introduction

India's Integrated Child Development Services's (ICDS) Supplementary Nutrition Programme (SNP) guidelines are based, in part, on the Indian Council of Medical Research's (ICMR) Recommended Dietary Allowance (RDA).[1] However, ICMR guidelines are not fully aligned with the World Health Organization (WHO) guidelines and require updating.[2] Additionally, there is significant variation in Take-Home Rations (THR) produced both across and within states, including multiple recipes and formulations that have variable adherence even to the current guidelines. An important factor to consider is that supplementary foods are frequently shared among family members, lowering the amount that beneficiaries themselves consume. Most supplementary foods are not energy-dense, and actual intake is frequently less than recommended, particularly for children under 12 months of age who have a smaller stomach capacity. In light of these challenges, in this article, we focus on opportunities to enhance the existing dietary guidelines for THR composition and formulation.

Global standards and ICMR and ICDS guidelines: An opportunity for improved alignment

ICDS SNP guidelines[3] stipulate energy, protein, and micronutrient requirements for THR (Table 1), and have been developed as per ICMR-specified RDAs.[1] However, comparisons of ICMR's recommendations to WHO guidelines highlight multiple differences, which may be due, in part, to different methodologies in estimating the contribution of breastmilk to nutrient requirements.[2] We have summarized the differences between WHO and ICMR recommendations in table 2 (for children aged 6-12 months), table 3 (for children aged 12-36) and table 4 (for pregnant and lactating women), and briefly describe the priority areas for further consideration.

First, ICDS norms do not differentiate between energy or protein recommendations for THR being supplied to children between the ages 6 and 72 months. Differentiation is important as children across this age range have different nutrient requirements (Tables 2 and 3),

and also because children under 12 months of age have a lower gastric capacity – without an energy-dense food product, it is unlikely that they will consume the recommended amount of THR as well as adequate breastmilk and complementary foods.

Second, ICDS standards stipulate that THR should include 50% of the ICMR-recommended RDA for nine micronutrients – iron, calcium, folic acid, zinc and vitamins A, B_1, B_2, B_3, and C. However, given persistent malnutrition, anemia, and micronutrient deficiencies, there is an important opportunity to expand this list to include other micronutrients as well, such as vitamins B_6 and B_{12}. Vitamin B_6 aids iron absorption and B_{12} is critical in preventing folic acid deficiency and consequently worsening rates of anemia. If added to THR, both vitamins could improve the overall nutritional status of mothers and their babies (Chart 1).

"ICDS norms do not differentiate between energy or protein recommendations for THR being supplied to children between the ages 6 and 72 months."

Recommendation 1

ICMR guidelines may be reviewed and revised to incorporate the most updated micronutrient and macronutrient guidance.

Aligning THR produced across five states with ICDS guidelines and ICMR standards

THR formulation was reviewed for Rajasthan, Uttar Pradesh, Odisha, Andhra Pradesh, and Kerala. Table 5 includes data for children aged 6-12 months and table 6 for pregnant women. There is a significant variation in THR produced across states, which shows that THR is frequently not aligned with ICDS guidelines for micronutrient composition (demonstrated by percentages highlighted in red in the associated tables).

While there are multiple opportunities for improvement, the most important is the excessive sugar content in all products, which should be lowered to adhere closely to nutritive standards.

CHART 1: Select Manifestations of Micronutrient Deficiencies

MICRONUTRIENT DEFICIENCY	SELECTED MANIFESTATIONS
Iron	• delayed mental, motor and emotional development in children • anemia • increased maternal morbidity and mortality • increased risk for preterm delivery
Calcium	• bone abnormalities • tetany
Zinc	• growth failure • skin disease • impaired immunity
Folic Acid and Vitamin B12	• anemia • neurologic abnormalities
Vitamin A	• blindness • impaired immunity • growth retardation
Vitamin B1	• cardiomyopathy • neuropathy
Vitamin B2	• skin problems • tongue and lip inflammation
Vitamin B6	• irritability and confusion • peripheral neuropathy
Vitamin C	• anemia • failure to thrive • depression and fatigue
Vitamin D	• poor bone development and health

"There is significant variation in THR produced across states, which shows that THR is frequently not aligned with ICDS guidelines for micronutrient composition."

Improving ICDS recommendations for THR

Enhanced ICDS THR guidelines could set a new minimum benchmark for all states and offer a significant impact if taken up throughout India. We note here that given the additional variation between ICDS guidelines and THR produced across states, simply revising ICDS THR guidelines will not by itself be sufficient to improve the nutritive value reaching beneficiaries. However, guideline revision is an important first step.

Currently, many states provide only one THR product,

TABLE 1: Current ICDS Norms for THR

TARGET GROUP	CALORIES (K CAL)	PROTEIN (G)	MICRONUTRIENTS	ICDS BUDGET PER BENEFICIARY
Children (6 - 72 months)	500	12 - 15		Rs 8.00
Severely Underweight children (6 - 72 months)	800	20 - 25	50% RDA of iron, calcium, folic acid, zinc, and vitamins A, B_1, B_2, B_3, and C	Rs 12.50
Pregnant and Lactating women	600	18-20		Rs 9.50

but providing multiple THR products is feasible in certain contexts. In Odisha, for example, Self-Help Groups (SHGs) utilizing decentralized production units produce THR while also manufacturing other food products that are sold in the local markets, indicating unutilized capacity. Likewise, the centralized production in Telangana also produces multiple food products. While acknowledging that not all states will be able to provide distinct THR products for each target beneficiary group, having differentiated THR products for children, and for pregnant and lactating women (PLW), should be a basic standard.

Recommendation 2

States should consider having at least one THR product formulated for children (6 to 36 months old) and a second product for PLW. Ideally, states could further stratify THR formulation by age and population where feasible.

Enhancing the micronutrient composition, protein and sugar content of THR

Local health survey data should be considered when states determine their THR recipe. There are certain trends that are obvious across most states:

1. Supplementary foods are frequently shared among family members, decreasing the amount that beneficiaries themselves consume;
2. Most supplementary foods are not energy-dense, and actual intake is frequently less than recommended, particularly for children under 12 months of age with smaller stomach capacity; and
3. Plant-based supplementary foods are often insufficient to meet micronutrient requirements.

"Enhanced ICDS THR guidelines could set a new minimum benchmark for all states and offer a significant impact if taken up throughout India."

Because of these challenges, while ICDS guidelines recommend 50% RDA inclusion for nine micronutrients (Table 1), most beneficiaries in reality consume substantially less. Multiple improvements across the THR systems will be required to fully address these challenges.

First and foremost, in order to satisfy the recommended micronutrient compositions, producers must have ready access to micronutrient premix to add during THR production. Micronutrient premix has been shown to be an affordable product that adds minimal cost to THR production and pilot programs have demonstrated success with its use.[20]

Secondly, it is necessary to consider which of the recommended micronutrients included in the ICDS guidelines may need to be increased and if additional micronutrients should be added to the ICDS guidelines. For example, recent work as part of a collaboration between the National Institute of Nutrition and Clinton Health

Access Initiative in Madhya Pradesh recommended increasing the percentage RDA of certain micronutrients.

Table 7 demonstrates that THR products exceeded the WHO-recommended energy intake. Additionally, the percentage of energy provided by sugar was significantly higher.

Recommendation 3

Enforce the requirement for appropriate micronutrient fortification in THR by ensuring universal access to micronutrient premix in all states and for all producers.

TABLE 2: Comparison of International Guidelines (WHO/FAO4,5) with ICMR Guidelines[11], Ages 6-12 months

Major differences are seen in protein, iron, folate, B12, and zinc requirements.

NUTRIENT	UNIT	ICMR, 2011	WHO/FAO, 2001 – 2007	% DIFFERENCE ICMR VS. WHO
Energy	Kcal	672	604-775[12]	similar
Protein	g	14.2g (1.69g/kg)	8.8g (boys), 8.2g (girls)	61-73%
Visible fat	g	19		
Vitamin A	µg	350	400	-12.5%
beta - Carotene	µg	2800		
Vitamin D	IU		200	
Vitamin E (alpha-tocopherol)	mg		5	
Vitamin K (phylloquinone)	mcg		15	
Thiamine (Vitamin B1)	mg	0.3	0.5	-40%
Riboflavin (Vitamin B2)	mg	0.4	0.5	-20%
Niacin (Vitamin B3)	mg	5.46	6	-9%
Pyridoxine (Vitamin B6)	mg	0.4	0.5	-20%
Vitamin B12	mcg	0.2	0.9	-77.8%
Vitamin C	mg	25	30	-16.7%
Pantothenic acid	mg		2	
Biotin	mcg		8	
Folate, total	mcg	25	150	-83.3%
Iron	mg	5	11.6	-56.9%
Calcium	mg	500	500	equal
Copper	mg		0.34	
Zinc	mg		8.3	
Iodine	mcg		90	
Magnesium	mg	45	60	-25%
Manganese	mg		1.2	
Phosphorus	mg		460	
Potassium	mg		3000	
Selenium	mcg			

Recommendation 4

Increase iron, folate and zinc content in THR formulation, and incorporate vitamins B_6, B_{12} and D.

"Local health survey data should be considered when states determine their THR recipe."

TABLE 2: : Comparison of International Guidelines (WHO/FAO)5 with ICMR Guidelines[7], Ages 12-36 months

Major differences are seen in energy, protein, iron, folate, B_6, and zinc requirements.

NUTRIENT	UNIT	ICMR	WHO/FAO	% DIFFERENCE ICMR VS. WHO
Energy	Kcal	1060	894	18.6%
Protein	g	16.7	9.1 (boys), 8.5 (girls)[15]	84% boys, 97% girls
Visible fat	g	27		
Vitamin A	µg	400	400	equal
beta - Carotene	µg	3200		
Vitamin D	IU		200	
Vitamin E (alpha-tocopherol)	mg		5	
Vitamin K (phylloquinone)	mcg		15	
Thiamine (Vitamin B_1)	mg	0.5	0.5	equal
Riboflavin (Vitamin B_2)	mg	0.6	0.5	20%
Niacin (Vitamin B_3)	mg	8	6	33%
Pyridoxine (Vitamin B_6)	mg	0.9	0.5	80%
Vitamin B_{12}	mcg	0.2-1	0.9	similar
Vitamin C	mg	40	30	33.3%
Pantothenic acid	mg		2	
Biotin	mcg		8	
Folate, total	mcg	80	150	-47%
Iron	mg	9	11.6	-22.4%
Calcium	mg	500	500	equal
Copper	mg		0.34	
Zinc	mg	5	8.3	-39.8%
Iodine	mcg		90	
Magnesium	mg	50	60	-17%
Manganese	mg		1.2	
Phosphorus	mg		460	
Potassium	mg		3000	
Selenium	mcg			

Recommendation 5

THR should contain high-quality protein (per PDCAAS), while sugar content should be reduced significantly to improve nutritive value.

Conclusion

Current THR recipes do not fully close the gap between RDA and the actual average nutrient intake. Closer alignment of ICMR and ICDS guidelines to WHO standards and enhanced THR recipes could contribute significantly towards achieving the targets of the National Nutrition Mission (NNM). The recommendations and examples provided here should be considered by all states – taken together they can put India on the path towards achieving the national nutrition goals set forth by the NNM.

References

1. Integrated Child Development Services, Government of Bihar. Norms for Supplementary Nutrition. Internet: http://www.icdsbih.gov.in/SupplementaryNutrition.aspx-?GL=9&PL=8&SL=1 (Accessed April 2018)
2. Vaid, A., R. Avula, N.R.George, A. John, P. Menon. A Review of the Integrated Child Development Services' Supplementary Nutrition Program: Take Home Ration for Children. POSHAN Research Note #7. New Delhi, India: International Food Policy Research Institute, 2017
3. Ministry of Women and Child Development. 2015. The Gazette of India: Part II, Section 3, Sub-section (i)
4. Food and Agriculture Organization of the United Nations, W. H. O. U. N. U. Joint FAO/WHO/UNU Expert Consultation on Protein and Amino Acid Requirements in Human Nutrition. (2007). Retrieved from Geneva: http://apps.who.int/iris/handle/10665/43411 (Accessed April 2020)
5. World Health Organization, & Food and Agriculture Organization of the United Nations. Human Vitamin and Mineral Requirements. (2001). Retrieved from http://www.fao.org/docrep/004/Y2809E/y2809e00.htm (Accessed April 2020)
6. World Health Organization, & Food and Agriculture Organization of the United Nations. Human Energy Requirements. Paper presented at the Expert Consultation, Rome. (2001). http://www.fao.org/docrep/007/y5686e/y5686e00.htm (Accessed April 2020)
7. Indian Council of Medical Research. Dietary Guidelines for Indians, A Manual. (2011). Retrieved from http://ninindia.org/DietaryGuidelinesforNINwebsite.pdf (Accessed April 2020)
8. ICDS Uttar Pradesh. Supplementary Nutrition. (2006). Retrieved from https://icdsupweb.org/hindi/poshankariya.html (Accessed April 2020)
9. Andhra Pradesh receiving THR from Telangana Foods during period of research. Government of Telangana. Balamruthma- Weaning food for children between 7 months and 3 years. (2014). Retrieved from http://wdcw.tg.nic.in/Balamrutham.html (Accessed April 2020)
10. Government of Odisha. Supplementary Nutrition Programme. (2018). Retrieved from http://wcdodisha.gov.in/content/2/33 (Accessed April 2020)
11. Government of Rajasthan. Department of Women and Child Development. (2016). Retrieved from http://wcd.rajasthan.gov.in/ (Accessed April 2020)
12. The Amrutham Nutrimix Consortium. Decentralized Production and Distribution of Supplementary Nutrition by community-based Enterprises in Kerala. Retrieved from http://kudumbashree.org/storage//files/gbtws_amrutham%20nutrimix%20for%20web.pdf (Accessed April 2020)
13. Standard for Processed Cereal-Based Foods for Infants and Young Children. Paper presented at the UNICEF Nutrition Supplier Meeting, Copenhagen. (2009)
14. Suthutvoravut, U., Abiodun, P. O., Chomtho, S., Chongviriyaphan, N., Cruchet, S., Davies, P. S., . . . Koletzko, B. Composition of Follow-Up Formula for Young Children Aged 12-36 Months: Recommendations of an International Expert Group Coordinated by the Nutrition Association of Thailand and the Early Nutrition Academy. Ann Nutr, (2015)
15. Ministry of Women and Child Development of the Government of India. Integrated Child Development Services Scheme, (2018). Retrieved from http://www.icds-wcd.nic.in/supplnutrition.aspx (Accessed April 2020)
16. Ministry of Women and Child Development of the Government of India. Strict implementation of feeding norms, prescribed by Government of India, while providing THR under ICDS Scheme. (2014). Retrieved from http://www.icds-wcd.nic.in/icdsimg/10122014.pdf (Accessed April 2020)
17. Government of Rajasthan. Department of Women & Child Development. (2018). Retrieved from http://wcd.rajasthan.gov.in/ (Accessed April 2020)
18. The Amrutham Nutrimix Consortium. Decentralized Production and Distribution of Supplementary Nutrition by community-based Enterprises in Kerala. Retrieved from http://kudumbashree.org/storage//files/gbtws_amrutham%20nutrimix%20for%20web.pdf (Accessed April 2020)
19. Government of Telangana. Balamruthma- Weaning food for children between 7 months and 3 years. (2014). Retrieved from http://wdcw.tg.nic.in/Balamrutham.html (Accessed April 2020)
20. Sylvia Fernandez-Rao, Kristen M. Hurley, Krishnapillai Madhavan Nair, Nagalla Balakrishna, Kankipati V. Radhakrishna, Punjal Ravinder . . . Maureen M. Black. Integrating nutrition and early child-developmentinterventions among infants and preschoolers in rural India. Annals of the New York Academy of Sciences. (2014)

TABLE 4: Comparison of WHO/FAO[5] with ICMR[7] Guidelines for Pregnant & Lactating Women

Major differences are seen in protein, iron, folate, zinc, and vitamins D, B_2, B6 and B_{12}.

		PREGNANT WOMEN			LACTATING WOMEN		
NUTRIENT	UNIT	ICMR	WHO/FAO	% DIFFERENCE ICMR VS. WHO	ICMR	WHO/FAO	% DIFFERENCE ICMR VS. WHO
Energy	Kcal	2250	2200[15]	2.3%	1060	894	18.6%
Protein	g	82.2	71	15.8%	16.7	9.1 (boys), 8.5 (girls)[15]	84% boys, 97% girls
Visible fat	g	30			27		
n-3 PUFA	mg		1.4		400	400	equal
n-6 PUFA	mg		13		3200		
Carbohydrate	g		175			200	
Fiber	g		28			5	
Vitamin A	mcg	800	800	equal		15	
beta - Carotene	mcg	6400			0.5	0.5	equal
Vitamin D	mcg		5		0.6	0.5	20%
Vitamin E (alpha - tocopherol)	mg		15		8	6	33%
Vitamin K (phylloquinone)	mcg		55		0.9	0.5	80%
Thiamine (Vitamin B_1)	mg	1.6	1.4	14.3%	0.2-1	0.9	similar
Riboflavin (Vitamin B_2)	mg	2.0	1.4	42.9%	40	30	33.3%
Niacin (Vitamin B3)	mg	18	18	equal		2	
Pyrodoxine (Vitamin B6)	mg	2.5	1.9	31.6%		8	
Folic Acid	mcg	500	600	-47%	80	150	-47%
Vitamin B_{12}	mcg	1.2	2.6	-22.4%	9	11.6	-22.4%
Vitamin C	mg	60	55	equal	500	500	equal
Pantothenic Acid	mg		6			0.34	
Biotin	mcg		30	-39.8%	5	8.3	-39.8%
Folate, total	mcg	500	600			90	
Iron	mg	35	27	-17%	50	60	-17%
Calcium	mg	1200	1200			1.2	
Copper	mg		1.15			460	
Zinc	mg	12	10			3000	
Iodine	mcg		200				
Magnesium	mg	310	220			90	
Manganese	mg		2	-17%	50	60	-17%
Phosphorus	mg		700			1.2	
Potassium	mg		4700			460	
Selenium	mcg		30			3000	
Sodium	mg		1500				

TABLE 5: Comparison of State THR[7] Foods with ICMR RDA[7], Ages 6-12 months

Table 5 shows THR product composition for children 6-12 months of age across five states. ICDS guidelines stipulate that THR should include 50% of the ICMR RDA for nine essential micronutrients: Iron, calcium, folic acid, zinc, and vitamins A, B1, B2, B3, and C. Percentages highlighted in green show where THR product meets or exceeds this requirement, and percentages highlighted in red demonstrate where THR does not meet the ICDS guidelines. Micronutrients that are not highlighted are not included in the ICDS guidelines.

NUTRIENT	UNIT	ICMR RDA	UTTAR PRADESH WEANING FOOD[7]	% OF ICMR RDA	UTTAR PRADESH AMYLASE RICH FOOD	% OF ICMR RDA	ANDHRA PRADESH, WITH EGG	% OF ICMR RDA	ANDHRA PRADESH (WITHOUT EGG)[7]	% OF ICMR RDA	ODISHA THR[7]	% OF ICMR RDA	RAJASTHAN PANJIRI,[7]	% OF ICMR RDA	RAJASTHAN DESHI MIHAI,[7]	% OF ICMR RDA	KERALA AMRUTHAM[7]	% OF ICMR RDA
				% RDA		% RDA		% RDA		% RDA				% RDA		% RDA		% RDA
Energy	Kcal	672	514.22	76.5	496.82	73.9	425.41	63.3	398.4	59.3	564.10	83.9	478.67	71.2	618.93	92.1	454.48	67.6
Protein	g	14.2	13.69	96.4	13.65	96.1	10.20	71.8	8.4	59.3	15.02	105.8	10.71	75.4	15.13	106.6	15.47	109.0
Total fat	g	19	17.89	94.2	18.37	96.7	12.58	66.2	11.2	58.8	8.54	44.9	11.04	58.1	26.39	138.9	9.29	48.9
Thiamine (Vitamin B_1)	mg	0.3	0.33	109.0	0.35	118.0	0.26	85.5	0.2	82.8	0.58	191.8	0.36	121.3	0.34	113.4	0.45	149.0
Riboflavin (Vitamin B_2)	mg	0.4	0.13	31.8	0.13	32.6	0.11	28.5	0.1	22.5	0.20	49.5	0.14	33.9	0.12	30.8	0.16	39.4
Niacin (Vitamin B_3)	mg	5.46	1.75	32.1	2.26	41.4	1.40	25.6	1.4	25.6	4.45	81.4	1.88	34.4	1.73	31.6	3.37	61.7
Pyridoxine (Vitamin B_6)	mg	0.4	0.22	55.0	0.21	53.6	0.15	36.8	0.1	36.8	0.32	80.6	0.23	56.7	0.21	51.4	0.26	64.7
Folate, total	mcg	25	64.09	256.4	72.12	288.5	16.66	66.6	16.1	64.4	43.01	172.1	59.75	239.0	78.1	312.4	65.07	260.3
Vitamin B_{12}	mcg	0.2	0.00	0.0	0.00	0.0	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Vitamin C	mg	25	0.00	0.0	0.00	0.0	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
beta-Carotene	mcg	2800	147.09	5.3	149.52	5.3	174.29	6.2	156.2	5.6	284.00	10.1	176.08	6.3	99.40	3.6	159.75	5.7
Vitamin A	mcg	350	0.00	0.0	0.00	0.0	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Calcium	mg	500	58.49	11.7	81.12	16.2	146.57	29.3	139.2	27.8	37.76	7.6	48.89	9.8	50.92	10.2	56.79	11.4
Iron	mg	5	3.25	64.9	3.30	65.9	1.56	31.2	1.3	26.2	3.50	70.0	2.62	52.5	2.99	59.8	3.60	72.0
Magnesium	mg	45	117.96	262.1	128.85	286.3	87.48	194.4	85.7	190.3	178.15	395.9	120.84	268.5	129.08	286.8	149.44	332.1
Zinc	mg	0	2.52	N/A	2.52	N/A	2.33	N/A	2.2	N/A	4.06	N/A	2.55	N/A	2.35	N/A	3.19	N/A

Note: While zinc is recommended in the ICDS guidelines, it is not highlighted in this table as there is no ICMR-specified RDA for children 6-12 months of age.

TABLE 5: Comparison of State THR[7] Foods with ICMR RDA[7], Ages 6-12 months

This table shows THR product for pregnant women across five states. ICDS guidelines stipulate that THR should include 50% of the ICMR RDA for nine essential micronutrients: Iron, calcium, folic acid, zinc, and vitamins A, B1, B2, B3, and C. Percentages highlighted in green show where THR product meets this requirement, and percentages highlighted in red demonstrate where THR does not meet the ICDS guidelines. Micronutrients that are not highlighted are not included in ICDS guidelines.

NUTRIENT	UNIT	ICMR-PW	AMYLASE RICH FOOD UTTAR PRADESH (PLW)	% ICMR RDA (PW) % RDA	KHICHADI RAJASTHAN	% ICMR RDA(PW) % RDA	THR-EDEF UPMA-RAJASTHAN	% ICMR RDA (PW) % RDA	THR RAJASTHAN - EDEH-DESHI MITHAI	% ICMR RDA (PW) % RDA	THR ODISHA CHHATUA	% ICMR RDA (PW) % RDA
Quantity, g			140			125		142		200		
Energy		2250.0	534.66	23.76	306.90	13.64	612.26	27.21	636.93	28.31	747.70	33.23
Protein	g	82.20	14.32	17.43	8.66	10.54	14.87	18.09	15.13	18.41	21.12	25.69
Total Fat	g	30.00	13.07	43.58	5.53	18.44	38.52	128.39	28.39	94.62	10.17	33.90
Thiamine (Vitamin B1)	mg	1.6	0.38	23.75	0.09	5.63	0.38	23.75	0.34	21.25	0.28	17.5
Riboflavin (Vitamin B2)	mg	2.0	0.15	7.50	0.05	2.50	0.14	7.00	0.12	6.00	0.13	6.5
Niacin (Vitamin B3)	mg	18	2.13	11.83	1.29	7.17	1.94	10.78	1.73	9.61	4.94	27.4
Pyridoxine (Vitamin B6)	mg	2.50	0.27	10.85	0.10	4.08	0.23	9.14	0.21	8.22	0.25	10.12
Folate, total	mcg	500.00	92.13	18.43	21.06	4.21	77.30	15.46	78.11	15.62	30.07	6.01
Vitamin B12	mcg	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vitamin C	mg	60.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carotenoids	mcg	6400.00	200.53	3.13	9.78	0.15	136.32	2.13	99.40	1.55	21.09	0.33
Vitamin A	mcg	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calcium	mg	1200.00	71.82	5.99	11.68	0.97	51.41	4.28	50.92	4.24	34.06	2.84
Iron	mg	35.00	3.07	8.78	1.05	2.99	3.02	8.64	2.99	8.54	3.32	9.50
Magnesium	mg	310.00	138.16	44.57	37.54	12.11	137.58	44.38	129.08	41.64	98.93	31.91
Zinc	mg	12.00	2.73	22.74	1.13	9.38	2.60	21.64	2.35	19.59	3.24	27.03

TABLE 7: Energy and Energy Source for THR, Ages 6-36 months

International recommendations on the percentage of recommended energy from each component in complementary foods for children aged 6-36 months, and the corresponding measurements from THR in five states. The excessive sugar content is worth noting.

AREA	PROGRAM	TOTAL ENERGY (KCAL)	% ENERGY FROM PROTEINS	% ENERGY FROM FATS	% ENERGY FROM CARBS	% CALORIES FROM SUGARS
Recommended Standards						
International Guideline	WHO, UNICEF	550 (12-23 mo)	20 to 30%	35%-45% Not below 30%	7.5 g/100 kcal= 30% [38]	<10%
International Recommendation	Suthutvoravut et al (2015)	1.6–2.7 g/100 kcal	N/A	40% -54% 4.4–6.0 g/100 kcal	36% -56% 9–14 g/100 kcal with >50% from lactose	<10% of total carbohydrates
National Guideline	ICDS, 2009	500		9.6-12%		
State and Regional Take-Home Ration (THR) Programs						
Uttar Pradesh	Weaning/Poshanahar	514.2	10.65%	31.31%	58.04%	24.31%
Uttar Pradesh	Amylase Rich Food	496.8	10.99%	33.27%	55.74%	24.15%
Rajasthan	Panjiri	478.7	8.95%	8.95%	70.29%	30.08%
Rajasthan	Deshi Mithai (EDEFH)	618.9	9.78%	38.37%	51.85%	22.62%
Odisha	Chhatua	564.1	10.65%	13.62%	75.73%	17.73%
Kerala	Amrutham Nutrimix	454.5	13.62%	18.39%	67.99%	22.00%
Telangana	Balamrutham + 13.3g egg	425.4	9.59%	26.61%	63.80%	18.81%
Telangana	Balamrutham	398.4	8.45%	25.25%	66.30%	20.08%

Governance and Management

This is an abridged article based on the Pharos Global Health Advisors' policy brief for Tata Trusts - The India Nutrition Initiative. Reproduced with permission.

Key messages

- India's progress towards achieving its nutrition targets faces multiple challenges, which include governance constraints, poor accountability and lack of performance management, limited use of data to improve programmatic effectiveness, and insufficient quality assessment systems.
- Effective implementation of the National Nutrition Mission will improve functioning of the Integrated Child Development Services and the Take-Home Ration administration.
- A formal performance management system with well-defined roles and responsibilities, accountability mechanisms, and monitoring systems can ensure effective implementation.
- Quality of Take-Home Rations can be improved by implementing regular, localized and independent quality assessment systems to check production, community level access and uptake of the product. Monitoring data can be utilized to inform programmatic improvement.

Introduction

The foundations of effective programs involve strong governance, performance management, data monitoring and review systems, and quality assessment. For Integrated Child Development Services (ICDS), for instance, these systems laid the groundwork for the gains in nutrition outcomes seen over recent decades. Increasingly, however, there is agreement that improvements in existing systems, or the development and implementation of these systems in situations where they do not yet exist, could be catalytic and lead to substantial impact in improving malnutrition.

This article outlines the research undertaken by Pharos and Tata Trusts - The India Nutrition Initiative on malnutrition and the challenges faced by ICDS and the Take-Home Ration (THR) system across five Indian states i.e. Rajasthan, Uttar Pradesh, Odisha, Andhra Pradesh and Kerala. It goes on to highlight opportunities for improvement, offering recommendations for policymakers to consider both at state and central levels.

Governance

Recommendation 1

States should consider ensuring effective implementation of National Nutrition Mission (NNM) to optimize multi-sectoral convergence and coordination to improve functioning of ICDS and THR administration.

Three key challenges in governance were observed at the national, state, and local levels, where programmatic service delivery is overseen. First, effective co-ordination within relevant ministries involved in nutrition related initiatives, especially the National Health Mission, Ministry of Health, ICDS, and Ministry of Women & Child Development (MWCD). Second, prioritization and ownership of the nutrition agenda, wherein actors eager to champion nutrition initiatives are limited by insufficient political will or by conflicting priorities among other government institutions. This results in diffusion of responsibility and lack of clarity over roles and ownership. Third, limited technical and nutrition-specific capacity within MWCD was highlighted as a significant hinderance during conversations with multiple stakeholders.[1,2]

It is useful to draw lessons from the multi-sectoral convergence mechanisms in the State Nutrition Missions (SNM) to inform implementation of the National Nutrition Mission. The SNM is a multi-sectoral governance body that aims to raise awareness and prioritization of nutrition across the political and bureaucratic systems, to cultivate the political will and environment necessary to improve service delivery, and ultimately

improve the nutrition status of target beneficiaries. SNMs have been implemented in multiple states beginning with Maharashtra in 2005 and have experienced success in championing nutrition agendas and improving the necessary governance to enable enhanced programmatic outcomes.

"Actors eager to champion nutrition initiatives are limited by insufficient political will."

Enabling factors identified as helpful in fostering SNMs' success[3] include:

- Political will and engagement of civil society and community members.
- Oversight and coordination mechanisms across sectors under the guidance of strong leadership.
- Creating a culture and strategy that enables actors throughout the nutrition value-chain to innovate and adapt to the specific challenges.
- Coordinating across government departments, aligning goals and strategy, and fostering collaborative efforts.
- Engaging non-governmental actors who are critical for funding of nutrition initiatives.

The lessons of SNMs are particularly relevant to the recent launch of NNM. Notably, NNM's structure can be leveraged to advance the nutrition agenda at both the national and state levels.

Performance Management System

Recommendation 2

Develop and implement a formal ICDS performance management system, clearly defining roles, responsibilities, metrics, and accountability mechanisms for all staff.

All ICDS staff cadres are committed to the mission of improving the health, education, and well-being of young children, adolescent girls, and pregnant and lactating women (PLW).[4] However, a systematic lack of accountability remains a key barrier to programmatic effectiveness; only rarely is the staff held accountable to achieving targets. This lack of accountability manifests in multiple ways across ICDS, varying across states, including a work culture that is not impact-oriented, persistent tardiness and absenteeism, achievement of only partial work responsibilities, and significant pilferage and leakage of THR.[5,6,7,8,9,10]

Performance management systems have been demonstrated to improve accountability and programmatic effectiveness (Figure 1).[11] In structuring such a mechanism, the following considerations are recommended:

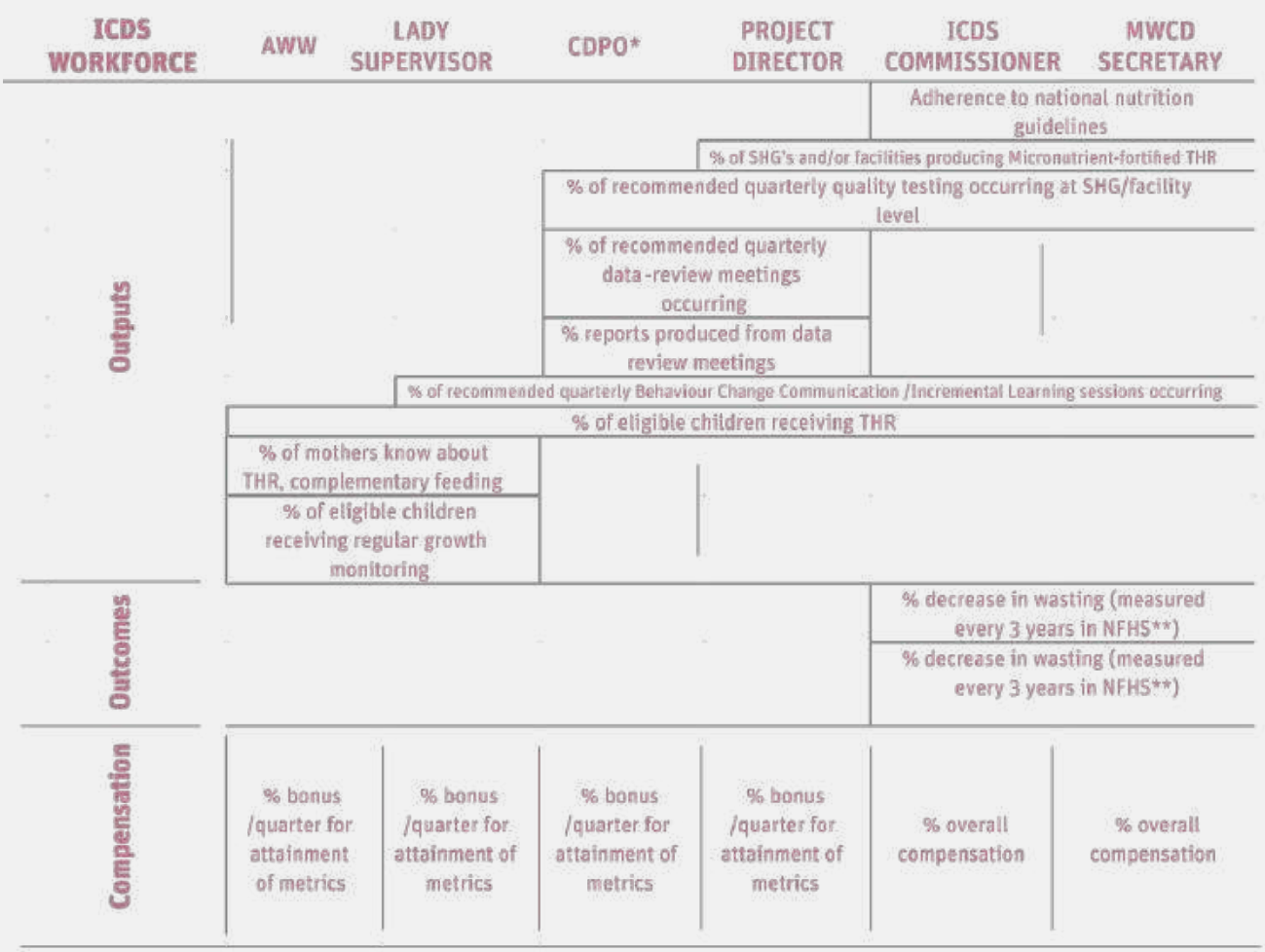
1. Inclusion of All Staff: Performance management systems that hold certain staff accountable to metrics, but not others, are often unsuccessful. The programmatic goals and incentive structures for all staff must be aligned to foster collaboration and ensure that challenges across the value chain are addressed simultaneously. Most importantly, the senior-most leadership must also be included to ensure top-down support and buy-in.

2. Transparency and Regular Feedback Mechanisms: All staff should be familiar with metrics they will be held accountable to, should be provided regular feedback on progress towards targets, and should understand how achievement of such targets will impact incentivization schemes.

3. Incentivization: Frontline Workers (FLWs) should be awarded for achievement of targets through bonuses. This helps align incentives and does not inequitably penalize staff cadres who already receive limited compensation and have less control of challenges across the nutrition value chain. Senior leadership of the program could alternatively be held accountable by tying a percentage of overall compensation to achievement of targets, which can further foster top-level buy-in and championing of programmatic improvement.

4. Outputs and Outcomes: FLWs should be held accountable for proximal output measures, which they are able to have direct and actionable impact upon, in their daily responsibilities. Conversely, senior leadership may be held accountable to more distal output and outcome measures to align incentives with actual programmatic effectiveness in achieving strategic priorities.

FIGURE 1: Sample ICDS Performance Management System



*Child Development Project Officer
**National Family Health Survey

5. Fostering Collaboration by Aligning Metrics: Metrics for one staff cadre should, in part, match or overlap with metrics for staff who report to them are held accountable for. This fosters collaborative effort and aligns incentives of both managers and staff, and broadly can help to ensure that the challenges FLWs face daily are understood and addressed by more senior managers and leadership.

Figure 1 provides an example of what an ICDS performance management system could look like and can be considered as an entry point into further discussions to operationalize such a system.

Data Monitoring and Review Systems

Recommendation 3

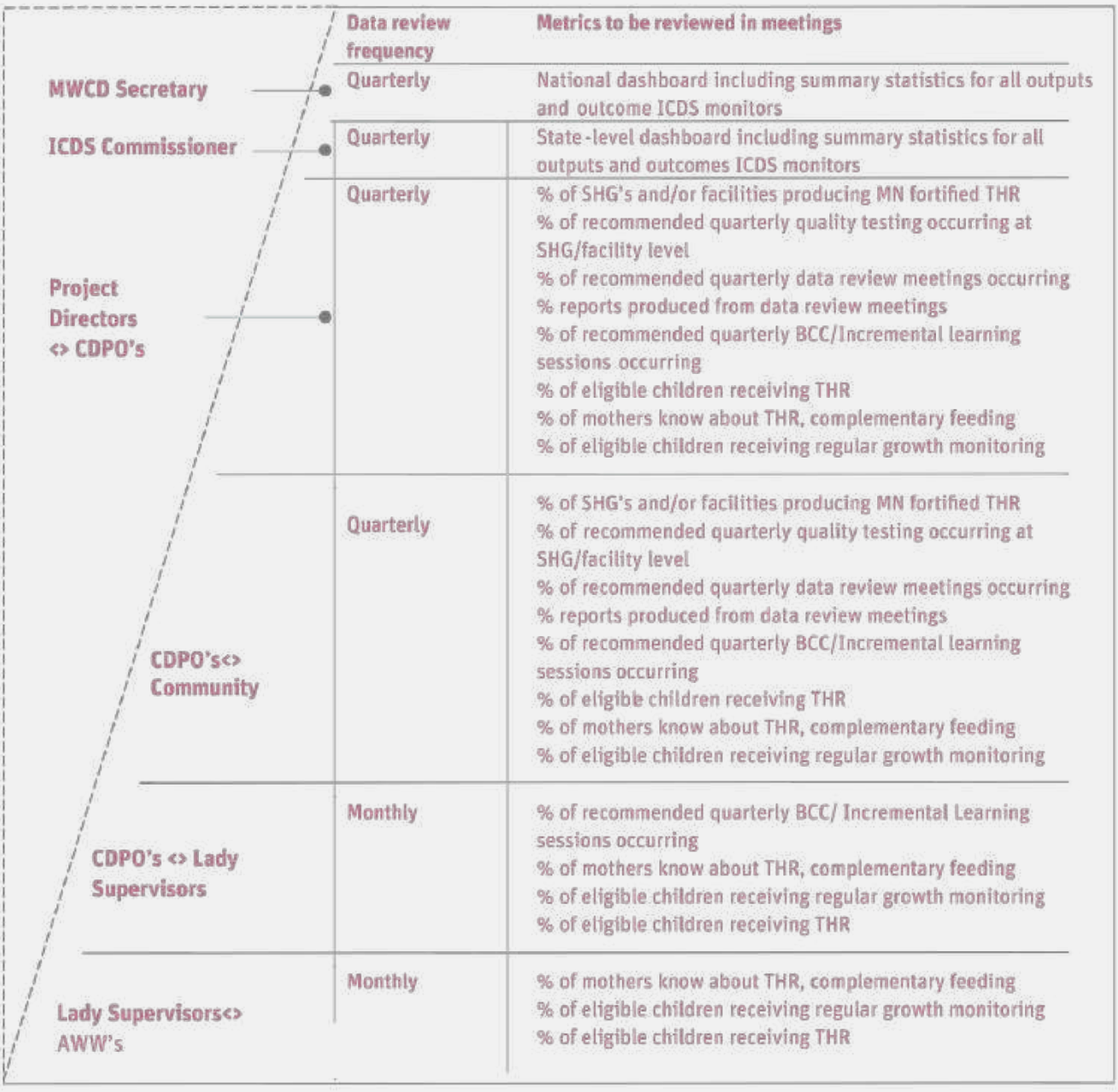
Develop and implement a formalized mechanism to regularly monitor and review data generated throughout the ICDS system.

Significant data is generated in the ICDS system. This includes registers filled out daily by Anganwadi Workers (AWWs), and, in certain locations, lab data examining quality and composition of THR produced. Additionally, Information and Communication Technology Enabled Real Time Monitoring through the ICDS Common Application Software (ICDS-CAS) is being rolled out in a phase-wise manner across India, beginning in

2017 with the highest-priority districts. However, there are fewer examples of robust mechanisms in place that a) regularly review data, b) use data to provide feedback on performance to FLWs, and c) capacitate FLWs to use feedback received from the data to inform programmatic improvement initiatives. Additionally, only in isolated cases is the data directly tied to any formal governance structure, performance management system, or awarding of contracts (e.g. in the case of THR production contracts).

While registers currently used to collect data can be cumbersome, unreliable, and require significant manual effort to review data regularly, the ICDS-CAS is fundamentally changing data availability, making it readily accessible for review through digital dashboards. ICDS-CAS is monitoring over 50 metrics, including health and engagement of young children, adolescent girls, PLW, behaviour change interventions, and SNP service delivery and reach.[12,13] It provides an excellent foundation for managers and senior leadership of SNP to better understand challenges at all levels of the nutrition value chain. The software also creates an important platform to add or adjust metrics tracked as programs evolve and monitoring systems need modifications. To lever-

FIGURE 2: : Sample ICDS Data Monitoring and Review System



CDPO: Child Development Project Officer | MN: Micronutrient | BCC: Behaviour Change Communication

age this data however, a regular data monitoring and review system must be formalized and implemented.

Figure 2 provides a sample of what a data monitoring and review system for ICDS staff across the board could look like. Some key considerations include:

1. Regularity: All staff cadres should regularly review data. This empowers staff with the information they need to identify areas for growth and simultaneously maintains accountability to programmatic targets (and can be paired with performance management mechanisms).

2. Frequency of Review: While certain metrics may be expected to change in the short-term (e.g. percentage of eligible beneficiaries who have received THR), other metrics may only be relevant to monitor on a yearly or even less frequent basis (e.g. percentage of stunting nationwide).

3. Transparency: To align incentives across ICDS, and to empower staff to succeed in achieving strategic targets, metrics that staff are evaluated upon should be readily available through their regular data review processes.

4. Community Engagement: Regular meetings could be held with community members to share progress and challenges on nutrition targets and provide an opportunity for community engagement and to co-own local nutrition priorities.

The Incremental Learning platform – a system designed to continuously improve frontline ICDS staff capacity and abilities[14] and now a part of the NNM – incorporates aspects of such quality improvement practices and is an important example of operationalizing data collected to improve ICDS programmatic effectiveness. Platforms such as the Incremental Learning initiative should be expanded and, if linked to strong governance and performance management, would be an excellent step in achieving the NNM's targets.

"Significant quality related challenges remain including limited testing, especially through external, independent, parties."

Quality Assessment of THR

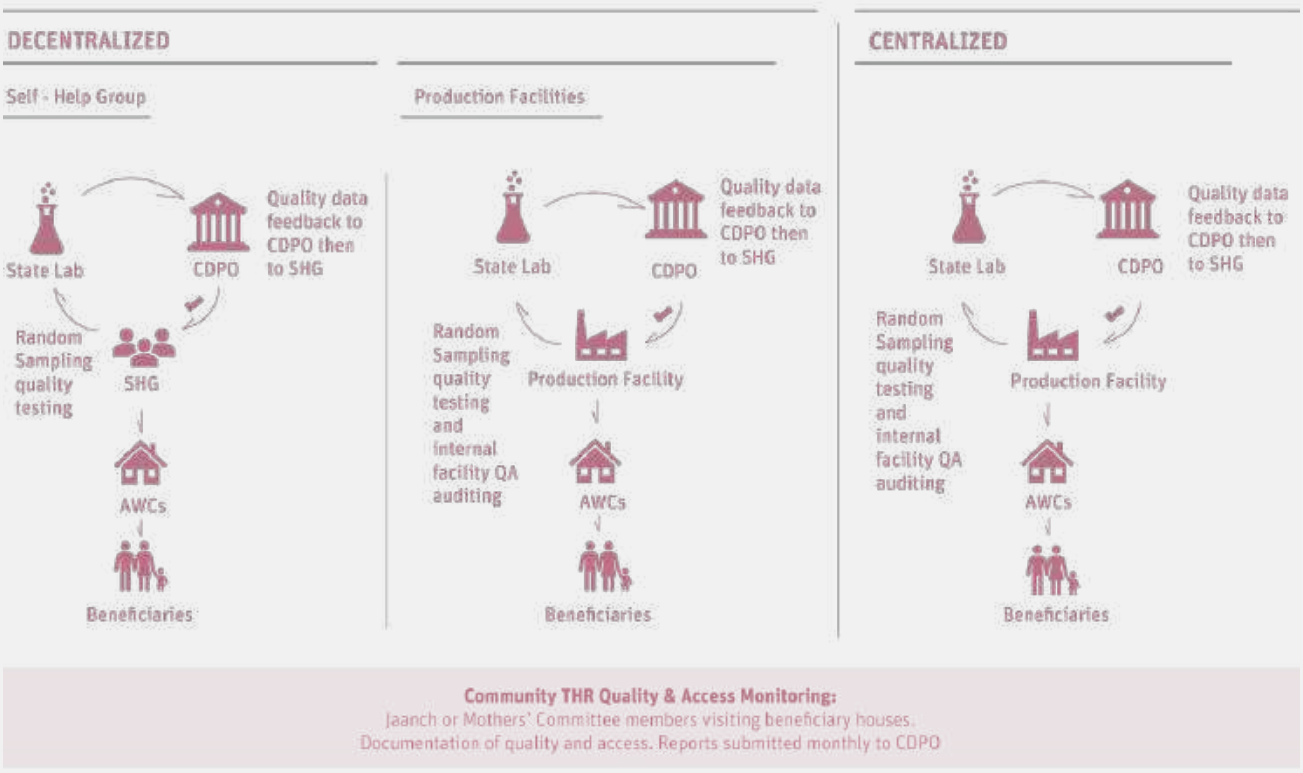
Recommendation 4

Implement a regular, localized, independent quality assessment system that evaluates quality of THR produced and monitors community-level access and uptake, and feeds data back into the ICDS system to inform programmatic improvement.

The quality of THR produced varies significantly across and within states, as does the ability of beneficiaries to access THR regularly. Central guidelines through the Food Safety and Standards Authority of India (FSSAI) provide broad regulatory guidance. States further provide specific guidelines for their own production and distribution models, though there is variation in the degree to which state government policies are fully implemented at the local level. Some notable examples of state guidelines include Odisha's THR guidelines[15] that offer an excellent template for decentralized SHG quality testing and improvement; Kerala's Kudumbashree system, which offers an important example of quality testing in the decentralized production facility model;[16] and Telangana Foods that has strong quality standards in a centralized production model.[17] Nonetheless, significant quality related challenges remain including limited testing, especially through external, independent, parties, within these states and in other states,. Additionally, anecdotal as well as documented research shows significant limitations in access to beneficiaries across both centralized and decentralized models with frequent break-downs in the supply chain, resulting in stockouts of THR at the Anganwadi Centers.[18,19] While existing policy stipulates that quality and access challenges should not be barriers to improved nutrition, an enhanced quality assessment system will be required to address these challenges more meaningfully. A quality assessment system will need to address both the quality of the THR product, as well as access to THR for beneficiaries, and therefore requires components at both the production and the community levels.

Figure 3 provides an example of what such a system could look like.

FIGURE 3: A sample of THR Quality Assessment and Community Monitoring System



- Regular, Random and Independent Testing: Feasible quality testing of THR product should be done randomly, and should be verified by independent external parties. Quality testing should assess a) food safety, b) micronutrient composition c) macronutrient composition, and d) moisture levels.

- Producer Process Reporting: In all models, states should consider the feasibility of producers submitting a quarterly report detailing different aspects of their production protocol, including where raw materials are stored, where the THR product is stored, maintenance of production machinery and any other process indicators that could impact the quality of the THR product.

- Data Feedback: Quality testing data should be channelled back through the ICDS system to ensure that producers understand where product can be improved and are provided with timely, actionable data to do so. Similarly, such data should be used by local ICDS officials to ensure contracts are awarded and/or renewed only to producers who maintain consistent quality.

- Community-Level Testing To Ensure Access And Uptake: Many states that do have quality systems in place focus primarily on quality of product, however this misses identification of important barriers to access, including supply chain challenges, and poor acceptability due to taste, texture, or other preferences. Thus, quality systems should also incorporate community-level monitoring of access as well as uptake, and this data should similarly be routed back into the ICDS system to ensure it can lead to programmatic improvement.

Conclusion

As described, there are clear paths forward for many of these challenges, which together can help to improve SNP programmatic effectiveness. The most important challenges to address include enhanced governance, most directly through the implementation of the NNM; improved accountability, through the implementation of a performance management system; expanded use of data through robust data monitoring and review systems; and finally, bolstered quality assessment systems to address THR production quality, access, and uptake.

As the NNM and policymakers look ahead, these recommendations provide a roadmap for improving the ICDS and THR systems, and collectively, can be the foundation upon which India continues to make progress towards its Vision 2022 targets.

References

1. Partnerships and Opportunities to Strengthen and Harmonize Actions for Nutrition in India (POSHAN). Working Multi-sectorally to Improve Nutrition: Global Lessons and Current Status in India (2014)
2. Stakeholder conversations and key informant interviews, by authors
3. UNICEF. Lessons from the State Nutrition Missions of Maharashtra and Uttar Pradesh. (2016). Retrieved from https://www.r4d.org/resources/lessons-state-nutrition-missions-maharashtra-uttar-pradesh/ (Accessed April 2020)
4. Niti Aayog. Nourishing India: National Nutrition Strategy, Government of India (2017)
5. Andrew Fraker, Neil Buddy Shah, & Abraham, R. Quantitative Assessment: Beneficiary Nutritional Status and Performance of ICDS Supplementary Nutrition (2013)
6. Child in Need Institute. USAID. Performance Needs Assessment of Integrated Child Development Services Scheme in Jharkhand. (2012)
7. Department of Women and Child Development, & Government of Odisha. Decentralisation of ICDS Supplementary Nutrition Programme: Ensuring timely and quality nutrition to all beneficiaries in Odisha (2015)
8. Dr. N.C. Saxena. Report of our Principal Adviser, Biraj Patnaik, with reference to SLP (Civil) No. 10654 of 2012 in the matter of Vyankateshwar Mahila Auyodhigik Sahakari Sanstha v. Purnima Upadhyay and Others listed along with Civil Writ Petition 196 of 2001 (PUCL v. UOI) (2012)
9. Schwarz, R. K., Briskin, E. A., Flanagan, K. F., Dodd, N., Soe-Lin, S., & Hecht, R. M. ICMR and ICDS Guidelines & THR Formulation and Composition – Challenges and Opportunities for Improvement. Policy Brief 2. Pharos Global Health Advisors (2018)
10. Flanagan, K. F., Schwarz, R. K., Soe-Lin, S., & Hecht, R. M. THR Production & Distribution Models: Overview. Policy Brief 4. Pharos Global Health Advisors (2018)
11. Cappelli, P., & Tavis, A. The Performance Management Revolution. Harvard Business Review (2016)
12. Ministry of Women and Child Development. ICDS CAS: AWW User Manual. In Government of India (Ed.)
13. Ministry of Women and Child Development. ICDS CAS: Dashboard Manual. In Government of India (Ed.)
14. Ministry of Women and Child Development, & Government of India. Guidelines For Implementation of Incremental Learning Approach (2018)
15. Government of Odisha. Odisha Take Home Ration Guidelines. (2017.) Retrieved from http://wcdodisha.gov.in/Application/uploadDocuments/plugin/ doc20170527_113230.pdf (Accessed April 2020)
16. Dr. N.C. Saxena. Report of our Principal Adviser, Biraj Patnaik, with reference to SLP (Civil) No. 10654 of 2012 in the matter of Vyankateshwar Mahila Auyodhigik Sahakari Sanstha v. Purnima Upadhyay and Others listed along with Civil Writ Petition 196 of 2001 (PUCL v. UOI) (2012)
17. Government of Telangana. Balamruthma- Weaning food for children between 7 months and 3 years. (2014.) Retrieved from http://wdcw.tg.nic.in/Balamrutham.html (Accessed April 2020)
18. Dr. N.C. Saxena. Report of our Principal Adviser, Biraj Patnaik, with reference to SLP (Civil) No. 10654 of 2012 in the matter of Vyankateshwar Mahila Auyodhigik Sahakari Sanstha v. Purnima Upadhyay and Others listed along with Civil Writ Petition 196 of 2001 (PUCL v. UOI) (2012)
19. Leyvraz, M., Wirth, J. P., Woodruff, B. A., Sankar, R., Sodani, P. R., Sharma, N. D., & Aaron, G. J. High Coverage and Utilization of Fortified Take-Home Rations among Children 6-35 Months of Age Provided through the Integrated Child Development Services Program: Findings from a Cross Sectional Survey in Telangana, India. PLoS One, 11(10), e0160814. doi:10.1371/journal.pone.0160814 (2016)

Production Models

This is an abridged article based on the Pharos Global Health Advisors' policy brief for Tata Trusts - The India Nutrition Initiative. Reproduced with permission.

Key messages

- There are three types of Take-Home Ration production models – centralized facility, de-centralized facility, and decentralized Self-Help Group. States using the decentralized model should consider awarding contracts to Self-Help Groups at the block level to enable consortium purchasing mechanisms, build capacity, and develop skills of group members based on grades and certifications. This will optimize production, guarantee financial viability, and improve quality of Take-Home Rations.
- Centralized production facilities can be held accountable for down-stream access gaps (such as stockouts, late and inconsistent supply), with a portion of overall compensation tied to access.
- States should consider transitioning all Integrated Child Development Services payments to an e-payment system to minimize delays in producer payments.
- Producers should consider monitoring all steps of production and distribution through an electronic monitoring system to improve operational efficiency.

Introduction

Different states in India employ different Take-Home Ration (THR) production models, each of which face challenges with accountability, leakage, and quality. This article presents four actionable recommendations through which distribution systems could be greatly improved, ensuring better access to high-quality THR.

THR production and distribution is the responsibility of the state, and have flexibility in THR production within overarching norms laid out by Integrated Child Development Services (ICDS).[1] The basic process is illustrated in figure 1. Every step of the THR production and distribution value chain is critical to ensuring a high-quality and nutritious THR product that reaches all Supplementary Nutrition Programme (SNP) beneficiaries. This article identifies challenges across the value chain and recommends steps to improve efficiency.

THR Production Models

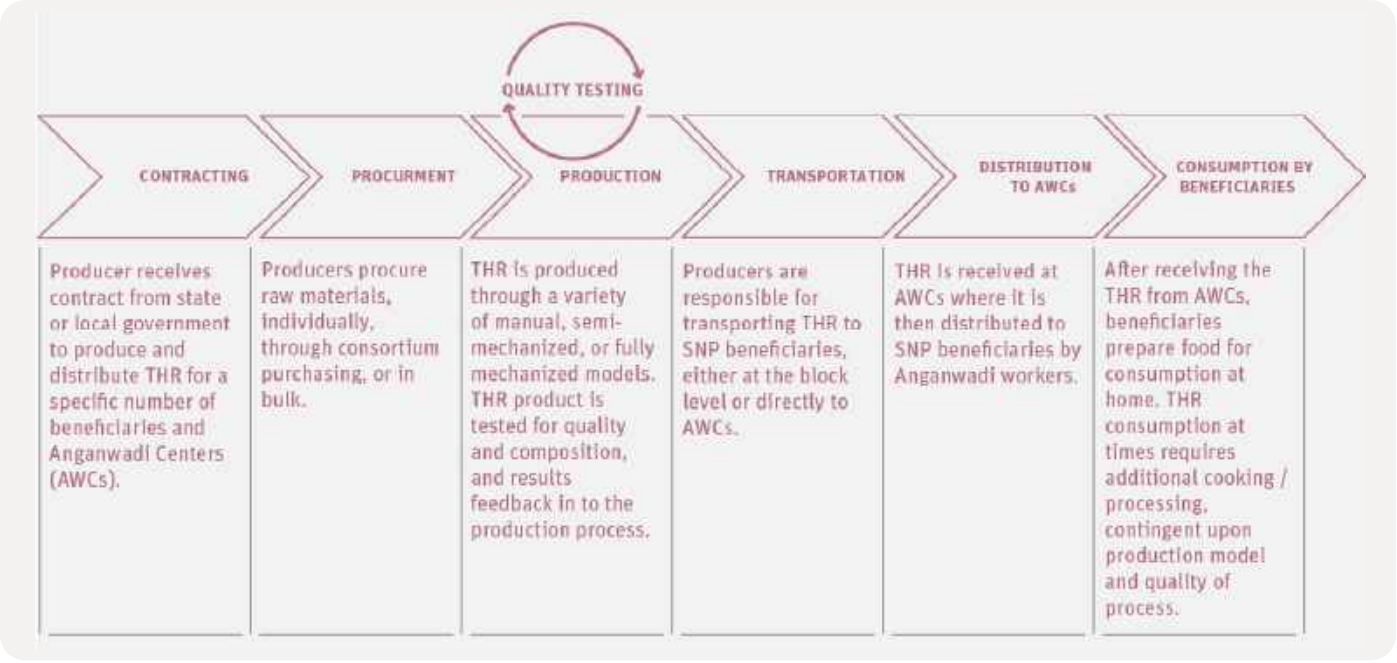
Today, three models of THR production and distribution exist across India:

1. Centralized Production Facility: In this model, one production facility is contracted to produce and distribute THR for an entire state. These facilities procure the raw ingredients for all orders, often have in-house quality testing, and transport the THR to communities (typically at the block level). Centralized facilities can be run either by state governments (Telangana, Madhya Pradesh) or by a federated cooperative society (Gujarat).

2. Decentralized Production Facility: In this model, producers are typically contracted to produce THR for Anganwadi Centres (AWCs) across multiple communities or at the block level. These production facilities are run by SHGs who are responsible for procurement of raw materials, production and distribution to AWCs or the Child Development Project Officer (CDPO) office. They may also form federations or consortia and work together for larger scale production (Kerala).

3. Decentralized Self-Help Group: These are micro-initiatives where SHGs produce THR to cover typically one or two AWCs (Rajasthan). Ingredients are procured locally; production is usually manual with limited or no automation. There is little to no quality testing done in this model.

FIGURE 1: THR Production and Distribution Value Chain



Challenges and Opportunities

While in the past the Supreme Court has encouraged decentralization, there are both opportunities and challenges that each of the three existing models face, as shown in table 1. This article discusses the challenges and opportunities of each individual model in detail while recommending policy initiatives to improve each of the three models.

In addition to challenges that affect each model individually, broader challenges in production and distribution exist that impact all models, as demonstrated in figure 2.

FIGURE 2: THR Production and Distribution Value Chain: Gaps and Bottlenecks

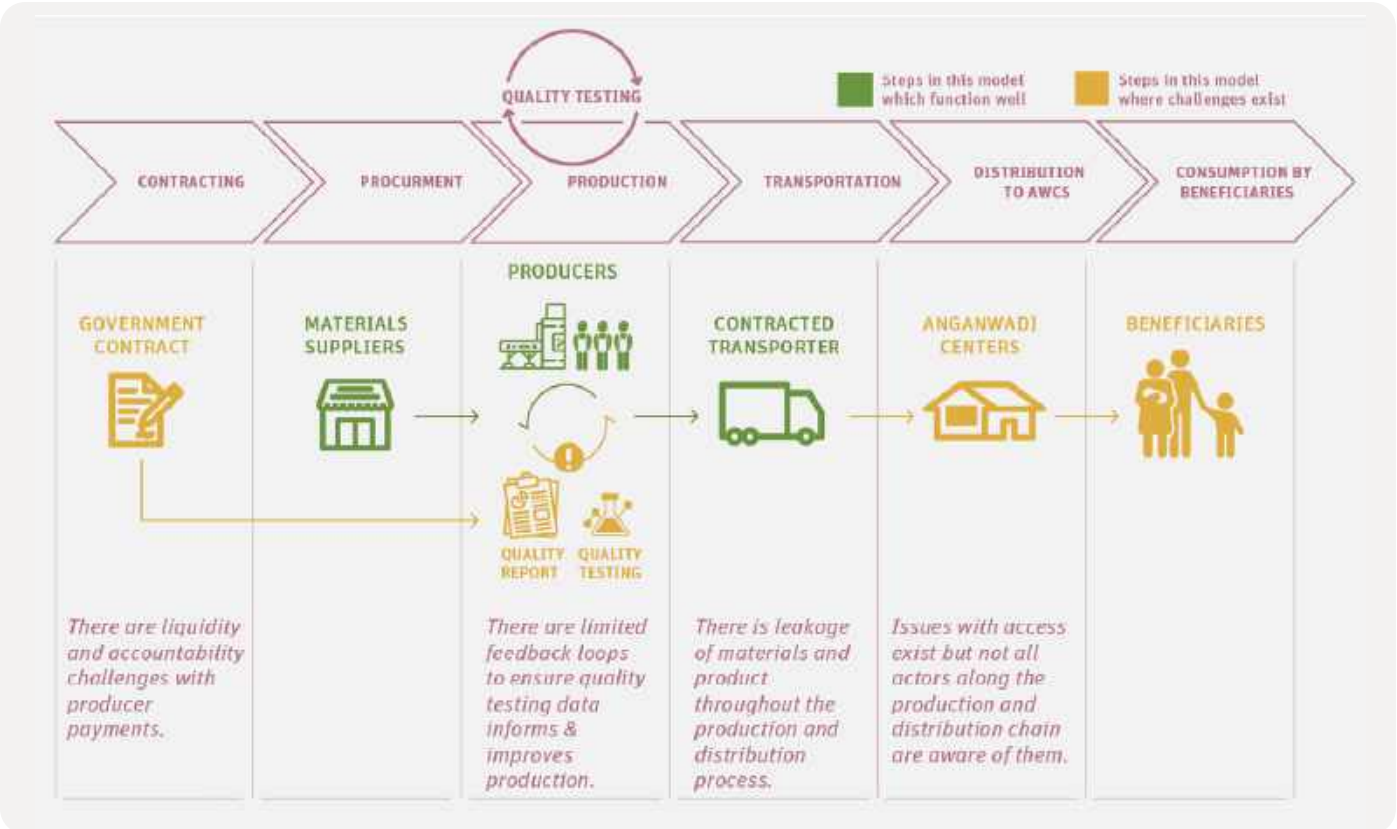


TABLE 1: . Challenges and opportunities in the three production and distribution models

	DECENTRALIZED SELF-HELP GROUPS	DECENTRALIZED PRODUCTION FACILITIES	CENTRALIZED PRODUCTION FACILITIES
Opportunities	• Enhanced community ownership of THR production • Promotes income-generating activities and female empowerment • Improves THR access in rural areas	• Provides economies of scale • Produces THR with high nutrient value through the addition of micronutrient premix • Enhanced community ownership of THR production • Promotes income-generating activities and female empowerment	• Provides economies of scale • Produces THR with high nutrient value through the addition of micronutrient premix • Greater potential to ensure a high- quality product
Challenges	• Fortified food products and micronutrient premix are not typically used in THR production • Small contracts and margins result in challenges with financial viability • Few decentralized states have mechanisms to improve quality of THR product or to improve SHGs skills	• Lack of guaranteed contracts and demand from ICDS • Limited management experience in SHGs • Delayed feedback from external quality testing leading to limited impact of results on THR production	• THR is not reaching all beneficiaries, particularly those in rural areas • Corruption and poor quality are seen in some privatized centralized facilities

1. Liquidity and accountability challenges with producer payments: Delays in payment were common across states with some producers reporting delays of over six months. Such delays can be challenging, particularly for SHGs and decentralized production facilities that have limited liquidity and rely heavily on monthly payments to continue their production process. Producers with e-payment mechanisms, however experienced better payment regularity.[2]

   The e-payment system is distinguished by enhanced transparency and accountability in transactions, which would also benefit the ICDS system and address ongoing challenges with leakage and pilferage. Some states already use e-payment systems. For example in Odisha, e-payments are deposited into a bank account that has been set up specifically for the SHG; the SHG leadership then distributes funds to all members. Liquidity challenges improved under this system.[3]

Recommendation 1

States should consider transitioning all ICDS payments to an e-payment system to minimize delays in producer payments.

2. Leakage of materials and product throughout the production and distribution process: Beneficiaries and Anganwadi Workers (AWW) reported that THR is not being received at the prescribed

frequency and quantity. Tracking pilferage manually, however, is difficult.

Several examples of electronic tracking mechanisms successfully addressed supply chain issues by monitoring raw materials and THR product using Aadhaar4 and barcoding systems.[5]In Gujarat, all materials are tracked through a scannable barcode across the THR supply chain.[5] Barcoding is also compatible with the new Common Application Software - Requirement Traceability Matrix system that all AWWs had by the end of 2019. This created a further opportunity to leverage electronic tracking mechanisms to decrease pilferage and leakage.[6]

3. Existing quality control methods have limited success in improving THR standards: Testing of THR products is rarely standardized, or utilized to inform subsequent production practices. However, certain examples are instructive as to how states could improve practices in this regard. In Kerala, decentralized production facilities have samples of their THR tested by an external laboratory. Results are then communicated to the local CDPO with a mandate to improve quality. Underperforming facilities are required to improve their production within a timeframe or contracts are terminated.[7] This feedback loop ensures that production facilities have the necessary information and are held accountable into changing their THR production processes when quality is inadequate.

Recommendation 2

Producers working closely with state levels ICDS officials should consider monitoring all steps of production and distribution via an electronic monitoring system to improve operational efficiency.

The following sections will provide a deeper look into the opportunities and challenges for each of the production models.

Quality Assessment of THR

Opportunities

There is greater community ownership

SHGs are community-based financial intermediary committees that typically consist of ten to twenty women.[8,9,10,11] In addition to financial savings and lending activities, SHGs also engage in income-generating activities, and in multiple states are the primary producers of THR.[12,13] Frequently, the children of SHG members and their neighbours receive the THR.[14] This increases accountability and incentivizes SHG members to produce a high-quality THR product, and theoretically to also minimize leakage and pilferage, in an effort to ultimately improve the nutrition of their families and communities. Another benefit of the decentralized SHG production model is that THR is produced locally and recipes may be adjusted according to local preferences, thereby improving acceptability of the product.

Profit made from THR production is retained by SHG members, increasing household income, and ultimately improving the wellbeing of those families. Having such a role in the community also cultivates respect among community members for SHG members.[11,12,13,15]

Access is improved

Each SHG typically supplies THR to one or two AWCs within their local communities. Therefore, even rural AWCs will have THR that has been produced locally. SHGs are also responsible for delivering the THR directly to the AWC, increasing SHG accountability for SNP beneficiary access. During state visits and key informant interviews, anecdotally, it was reported that there are fewer access challenges in this model than in more centralized models. Limited data exists to substantiate or refute this claim which could be an area for further research.

Challenges

Despite potential opportunities, SHGs also face a number of challenges across the production and distribution value chain, as shown in figure 3.

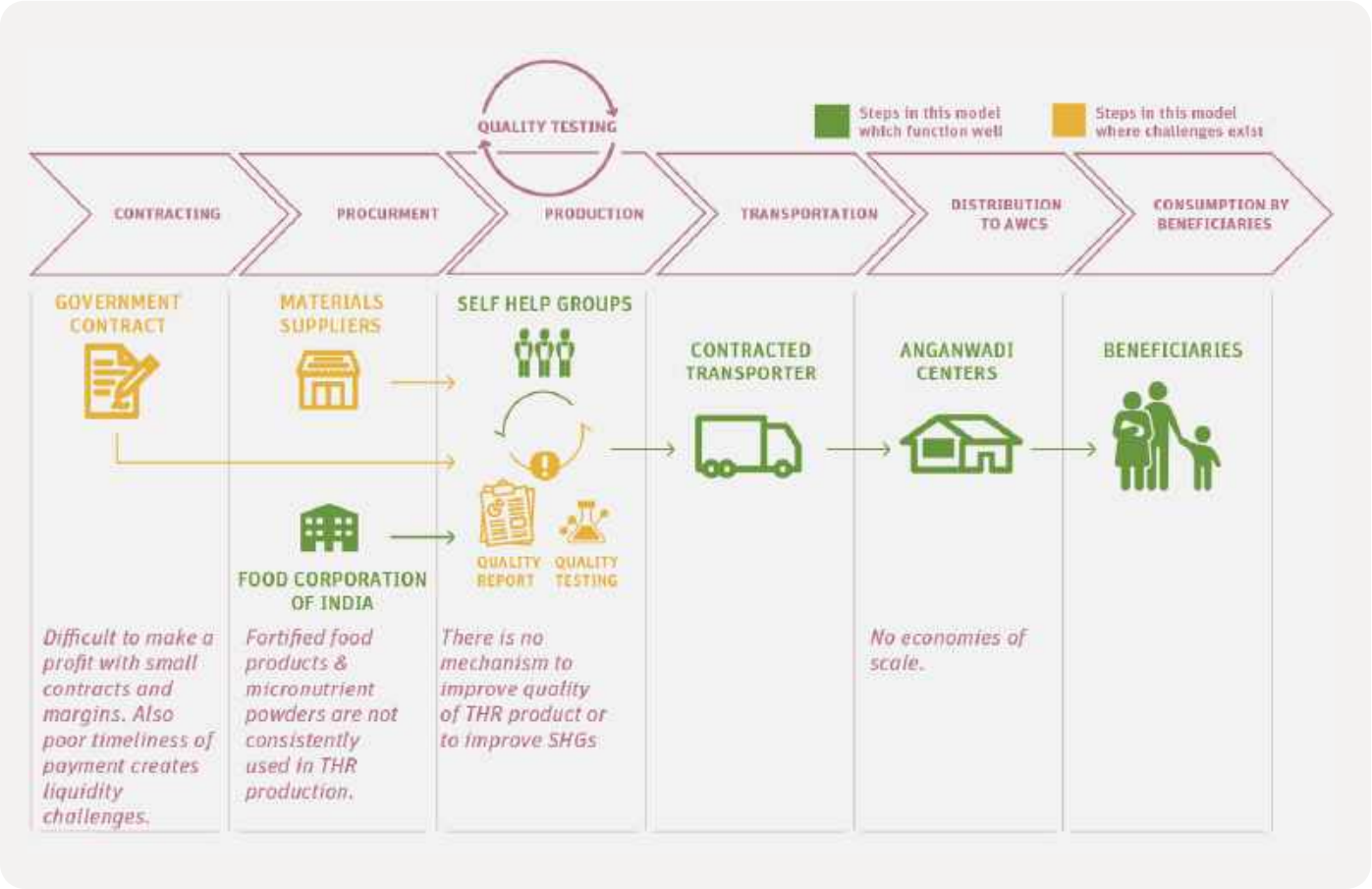
Fortified food products and micronutrient powders not used in THR production

Fortified raw materials and micronutrient premix are typically not added to THR in states employing an SHG model, leading to a THR product that is frequently insufficient in micronutrient composition.[16]

Small contracts lead to small margins and challenges with financial sustainability

As most SHG contracts are for only one or two AWCs, there are limited economies of scale in this model.[16,17]

FIGURE 3: THR Production & Distribution in the Decentralized SHG Model



Additionally, such small contracts do not allow for bulk purchasing as the raw ingredients are not used quickly enough. In certain states, consortium purchasing is permitted, enabling multiple SHGs to purchase ingredients together at bulk rates. However, this model has only been variably implemented. Further, given limited revenue, SHGs typically lack the capital to invest in mechanization for THR production, which impacts both efficiency as well as quality of the THR product.

Few decentralized models have mechanisms to improve SHG production quality

Quality and production of THR in the SHG model is monitored by female supervisors. Concerns about quality, supply or access of THR is routed through the supervisors or CDPO. If concerns are identified, SHGs will be compelled to address the inadequacies or have their contracts terminated. However, unfortunately, there are very few formal mechanisms in place to help SHGs improve their own performance if and when such concerns are identified. Secondly, even in the absence of concerns, there are limited opportunities for continued skill-development among SHG members to improve quality, production and distribution processes.[16,17]

A parallel problem exists insofar as there is no clear mechanism by which SHGs are evaluated for skills or their ability to fulfil THR production needs prior to awarding of contracts. In many communities there are multiple SHGs, yet not all of them are awarded contracts for THR production, given demand requirements. The development of a grading or certification process for SHG capacity for THR production could enable communities to award THR production contracts to the SHGs most well-suited and capacitated to fulfil community needs.

Given the magnitude of the malnutrition burden and the urgency to address it, for states who employ the decentralized SHG model, developing parallel mechanisms to guarantee and improve quality and skills of SHGs could lead to significant improvements in local nutrition outcomes. Programs like the National Nutrition Mission's (NNM) Incremental Learning platform offer insights into what a mechanism might look like and should be considered for SHG models as well.[18] The NNM could also engage multiple sectors in building SHG capacity, such as the Ministry of Rural Development or development partners.

Decentralized Production Facility Models

Opportunities

Economies of scale made possible

In decentralized production facilities, a single facility typically supplies THR for an entire block, though this varies across states. This enables decentralized production facilities to purchase the required raw materials in bulk, lowering the unit cost. With large orders and higher margins, decentralized production facilities can also invest in technology and machinery to speed production and increase efficiencies. With this increased automation, many SHGs in Odisha and Kerala reported producing other products for commercial sale to increase the SHGs' overall revenue.[19]

Producing THR with high-nutrient value is more feasible

The addition of a micronutrient premix to THR is more feasible for a decentralized production facilities due to automation. This practice has been seen in existing facilities, such as in Rajasthan, which is further described in article "The Banswara Model: An Experience from Rajasthan" on page 78.

Improved beneficiary THR access

These production facilities typically supply THR to a single block and are run by local SHGs. Production units are responsible for THR distribution typically to the AWC level, ensuring there are limited downstream access gaps and that production facilities are accountable for beneficiary access. According to a study using NFHS-4 data, highest coverage of supplementary food was seen in Odisha, which employs a decentralized facility model.[8]

Challenges

Decentralized production facilities face a number of challenges throughout the production and distribution value chain, as demonstrated in figure 4.

No guaranteed contracts

While significant investment and effort may be put into the development of production facilities, contracts for THR production are not guaranteed by ICDS. Given the capital and operational expenses necessary for production facilities, this is not a viable business model without some form of guaranteed demand.[16] On the other hand, ICDS should have the ability to ensure high-quality production and therefore should not be obligated to purchase from facilities without regulatory control over production quality. Therefore, to ensure financial viability of the decentralized production facility model, some form of guaranteed demand must be ensured by ICDS, and in parallel, the facilities must be held accountable to ICDS standards for quality, access, and adequate and timely supply.

Limited management experience in SHGs

SHGs typically have limited management experience, which has led to challenges in implementation of this model. Capacity-building and skills-development activities are often provided when an SHG is initially contracted, but is not mandated on a regular basis. In the Rajasthan GAIN-supported factory, this was found to be a limitation of the model.[19] In Kerala, Kudumbashree provides management oversight for the SHG production facilities, which promotes the sustainability of SHG production.

External quality testing results are delayed

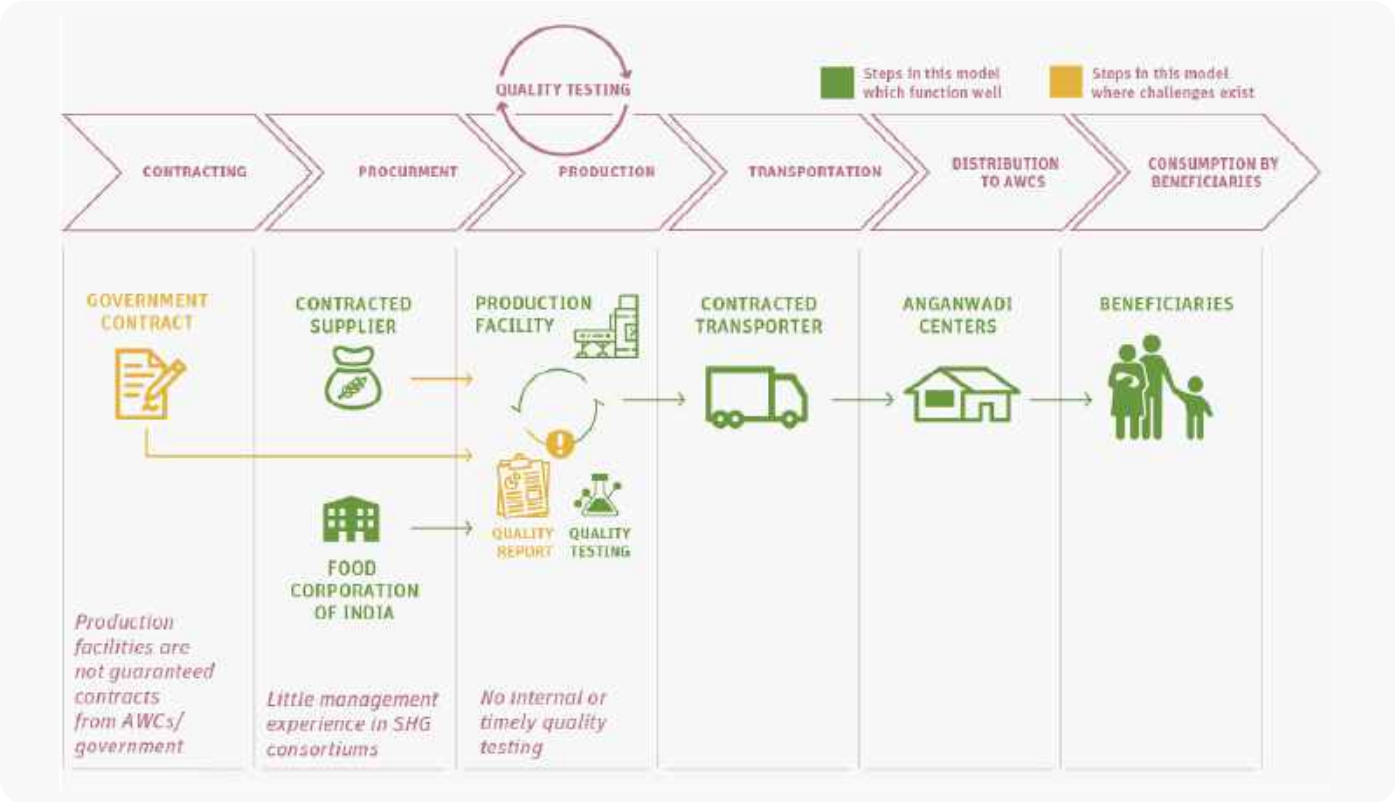
Although decentralized production facilities do not have internal quality testing labs, external quality testing is employed in some states, including in Odisha and Kerala.[13,19,20] In these states, samples are taken from each batch of THR produced and sent to external laboratories, sometimes in different states.

Results are sent back to the local CDPO and, in some cases, the SHG themselves. However results can usually take over three months. Due to the extended period between THR production and receipt of results, it is difficult to operationalize changes and improvements to production processes in a timely manner. However, state food labs that currently exist in all states could

Recommendation 3

States using the decentralized model should consider awarding contracts to SHGs at the block level, enable consortium purchasing mechanisms, develop mechanism to build capacity, and develop skills of group members and award contracts based on grades and certifications. This will optimize production, guarantee financial viability, and improve quality of THR.

FIGURE 4: THR Production & Distribution in the Decentralized Production Facility Model



also satisfy this quality testing function and, if utilized, could significantly decrease the time involved in testing and results feedback, thereby enabling faster improvements and accountability for THR production.

Centralized Production and Distribution Models

Opportunities

While the Government of India (GoI) has recommended decentralization, centralized production models still remain a prominent mode of THR production.

Provides economies of scale

In centralized models, THR for an entire state is typically made at one facility (sometimes more) via large-scale production. This enables centralized production facilities to purchase required raw materials in bulk, lowering productions costs. Centralized facilities also have the opportunity to invest in technology and machinery to speed up production and increase efficiencies. Overhead costs, including accounting and administration, may also be reduced through the efficiencies of centralization.

Producing THR with high nutrient value is more feasible

Due to the ability to buy in bulk, other cost savings, and the greater availability of products in urban locations, purchasing fortified staples, such as wheat, and micronutrient premix is less challenging for centralized facilities. Further, the addition of a micronutrient premix to THR production is much easier to streamline and purchase in centralized models. In many areas of India, particularly rural settings, access to micronutrient premix is limited.

Greater potential to ensure a high-quality product

Standardization of the production process is easier to implement in centralized facilities, thereby increasing the likelihood of a higher quality THR product, enabling improved hygienic conditions, appropriate processing times, and enhanced fidelity to approved formulation and recipes. In addition, some centralized facilities, such as Telangana Foods, have on-site quality control laboratories, which also provide a quality improvement mechanism for the facility and production process.[21]

Challenges

Centralized facilities also present a number of challenges across the production and distribution value chain, as demonstrated in figure 5.

Community ownership is not a central part of this model

As centralized facilities are either run by government or by a private contractor, there are few opportunities to include local SHGs in the production of THR. GoI's order for decentralization, among other factors, was premised upon the idea that decentralization would lead to local economic opportunities and empowerment,[22,23] however, this model does not prioritize this approach, which may also lead to less community ownership of the SNP and THR program.

THR is not reaching all beneficiaries, particularly those in rural areas

As centralized production models consist of one or a few number of facilities, usually based in urban areas, it is challenging to reach remote locations. According to a 2016 study, 28% of caretakers in Telangana reported that their local AWC had no THR in stock, and 39% reported that their AWC did not supply THR.[24] Centralized facilities are not currently held accountable for any downstream challenges, at the transportation and distribution steps of the value chain, which prevent THR from being accessible to all beneficiaries.

If Recommendation 4 were to be implemented in Telangana and Andhra Pradesh, for example, where coverage issues have been reported,[24] it is estimated that over 1 million more beneficiaries could have access to THR.

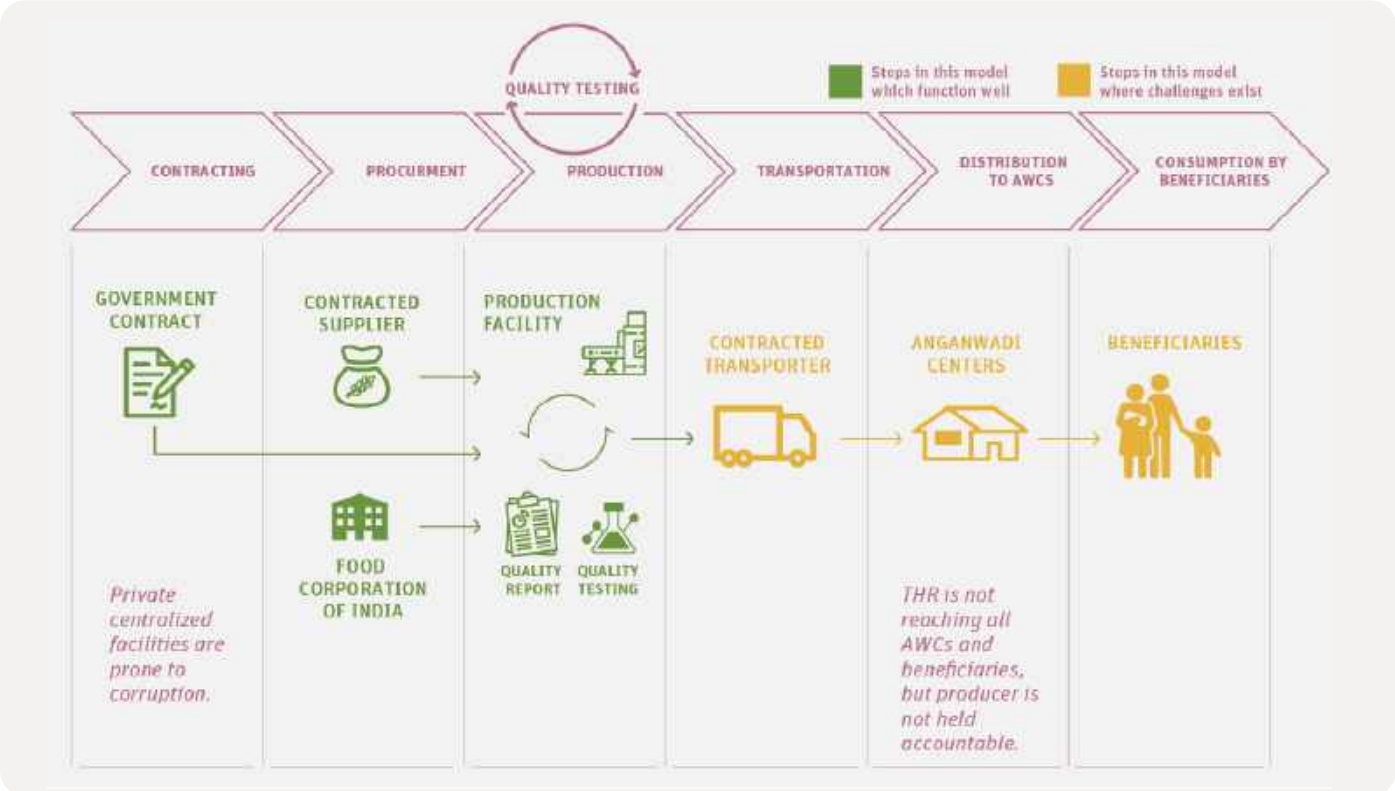
Recommendation 4

Centralized production facilities should be held accountable for down-stream access gaps (such as stockouts, late and inconsistent supply), with a portion of overall compensation tied to access.

Corruption and poor quality of THR

As centralized production models consist of one or a Some states with a centralized model have chosen to contract production and distribution of THR to private corporations. Although, in theory the private sector brings experience and infrastructure to deliver a high-quality product, in practice, certain examples from private corporations in Uttar Pradesh and Madhya Pradesh demonstrate challenges in both quality and access, as well as corruption in operations.[26,27,28] Limited access for beneficiaries at the AWC level have been observed in these states, but upstream steps in the production and distribution value chain have also been subject to corruption at various degrees. While corruption exists in many systems, these examples are nonetheless cautionary, as other states consider centralized production models and the contracting process therein.

FIGURE 5: THR production and Distribution Value Chain Centralized Models



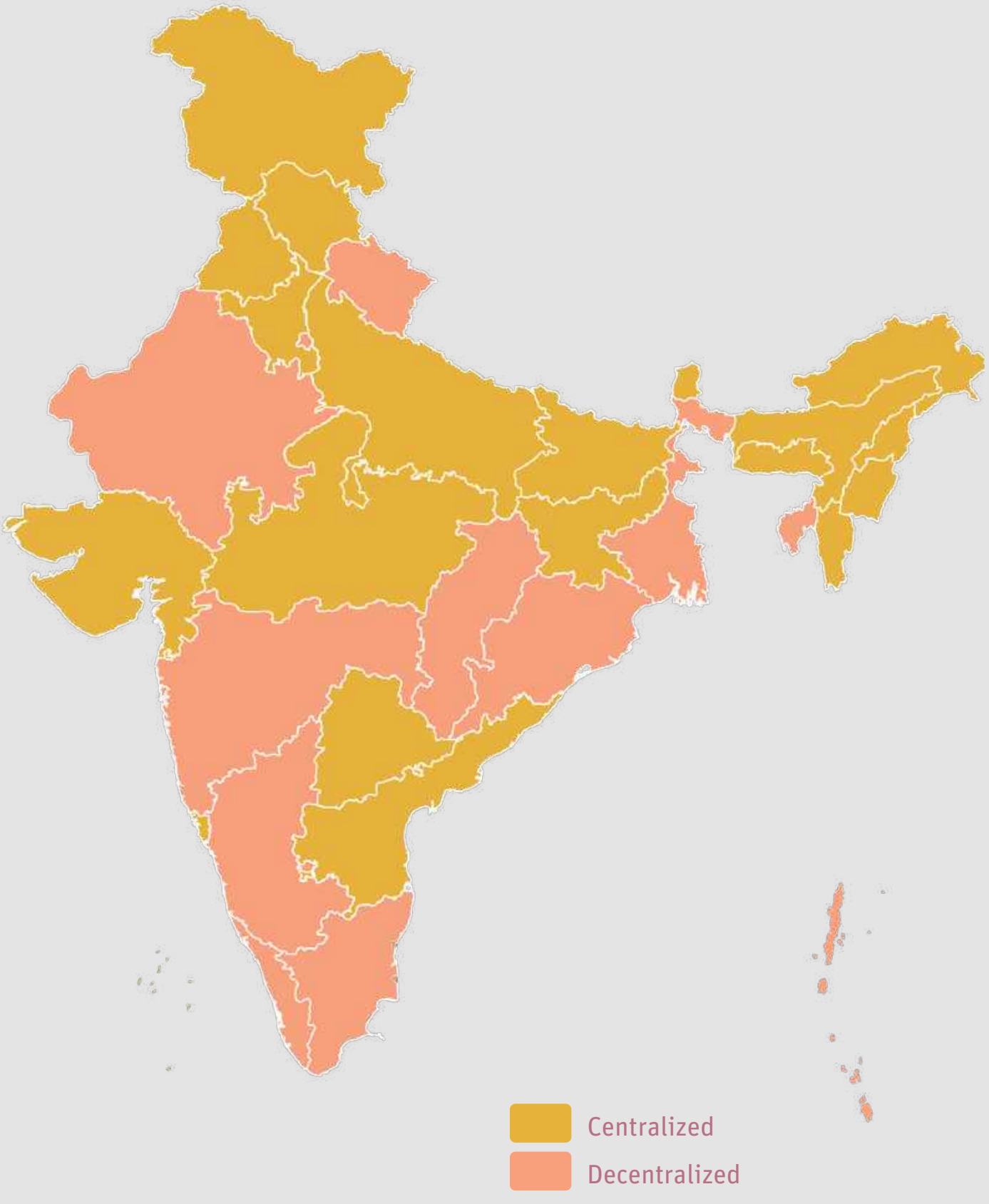
Conclusion

Deciding on the best model for a state will depend on a number of considerations, and states must understand the trade-off between quality and access that each model represents. Regardless of the model, challenges with accountability, leakage, and quality are inevitable. By implementing the recommendations presented here, production and distribution systems could be greatly improved, ensuring better access to high-quality THR.

References

1. Ministry of Women and Child Development, Government of India. Integrated Child Development Services (ICDS) Scheme. (2009). Retrieved from: http://www.icds-wcd.nic.in/icds.aspx (Accessed April 2020)
2. Chhabra, I. Community Participation through empowerment in India's Supplementary Nutrition Programme
3. Key informant interviews – Odisha, May, 2018
4. National Informatics Centre. Functional requirements specification for fps automation, version 1.0. Retrieved from: http://epds.nic.in/documents/FRS-for-FPS-Automation.pdf (Accessed April 2020)
5. Dave, K. & Rupera, P. Amul rations to help government fight malnutrition. (2018). Retrieved from: https://timesofindia.indiatimes.com/city/ahmedabad/amul-rations-to-help-govt-fight malnourishment/articleshow/64607946.cms (Accessed April 2020)
6. ICDS WCD. Guidelines for ICDS-CAS device distribution. 2018. Retrieved from: https://www.icds-wcd.nic.in/nnm/NNM-Web-Contents/LEFT-MENU/ICT-RTM/ICDS-CAS_Device_ Distribution_Guidelines_English.pdf (Accessed April 2020)
7. Key informant interviews with SHG members in Kerala, May 2018
8. IFPRI. District-level coverage of interventions in the Integrated Child Development Services (ICDS) scheme during pregnancy, lactation and early childhood in India: Insights from the National Family Health Survey-4. (2018). Retrieved from: http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/132803 (Accessed April 2020)
9. Department of Women and Child Development. Guidelines THR. (2016). Retrieved from: http://wcdodisha.gov.in/Application//uploadDocuments/plugin/doc20170527_113230.pdf (Accessed April 2020)
10. Pati, R. & Arshand, B. A concept note on amrutham nutrimix. (2015). Retrieved from: http://kudumbashree.org/storage//files/di9x7_12.%20a%20concept%20note%20on%20amrurtham%20nutrmix.pdf (Accessed April 2020)
11. Kondal, K. Women empowerment through self-help groups in Andhra Pradesh, India. International Research Journal of Social Sciences, 3(1), 13-16 (2014)
12. Sarkar, M. A. Assessment of Self-Help Groups in Rural India-A Study of Jalpaiguri District. Small Enterprises Development, Management & Extension (Sedme) Journal, 45(2) (2018)
13. Kudumbashree.org. State poverty eradication mission. Government of Kerala (2018)
14. Key Informant Interviews, Rajasthan and Kerala, May 2018
15. Antier, C., Kumar, S., Bhagwat, S., & Sankar, R. Production of fortified food for a public supplementary nutrition program: performance and viability of a decentralized production model for the Integrated Child Development Services Program, India. Asia Pacific journal of clinical nutrition, 23(S1), s20-s28 (2014)
16. GAIN. Case study: Empowering women entrepreneurs to produce fortified food for mothers and children in Rajasthan
17. Key Informant Interviews, Rajasthan, March 2018
18. National Nutrition Mission. Guidelines for implementation of incremental learning approach (2018)
19. Key Informant Interviews, Kerala and Odisha SHGs, May 2018
20. WCD Government of Odisha (2015)
21. Further discussion of quality assessment and quality improvement mechanisms within the production and distribution value chain is discussed in Policy Brief 3 of this series
22. Sehgal, R. Is the Government Planning to Dismantle the ICDS Programme? (2017). Retrieved from: https://thewire.in/government/government-planning-dismantle-icds-programme (Accessed April 2020)
23. Chhabra, I. Community Participation through empowerment in India's Supplementary Nutrition Programme.
24. Leyvraz, M., Wirth, J. P., Woodruff, B. A., Sankar, R., Sodani, P. R., Sharma, N. D., & Aaron, G. J. High coverage and utilization of fortified take-home rations among children 6–35 months of age provided through the integrated child development services program: findings from a cross-sectional survey in Telangana, India. PloS one, 11(10), e0160814. (2016)
25. Andhra Pradesh Foods. M Foods. (2014). Retrieved from: http://apfoods.ap.nic.in/. (Accessed April 2020)
26. Tewari, S.S.K. Summary of report on ICDS, Gorakhpur, U.P. (2011)
27. Office of the Supreme Court Commissioners. Report of our Principal Adviser, Biraj Patnaik, with reference to SLP (Civil) No. 10654 of 2012 in the matter of Vyankateshwar Mahila Audyogik Sahakari Sanstha v. Purnima Upadhyay and Others listed along with Civil Writ Petition 196 of 2001 (PUCL v. UOI). (2012)
28. Johari, A. How three tainted companies retained their grip over Madhya Pradesh's nutrition scheme for children. (2018). Retrieved from: https://scroll.in/article/880136/how-three-tainted-companies-retained-their-grip-over-madhya-pradeshs-nutrition-scheme-for-children. (Accessed April 2020)
29. Adapted from: ICDS, POSHAN Abhiyaan. Supplementary Nutrition. (2018). Presented on May 2nd, 2018

State-wise models for production of Take-Home Ration



experience

Government/State owned

Andhra Pradesh
Bihar
Dadra and Nagar Haveli
Haryana
Lakshadweep
Madhya Pradesh
Punjab
Sikkim
Telangana
Daman and Diu
Gujarat

Private Sector

Arunachal Pradesh
Assam
Goa
Himachal Pradesh
Jammu & Kashmir
Jharkhand
Manipur
Meghalaya
Mizoram
Nagaland
Puducherry
Uttar Pradesh

centralized

Telangana Foods: A State Enterprise Model

This is an abridged article based on Global Alliance for Improved Nutrition (GAIN)'s reports. Reproduced with permission.

Key messages

- In Telangana, one in every three children suffers from stunting and underweight, and one in every five children suffers from wasting.
- Telangana Foods, a centralized production facility, supplies the Take-Home Ration products, *Balamrutham*, to over 5 million children.
- A survey by Global Alliance for Improved Nutrition shows comparatively high coverage of Take-Home Ration in Telangana.
- Standardized production processes, economies of scale and better quality control ensured financial sustainability in less than three years.

Introduction

Telangana, a new state formed after the bifurcation of Andhra Pradesh in 2014, has 32 lakh children under 5 years of age.[1] One in every three children suffers from stunting and underweight, and one in every five children suffers from wasting.[2] To address malnutrition, Integrated Child Development Services (ICDS) launched the Supplementary Nutrition Programme (SNP) through 35,700 Anganwadi Centers (AWC), covering 2.8 million children.[3,4]

SNP in Telangana includes freshly cooked meals and fortified food products such as Take-Home Ration (THR). On the first day of every month, 2.5 kg of fortified blended food called *Balamrutham* is given to mothers of children aged below three years as THR. Children are also spot fed extruded foods called Nutri Snacks in addition to the freshly cooked meal before they leave AWCs. Both *Balamrutham* and Nutri Snacks are manufactured by Telangana Foods, a public sector enterprise.

Telangana Foods: An overview

Telangana Foods (previously AP Foods) is a state government-run centralized facility. It was established in the year 1974 with support from CARE, UNICEF and GoI. The single production facility supplies THR to 400 ICDS projects, covering 5.3 million children in both Andhra Pradesh and Telengana.[4] THR is produced within the ICDS budgetary norms, and any remaining funds are used to improve the facility and production practices. A variety of THR and instant mixes, such as upma, halwa, khichdi and sweet porridge, can be produced at the facility.

In 2013, the state government stopped the production of these instant mixes due the directive from the Supreme Court that prevented for-profit food manufacturers from participating in the ICDS scheme. Despite being a government enterprise, Telangana Foods's operations were affected due to this directive and resulted in less than 50 per cent utilization of the production capacity.

The unit is governed by the Essential Services Maintenance Act (ESMA) and there is no labor union. With reduced production, the staff strength had to be substantially lowered. The company, however, had already made investments in expanding its production capacity in anticipation of enhanced future demand. This expansion exercise had commenced before the bifurcation of the state. For the next four years, the facility was left in a limbo. Finally, in 2017, Telangana Foods entered into an agreement with the government of Andhra Pradesh and started supplying THR to a larger beneficiary base. Its sales have been growing and recently another factory was constructed.

THR Production

Product

Balamrutham is made with roasted wheat, chickpea, milk powder, oil and sugar. It is fortified with eight micronutrients – calcium, iron, vitamins A, B_1, B_2, C, folic acid, and niacin. A serving size of 100g of *Balamrutham* meets 50% of a child's Recommended Dietary Intake

(RDI). (Table 1.)

TABLE 1: Nutritional composition per 100g of *Balamrutham*[5]

	Nutrients	Total
1.	Energy (kcal)	414
2.	Protein (g)	11
3.	Calcium (mg)	367
4.	Iron (mg)	9
5.	Vitamin A (µg)	202
6.	Vitamin B1 (µg)	0.6
7.	Vitamin B2 (mg)	0.55
8.	Vitamin C (mg)	15.5
9.	Folic Acid (µg)	22
10.	Niacin (mg)	6.3

Raw material procurement

All ingredients are procured in bulk: while wheat is obtained from the Food Corporation of India, there is a tender process for all other raw materials. Telangana Foods screens potential vendors on criteria such as reputation, standards, and product quality. It leverages its scale to purchase raw materials in bulk at favorable prices from established vendors who pass the screening process.[6]

Packaging

The packaging materials and standards such as labelling are as per parameters recommended by the Indian Institute of Packaging. Any residual or unused packing material is sold by Telangana Foods.

Processing

With its fully automatic production system, Telangana Foods manufactures and supplies 2,500 MT of THR every month. It starts with cleaning and preparation of cereals and pulses for roasting. After roasting, they are milled and mixed through intermediary silos as a batch mixing process. The finished product is packed in 2.5 kg bags.

Quality control

An on-site laboratory tests the quality of raw materials, packaging, and the finished THR. They also have the capacity to test vitamin and mineral composition. Any complaints received on THR quality received are addressed through the laboratory.

THR delivery and distribution process

The annual forecasted supply is given by ICDS at the beginning of each financial year. Details on the number and types of schemes for THR, number and location of AWCs, ration size for each category of beneficiaries and any other norms are also provided to help plan production and delivery for the year. Transportation arrangements are made through annual tenders. THR from this facility is then distributed to ICDS projects, and they are responsible for delivering it to AWCs. After the delivery is made, an onward claim is raised from the relevant beneficiary department.

Monitoring and feedback

Telangana Foods has a Nutrition Council that meets twice a year. It is headed by the Chief Secretary to the Government of Telangana and includes a member from the National Institute for Nutrition for oversight of the nutritional quality of THR. An executive committee, that convenes every quarter, oversees regular operations.

Partnership with Global Alliance for Improved Nutrition

In 2010, Global Alliance for Improved Nutrition (GAIN) partnered with Telangana Foods (then AP Foods) to support an increase in their capacity and improve the quality of the supplementary foods across several dimensions.

First, the nutritional quality and packaging of the THR were significantly enhanced. For example, milk powder was added to improve the protein content as soon as GoI increased the budget for THR. Hydrogenated oil, that contains unhealthy trans-fatty acids was replaced

TABLE 2: Plant payback calculations[7]

	Amount	Unit
Capital cost	40	Crore in INR
Surplus per MT	1000	INR
Capacity (annual)	144,500	MT
Annual surplus	14.5	Crore in INR
Payback*	2.8	Years

*Calculated according to the Telangana Foods guidelines.[8] Does not include time value of money or cost of financing. Capital cost includes related investments by GAIN.

with palm oil. Packaging was changed from woven sacks to high density polyethylene material to increase shelf life.

"Milk powder was added to improve the protein content as soon as Government of India increased the budget for Take-Home Ration."

Second, setting up a new production facility instead of upgrading the existing unit allowed for a safer, fully automated and greater manufacturing capacity. This helped meet the demand of all community centers in Telangana and Andhra Pradesh. The initial catalytic investment by GAIN led to a three-fold increase in investment from the government, resulting in a best-in-class facility.

Third, adopting a market-based mindset ensured financial sustainability. All raw materials are procured in bulk, including the wheat from FCI, which allows for better control on cost of goods. The facility had an estimated payback period of less than three years (Table 2).

Challenges and Opportunities

A two-stage stratified cross-sectional cluster survey was conducted in 2016 to estimate the coverage and utilization of *Balamrutham* and to identify THR's barriers and drivers.[8] The coverage of the fortified THR was found to be high among the target population.[8] Nearly all caregivers (93.7%) had heard of *Balamrutham* and 86.8% had already received the product.[8] Among the children surveyed, 57.2% consumed the product regularly.[8] The ICDS program was found to be widely available, accessible, accepted, and utilized by the population in both urban and rural catchment areas, as well as among poor and non-poor households.[8] However, two barriers to optimal coverage were identified: (a) irregular supply of the product to the beneficiaries and (b) intra-household sharing of the product. [8] We identify two policy measures below that can mitigate the challenges.

1. Effective deployment of technology to boost distribution and promotion:

Telangana Foods utilizes an integrated web-based supply chain management tool called *'mFoods'* to project demand. Anganwadi Workers (AWWs) at the community centers enter product requests through mobile phones, which are tracked by a centralized system along with timestamps. Relevant stakeholders are alerted and can dynamically adjust their supply schedules to meet the demand better. Inefficiencies can thus be minimized, resulting in timely production, less waste and proper accounting.

This technology can be further utilized by AWWs to gain better understanding of consumer behavior. AWWs can raise awareness around the product and its benefits, and the importance of appropriate use (use by the intended target groups and not shared with the rest of the family, safe preparation, serving size, consistency, meal frequency and density).

2. Low attendance:

Poor households are less likely visit an AWC compared to non-poor households. This is because of familial duties and restrictions placed on the caregiver, and costs involved (both opportunity and travel) in accessing an AWC. Empowering AWWs to travel to farther households, reimbursing caregivers' travel and opportunity costs, and educating households on the importance of THR can enable improved reach.

"Nearly all caregivers (93.7%) had heard of *Balamrutham* and 86.8% had already received the product."

Conclusion

A centralized production facility can be an effective strategy to improve nutritive value of THR products and to ensure adherence to high quality standards. There are, of course, numerous challenges, such as high start-up capital requirements, long ramp-up period, high concentration of risk, lack of local economic empowerment, and lack of link with end beneficiaries.[8] However, this model has several advantages, including standardized production, stronger quality control standards, and the possibility of using advanced micronutrient formulations and production processes, as well as economies of scale.[8] These advantages likely favored the high coverage achieved in this project and should be examined closely by states looking to strengthen their centralized production facilities.[8]

References

1. Telangana State Portal. About. n.d. Internet: https://www.telangana.gov.in/about/state-profile (accessed 27 January 2020)
2. Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council. Comprehensive National Nutrition Survey (CNNS) National Report. New Delhi 2019
3. Supplementary Nutrition Program under ICDS: Case study of Telangana and Tamil Nadu. July 2018. Internet: http://59.160.153.188/library/sites/default/files/Supplementary%20Nutrition%20Programme.pdf (accessed 27 January 2020)
4. Flanagan, K. F., Soe-Lin, S., Hecht, R. M., & Schwarz, R.K. THR Production and Distribution Models- Challenges and Opportunities for Improvement. Policy Brief 4. Pharos Global Health Advisors. (2018)
5. Department of Women and Child Welfare. Supplementary Nutrition. Balamrutham - Weaning food for children between 7months and 3 years. Internet: http://wdcw.tg.nic.in/Balamrutham.html (accessed 27 January 2020)
6. Telangana Foods. Production Wing. n.d. Internet: https://tfoods.telangana.gov.in/AboutProductionWing.aspx (accessed 27 January 2020)
7. The Global Alliance for Improved Nutrition (GAIN), the Global Business School Network (GBSN), and the Tuck Global Consultancy Program at the Tuck School of Business at Dartmouth. Case Study: Better business practices boost Indian government efforts to provide nutritious food to young families. 2014
8. Leyvraz, M., Wirth, J. P., Woodruff, B. A., Sankar, R., Sodani, P. R., Sharma, N. D., & Aaron, G. J. High Coverage and Utilization of Fortified Take-Home Rations among Children 6-35 Months of Age Provided through the Integrated Child Development Services Program: Findings from a Cross-Sectional Survey in Telangana, India. PLoS One, 11(10), e0160814. doi:10.1371/journal.pone.0160814 (2016)

Gratitude to frontline workers at the time of coronavirus

Srujith Lingala, Kalpana Beesabathuni, and Priyanka Kumari
Sight and Life, Bangalore, India

At nearly six months pregnant, Vidyarani learned that her neighborhood Anganwadi Centre (AWC) was closing due to the coronavirus (COVID-19) control measures. She depends on the AWC for a daily hot cooked meal to feed herself and her two-year-old daughter. Adding to her growing concerns, the lockdown caused her husband to lose his job.

AWCs, or courtyard shelters, are primary childcare centers providing basic health care activities and nutritious meals for families while also serving as a pre-school for young children. Across all states in India, AWCs serve either hot cooked meals or provide monthly rations that can be cooked at home. The Telangana state government, for instance, serves approximately half a million hot cooked nutritious meals daily to pregnant and lactating women through the AWCs. As a part of this program, all beneficiaries also receive one egg every day.

As COVID-19 quickly spreads around the globe, India has enforced a nation-wide lockdown to contain the disease creating unprecedented challenges for people like Vidyarani and their families. In addition to the closure of primary schools and AWCs, children in rural India are now not attending school and therefore have to do without their guaranteed school meal, potentially worsening an already "severe" malnutrition problem in India. Even though the government has ordered state authorities to ensure provision of Take-Home Rations and cash allowance during the lockdown, efforts to tackle acute malnutrition could still take a hit. It is in times like these that India's frontline workers are making sure that no one in their communities goes hungry. Many AWC teachers are going door to door to deliver their weekly rations of rice, lentils, oil and eggs to beneficiaries.

In this photo, tweeted by the Women and Child Development Ministry of Telangana, an AWC teacher delivers Take-Home Rations including eggs to the homes of lactating mothers in the tribal region of Mulugu district via her scooter. Women like Vidyarani and their families are grateful for these workers delivering essential food items.

A Public-Private Partnership in Gujarat: The Amul Case Study

Priyanka Kumari, Madhavika Bajoria, Kalpana Beesabathuni
Sight and Life, Bangalore, India

Alex Burns, Alex Hardin, Danielle Minnett, Nayantara Bhandari
John Hopkins University Research Team, USA

Key messages

- The Amul Dairy model is a three-tier cooperative system where almost 80% of the revenue reaches the farmer members in the form of milk sales and bonuses.[1]
- Amul modelled its Take-Home Ration production system around the Amul Dairy model and made significant strides in improving quality and eliminating the barriers related to other types of production models.
- Supply chain logistics are digitized through Amul's mobile application thus allowing for greater transparency and efficiency.
- Despite few implementation challenges, the Amul model has been successful in setting up three factories, catering to 42 million beneficiaries in its first year of operation.

Introduction

Gujarat, one of India's most industrialized states, entered into a 10-year agreement with Amul, a co-operative dairy society, for centralized production of high-quality Take-Home Ration (THR). This initiative leverages Amul's industrial expertise to alleviate malnutrition in the state, where 39% children suffer from stunting and 38.2% suffer from anemia.[2] The Gujarat model is one of the few models in India that has efficiently incorporated micronutrient fortification production of THR.

Operating Model

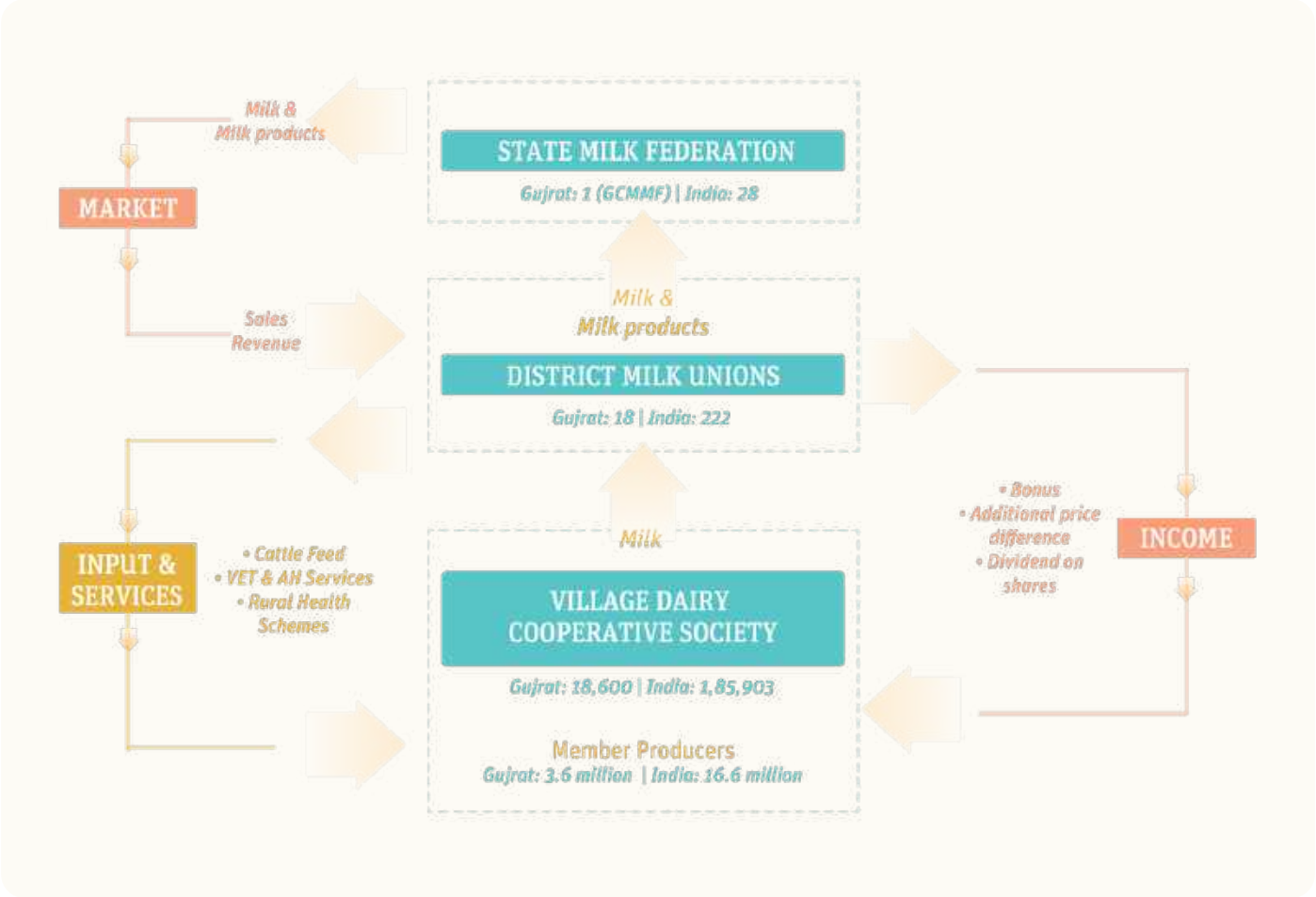
Amul Dairy's three-tier system (Figure 1) is a democratic governance model. Farmers own and control institutional infrastructure and are involved in strategic and operational decision-making, thus resulting in high accountability and ownership of the model. The model is structured into three tiers: village, district, and state levels. At the village level, each farmer contributes by supplying milk to the Village Dairy Cooperative Societies (VDCS). VDCS are federated at the district level under the District Milk Unions (DMU). Milk supplied by VDCS to DMUs is processed into various consumer products. At the state level, State Milk Federation (SMF), the apex organization, spearheads sales and marketing.[3] The management committees and the board members of Amul Dairy, and its various tiers, who are all farmers at the DMU level, are elected by other farmers through elections held every three years. This simple and innovative model has ensured that farmers take ownership of their growth through cooperatives, where managers at all levels are accountable to leaders elected by farmers, thus helping India emerge as the largest milk producer in the world.

The desire to emulate the same trajectory for nutritional improvement was the driving factor for the Government of Gujarat to contract Amul for THR production. THR production is an inverted model compared to the dairy model because production occurs centrally before it is distributed to the village level. Nonetheless, the quality control, production process and control design were all modelled after the Amul Dairy model.

THR Production

Gujarat Cooperative Milk Marketing Federation (GCMMF), the cooperative body that manages the Amul brand name, has entered into a tripartite agreement with the Government of Gujarat and the Kaira, Banas and Surat district unions for production and supply of THR products. The three unions have individual installed capacities of 200MT/day.[4]

FIGURE 1: Anand Pattern - Operating Model of Amul[3]



THR Products

Amul produces two types of fortified blended food as THR for children and women[5]:

1. Balbhog: For normal weight children of 6 months to 3 years and severely underweight children of 6 months to 6 years; 125g per child per day.
2. Sakhibhog or Devibhog: For pregnant and lactating women (PLW); 145g per person per day. These are designed as instant mixes for recipes such as sukhdi, sheera and upma.

The common ingredients for both products are wheat, soybean, pulses, sugar and oil. The two formulation differ in their micronutrient composition (Table 1).

The packaging is designed to appeal to the distinct beneficiary categories and avoid intra-household sharing (Figure 2). The illustration on the packaging is mandated by the government but Amul has the flexibility to adapt the style and seal of the packaging.

Figure 2: THR products for PLW (top) and children under six (bottom)

TABLE 1: Nutritive value per 100g

	Balbhog	Sakhibhog/Devibhog
Energy (kcal)	414	482
Protein (g)	9.3	11.1
Fat (g)	14.8	23.3
Carbohydrate (g)	59.7	44.2
Vitamin B1 (mg)	0.27	0.22
Vitamin B2	0.12	0.08
Vitamin B3	1.49	0.89
Folate (µg)	63.79	84.58
Beta-carotene (µg)	22	1
Calcium (mg)	53	107
Iron (mg)	3.06	4.39

Procurement and Quality Control

Raw material procurement

Raw materials are procured through tenders adhering to the standards and conditions established by the Government of Gujarat. Wheat is issued by Food Corporation of India (FCI). All raw materials are stored at a central warehouse.

Processing

The central warehouse supplies to factories in the three unions. Each factory is equipped with fully automated plants designed as a multi-floor production unit. Raw materials are inputted at the 11th floor and the final product is received on the first floor. The output is packed in sacks of 20 THR packages and sealed in bulk sacks for delivery.

Quality Control

Quality is rigorously checked throughout the production process using advanced technology. Once sample checks are certified by quality control manager, bulk parcels are kept in storage for five to six days before distribution. In some cases, further analysis is conducted through a collection of 18 random samples every month by third-party laboratories as well as by the Government of Gujarat.

Monitoring

Amul developed a mobile application-based system to monitor packages as they are produced, stored and transported through the supply chain. Once the product is ready for distribution, the quantity is logged in Amul's mobile application, and the Integrated Child Development Services - Common Application Software (ICDS-CAS) system assumes oversight. This is a key lever that improves transparency among all stakeholders in the supply chain and plugs pilferage while ensuring product quality and safety.

Delivery and Distribution

Each Anganwadi Centre (AWC) inputs their monthly THR requirement into the ICDS-CAS. The ICDS then reviews the order, amalgamates them, and approves and submits orders to Amul through the mobile app. Amul

Figure 3: Anganwadi Centres in School Courtyard

uses the application to monitor the packages as they are produced, stored and transported. Upon arrival at the AWCs, the recipient Anganwadi Worker (AWW) confirms that they received the transported THRs through the application by inputting a one-time password (OTP) provided to him for each transaction through ICDS-CAS.

"The deliveries are very reliable, and I have never faced discrepancies in the THR I ordered and the quantity I received." — *Anganwadi Worker*

Consumption

Amul THR products are currently being distributed to ~42 lakh beneficiaries every day. To gauge the reaction of these beneficiaries towards THR provided by Amul, we conducted focus group discussions at three urban AWCs. These AWCs were located in school complexes (Figures 3 & 4) and cater to 600-700 beneficiaries.

Figure 4: Children at Anganwadi Centres

In the previous model, ingredients were allocated separately. This led to beneficiaries using the ingredients to make food for the entire family, thus diluting the reach and reducing nutritional benefit to target beneficiaries. However, with the Amul model, sharing between family members has been largely reduced due to specific combination of *Balbhog* (recipes for children) and *Devibhog* (recipes for PLW) rations and appropriate packaging of the THR, emphasizing the beneficiary category. Beneficiaries also expressed satisfaction with the quality of the THR and reliability of supply.

Further, AWC supervisor cited improvement in nutrition content of the Amul THR and emphasized the necessity of continuing to educate and encourage beneficiary uptake. The supervisor also corroborated the fact that the THR has mitigated family-sharing dynamics of previous products. Lastly, the supervisor explained that delivery has improved through Amul's participation in the supply chain. Previously, AWWs were responsible for purchasing the various ingredients, which they had to deliver and store at the AWC themselves. With Amul, the THR packages arrive at the AWC ready for distribution and consumption.

Training on THR Usage and Storage

Amul has created a recipe booklet containing different food items that can be prepared from the THR, but there's a perceived gap in its dissemination. Some women indicated that they have not received any formal training on THR preparation from the AWCs; rather, they were self-taught in this matter. As such, all beneficiaries explained that they prepared the product by mixing it with hot water or milk, depending on availability. Breastfeeding mothers used the THR as a complementary food to breastmilk. For older children, mothers prepared the THR either as breakfast or a snack upon requests from the child. Regarding dosage, most beneficiaries expressed that they follow the instructions on the packaging. Lastly, storage was typically in their own aluminum containers given that the packages do not come with a zip or storage function.

Amul model versus Old model

Table 2 gives us a quick glimpse of the changes brought in by the Amul model to THR distribution in Gujarat as compared to the old decentralized model.

TABLE 2: Comparison of Amul model with old model of decentralization

	Decentralized (old model)	**Amul** (new model)
Quantity of THR received per beneficiary	3 kg wheat, 500 ml oil and 1 kg pulses	3.5 kg of THR per child and 2 kg per PLW
Frequency of distribution	Monthly	Monthly
Degree of processing	No processing; directly raw materials given as THR	Primary processing integrated with micronutrient fortification
Procurement of raw materials	AWW procure and store in AWCs	Federation procures and stores the materials in central warehouse
Packaging	No packaging, gunny sacks used to pack THR	Packed by fully automatic packing machines in food grade pouches
Distribution and collection	Bulk sack stored at AWCs and beneficiaries collect their portions in own containers on monthly basis	Small packets sufficient for one month consumption are distributed among beneficiaries at AWCs
Shelf life	Varies depending on exposure to human contact	4 months
Degree of consumption among family members	High	Low
Usage in diet	Main meal	Complementary to main meal
Nutritive value	Lower	Higher

Challenges and Recommendations

Use of Technology

Amul's mobile application is highly innovative and pragmatic but it is only integrated with the ICDS system up until the product is ready for distribution, after which the ICDS-CAS assumes oversight. In order to better control leakages, the Amul app can be integrated into the ICDS-CAS to allow for supply oversight at the grassroots level. In addition, a barcoding system can be implemented by Amul to seal leakage possibilities.

Implementation Issues

Amul explained that basic food storage requirements were suggested to AWWs, including keeping the THR off the ground and away from walls to avoid water damage. However, implementation of these recommendations was not observed. Continual training on government provided smart phones, periodic messaging, and spot checks from Amul at the AWCs is an essential consideration moving forward.

Beneficiary Retrieval

THR distribution is announced to AWCs through the ICDS SMS that provides a three-week window for delivery. Thus, AWWs and members are unaware of an exact day of delivery or a routine schedule for distribution to beneficiaries. To that end, AWWs have to physically walk around and visit the beneficiaries in the neighborhoods under their jurisdictions on the day that THRs are delivered. While this system is not troublesome for AWCs located in urban areas, it can be a significant burden for both AWWs and beneficiaries in rural areas. This system can be improved by building a more reliable routine for distribution to ensure maximum uptake.

"AWWs and members are unaware of an exact day of delivery or a routine schedule for distribution to beneficiaries"

Training and Education

Beneficiaries reported that they received no training on preparing, storing and serving the Amul THR. As such, ICDS officials can work in coordination with Amul to design and implement training, potentially through the Amul Review Board's collaboration. Further, given complications with beneficiary uptake of the THR, educational workshops can be carried out at the AWC level to inform beneficiaries of superior nutritional gains and benefits.

"Amul model has been successful in setting up three factories in north, south and central Gujarat to cater to 42 million beneficiaries within a year."

What can other states learn from the Amul model?

Despite the challenges, the Amul model has been successful in setting up three factories in north, south and central Gujarat to cater to 42 million beneficiaries within a year of being operational.

There are key learnings from the Amul model that can be replicated by other states, interested in streamlining THR production and making the whole program more effective.

- With pilots in five districts Amul gained a comprehensive understanding and proficiency on distribution, accounting, quality control, and government coordination for THR production. Lessons learned from pilot:
  - Designing a quality product and recipe, through rapid testing
  - Producing in large quantities; skilled workers were recruited from other Amul factories and/or related fields, which provided insights on production procedures and quality testing
  - Integrating quality standards of Amul and FCI
  - Distributing from a centralized production unit to decentralized recipients
  - Mitigating software issues within the mobile application, particularly with connectivity issues in rural areas. The software was adapted to allow users to input data into the app while offline and then automatically synchronize once the phone connects to a network
- Amul's in-house mobile application, which is tailored to the Amul supply chain but in accordance with the federal ICDS-CAS system, is a key element in its success and an important consideration for replicability. This has mitigated leakages and quality control issues, while avoiding a duplication of efforts or overburdening AWWs.
- Amul cited the commitment of the Government of Gujarat as an indispensable component of its success. The seriousness with which government officials were committed to the Amul THR system was witnessed down to the AWC supervisor level. Thus, strong state-level commitment is essential to the success of any THR program.

"Strong state-level commitment is essential to the success of any THR program."

Way Forward

In light of the Supreme Court order in 2012 that emphasized on quality and safety standards during THR production and role of automated machines in it, the replicability of the Amul model is high. Given that Amul's governance is built on a cooperative model, it is not oriented towards profit maximization and adheres to quality standards. Moreover, there are standards and successes from the Amul model that should be considered across other states of India depending on their particular needs, strengths, and state government policies.

References

1. Madhvi Sally. Amul turnover grows 13% to Rs. 33,150 crore in 2018-19. Economic Times. Internet: https://economictimes.indiatimes.com/industry/cons-products/food/amul-turnover-grows-13-to-rs-33150-crore-in-2018-19/articleshow/68674269.cms?from=mdr (accessed 21 January 2020)
2. Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council. 2019. Comprehensive National Nutrition Survey (CNNS)
3. National Report. New Delhi.Amul, About Us. n.d. Internet: https://www.amul.com/m/about-us (accessed 21 January 2020)
4. Amul, 45th Annual General Body Meeting on 28th May 2019. Internet: https://www.amul.com/m/45th-annual-general-body-meeting-on-28th-may-2019 (accessed 21 January 2020)
5. Directorate of ICDS. Internet: https://wcd.gujarat.gov.in/Directorate_of_Social_Defence.html (accessed 21 January 2020)
6. State, GCMMF, dairies jointly to provide nutritive foods to anganwadies children and women. Internet: https://cmogujarat.gov.in/en/state-gcmmf-dairies-jointly-provide-nutritive-foods-anganwadies-children-women/ (accessed 21 January 2020)

Nutrition Matters: Reformulation of Take-Home Rations in Madhya Pradesh

Parth Bahuguna
Clinton Health Access Initiative, Delhi, India

Key messages

- In Madhya Pradesh, 39.5% children under age five are stunted, 38.7% are underweight, and over 53.5% are anemic.
- The existing Take-Home Rations in Madhya Pradesh was tested and its composition optimized to improve nutrient quality within the available budget of Integrated Child Development Services scheme.
- Clinton Health Access Initiative developed three recipe reformulation tools, one each for children, adolescent girls, and pregnant and lactating women.
- The resulting recipes were significantly superior in nutritional quality, especially in key deficit components such as protein, micronutrients and essential fatty acids, as well as reduced sugar content, improved palatability and shelf-life.

Madhya Pradesh: A large state with large issues

Madhya Pradesh is the second largest state in India by area and home to ~7% of India's children.[1] The state has been under scrutiny for the last two decades for its poor child health and nutrition indices. Prevalence of underweight among under-five children has reduced by 21% in the last 15 years but is still higher than the national average. Likewise, stunting stands at 39.5% while anemia among women of reproductive age remains extremely high at 52.5%.[2,3] Despite relentless efforts to ensure delivery of fortified supplementary food to children and Pregnant and Lactating Women (PLW), rates of undernutrition continue to remain high. To fight malnutrition through Supplementary Nutrition Program, the state government produces Take-Home Ration (THR) through four mechanized production facilities owned by Madhya Pradesh State Agro Industries Development Corporation Ltd and distributes it through the Integrated Child Development Services (ICDS) supply chain. Targeted improvements in THR composition for the three target groups, i.e., children, adolescent girls, pregnant and lactating women can substantially improve the effectiveness of this program in improving nutritional outcomes.

The primary ingredients in the THR are wheat flour, soya flour or rice. Three recipes, Bal Ahar, Halwa and Khichdi, are produced. The revised ICDS nutritional and feeding norms for supplementary nutrition recommended fortification of THR with 50% of the Recommended Dietary Allowance (RDA) of nine micronutrients. These micronutrients are iron, calcium, folic acid, zinc, and vitamins A, B_1, B_2, B_3 and C.

Challenges with THR formulation and composition

In 2015, the Clinton Health Access Initiative (CHAI) started a nutrition project to assess and improve THR products. We conducted label analyses and laboratory tests on *Bal Ahar* and Khichdi. Results showed that micronutrients were absent, yeast and mold are of unacceptable levels, sugar content was very high, and protein was barely present. The product consisted of 70% wheat and 30% sugar, making wheat the primary source of protein. Both these ingredients serve solely to fill the belly, but not provide adequate nutrition.

Wheat alone does not meet the protein deficit in the diets. Therefore, our first recommendation was to change the source of protein from only wheat to a blend of wheat and other commodities such as milk powder, soy flour or lentils. Our second recommendation was to

reduce the sugar content in the products, which was very high and unhealthy for babies. Sugar is cheap and adds to the caloric intake of any food, but high levels only inhibit the nutritional value of food. In the next section, we summarize results for THR reformulation for children. Details of THR for adolescent girls, pregnant and lactating women can be obtained by contacting CHAI.

Revised THR formulation

As a result of these findings, Atal Bihari Bajpayee Bal Arogya Avam Poshan Mission, Government of Madhya Pradesh signed an MoU with CHAI for developing alternative recipes for supplementary nutrition with a view to optimize micronutrient and protein content within the requirements mandated by ICDS. Table 1 illustrates the revised formulation of the Bal Ahar and Khichdi products for children aged six months to three years old, developed by CHAI with technical support from the National Institute of Nutrition.

Changes were made to both nutritional density and the quality of the THR. Improvements in the formulation included a higher content of superior quality protein rich ingredients such as soy flour and milk powder, lowered sugar content by 10%, and increased dal content by 8%. Introducing milk powder was made possible when Government of India had increased the THR budget by INR 2 per beneficiary per day across all states. The reduction of the sugar content by nine percent ensures that the most calorific value is drawn from the primary ingredient, wheat. Micronutrient changes included increasing the levels of iron, folic acid, and zinc through fortification to 100% of RDA and adding other critical micronutrients such as vitamins B_6, B_{12} and D at 50% of RDA (Table 2). The estimated cost of micronutrients per packet was nominal at INR 0.6 to INR 1. Even when micronutrient content is increased to one RDA, its impact on cost is negligible, while the health benefits of micronutrients are tremendous.

TABLE 1: Madhya Pradesh – Old and updated recipes of THR for children

Ingredients		
Bal Ahar		
	Old	New
Wheat flour	56%	58%
Defatted Soy Flour	7%	9%
Skimmed Milk Powder	2%	8%
Sugar	25%	15%
Besan	3%	3%
Vegetable Oil	7%	7%
Khichdi		
	Old	New
Rice	58%	62%
Soy grits	20%	10%
Moong Dal	10%	18%
Masala	2%	2%
Vegetable Oil	10%	8%

In addition to being a major source of energy, dietary fats also provide essential fatty acids needed for optimal child growth and development. We examined the composition of fats in THR. The current blending of palm oil, which is cheaper, into soybean oil raised concerns on the quality of the oil and the balance of the recommended fatty acid ratios. Therefore, CHAI suggested using only soybean oil or blends of oils that ensures the recommended balance of saturated to unsaturated fatty acids.

The breakup of the cost for every recipe suggests that ~60% (INR 16.6) of the cost is attributable to raw materials (Figure 1). Benchmarking the rate at which the raw materials are procured in retail, suggests that most of these procurement rates are significantly higher especially for essential raw materials such as whole milk powder– the retail price of a packet sold by a leading dairy cooperative is about INR 260 compared to INR 371 at which it is currently procured by the department. There is a need to examine the procurement rates to be able to optimally utilize the funds available for the supplementary nutrition by the ICDS.

CHAI has developed a recipe reformulation and cost impact assessment tool providing scenarios of different recipes and optimizing cost, nutritional quality and palatability of THR for children aged 6 to 36 months, adolescent girls, and PLW. Besides the changes in energy, protein, micronutrients and fats, CHAI also provided other general considerations for rationalizing the

TABLE 2: Madhya Pradesh – micronutrient content in old and updated recipes of THR for children

Nutrients	Units	Old *Bal Ahar*	Revised *Bal Ahar*	Revised Khichdi Premix
Iron	mg	4.5	9.0	9.0
Vitamin A	microgram	200.0	200.0	200.0
Calcium	mg	300.0	300.0	300.0
Thiamine	mg	0.3	0.3	0.3
Riboflavin	mg	0.3	0.3	0.3
Niacin	mg	4.0	4.0	4.0
Vitamin C	mg	20.0	20.0	20.0
Free Folate	microgram	40.0	80.0	80.0
Zinc	mg	2.5	5.0	5.0
Vitamin B_{12}	microgram	--	0.3	0.3
Vitamin B_6	mg	--	0.3	0.3
Vitamin D	IU	--	100.0	100.0

recipes such as improving the palatability or shelf life of THR or reducing consumer pain points during preparation or cooking of THR at home. Distribution of the reformulated products started in 2018 and are well accepted by the consumers and communities.

"CHAI has developed a recipe reformulation and cost impact assessment tool providing scenarios of different recipes and optimizing cost, nutritional quality and palatability of THR."

Implementation Challenges

Implementing the improved and more nutritious THR will require addressing limitations and challenges with supply, monitoring and accountability.

Attribution will be difficult

A survey will be conducted in 2021 to analyze changes in stunting and other long-term malnutrition indices malnutrition. While an end-line will be established using this survey, it will be difficult to attribute any changes to the reformulation as there are other nutrition and health schemes that also benefit the same consumers.

Replicability is context-dependent

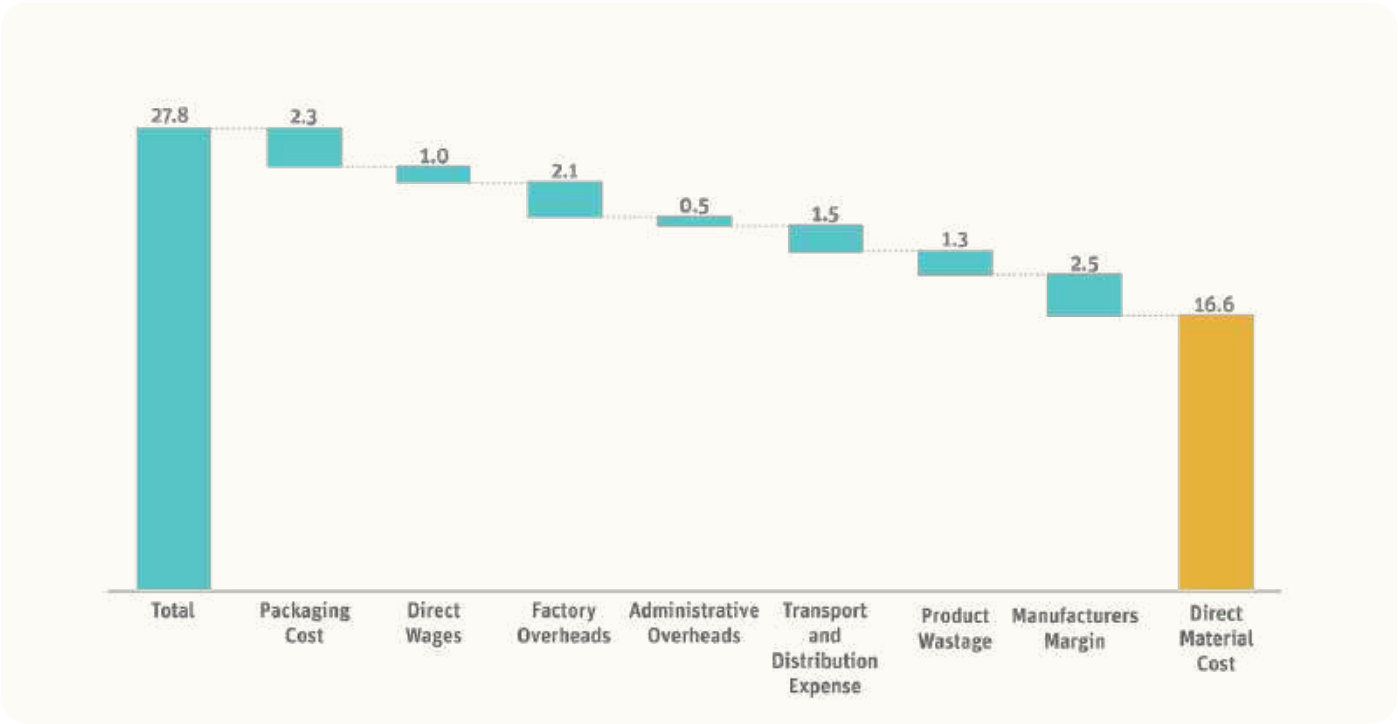
The process of THR reformulation will vary from state to state. Nutrition surveys should be carried out to determine the micronutrient deficiencies in a specific state. Irrespective of the guidelines, the state THR should be providing the nutrients that the beneficiaries in the state are deficient in. The excel models or tools that CHAI developed can be adapted across states.

Accountability needs to be addressed

THR reaches only 35% of the intended beneficiaries. Better mechanisms to improve access such as QR (Quick Response) codes on each THR package that can be scanned at points of contact could help increase accountability.

Despite these challenges, reformulating THR in Madhya Pradesh to fill the nutrient gap, is a step in the right direction, which can bring about significant changes in the malnutrition status, when coupled with robust production and distribution systems.

FIGURE 1: Cost structure in INR of one packet of THR (600 grams) for children



References

1. Social Statistics Division, Central Statistics Office, Ministry of Statistics and Programme Implementation, Government of India. Children in India – 2018. Internet: http://www.mospi.gov.in/sites/default/files/publication_reports/Children%20in%20India%202018%20%E2%80%93%20A%20Statistical%20Appraisal_26oct18.pdf (accessed 10 February 2020)
2. Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council. 2019. Comprehensive National Nutrition Survey (CNNS) National Report. New Delhi
3. International Institute of Population Sciences. National Family Health Survey-4 2015-16. Internet: http://rchiips.org/nfhs/NFHS-4Reports/India.pdf (accessed 21 January 2020)

An Investment Case for Madhya Pradesh: Is Financial Sustainability Achievable?

This is an abridged article based on the Clinton Health Access Initiative (CHAI)'s analysis. Reproduced with permission.

Key messages

- Issues with the existing centralized model in Madhya Pradesh have led to increasing calls for decentralization of Take-Home Ration.
- Clinton Health Access Initiative undertook a comprehensive diagnosis of the existing versus proposed production models, including looking at the cost drivers and revenue needed to make the decentralized model sustainable at three possible administrative levels.
- This analysis was then compared with the costs involved with strengthening the current centralized model, by introducing barcoding technology.
- The analysis showed that decentralization was only financially sustainable at the divisional and district levels but still considerably more expensive than introducing barcoding into the centralized model.
- Despite the grave challenges of the existing centralized model, in the past 15 years, Madhya Pradesh has managed to achieve a 15% reduction in wasting and 21% decrease in underweight for children under five. It should not hurriedly transition from one model to another without understanding the full financial and health implications.

Introduction

Madhya Pradesh currently has a centralized model for Take-Home Ration (THR), which is racked with issues of leakage and pilferage. Reports and anecdotes from field experiences suggest that the following gaps in the monitoring mechanism lead to unchecked leakages:

1. Lack of a foolproof monitoring mechanism to track actual quantities of THR produced in the facilities, received, and stocked at warehouses, and distributed to Anganwadi Centers (AWCs) and beneficiaries.
2. Substandard quality of THR that discourages consumption and leads to side selling in the market as cattle feed.

These issues have led to increasing calls for decentralization of THR, so that self-help groups (SHG), village collectives and women's groups can take on the role. The argument is that not only would decentralization address the leakage issues but also give local communities greater control over the variety and quality of meals being provided to undernourished children. Additionally, decentralization would also help generate employment, particularly among marginalized women in rural MP.

Given this, the Clinton Health Access Initiative (CHAI), an NGO supporting critical interventions to improve the health of women and children including combating chronic malnutrition, undertook a comprehensive diagnosis of the existing versus the proposed production models, which included looking at the cost drivers and revenue needed to make the decentralized model sustainable, at the divisional, district and block levels. This analysis was then compared to the costs involved with strengthening the current centralized model by introducing barcoding technology. Key findings from their analysis and its implications for decision-making by state officials are presented in this report.

"Not only would decentralization address the leakage issues but also give local communities greater control over the variety and quality of meals."

Past Brush with Decentralization

Madhya Pradesh had briefly transitioned to a decentralized model in the early 2000s, but discontinued it soon after, chiefly because of the financial infeasibility of the community-based organization to build-up the required infrastructure, and the limitation in working capital required for day to day operations while waiting for bills to be cleared by the government. Some of the major cost drivers that rendered this model unsustainable included:

- Investment in the manufacturing infrastructure by the state – this would be a recurring cost every five years.
- Repair and maintenance of production units – which would have a high cost impact as delays and closures affect production.
- Cost of basic ingredients – these keep fluctuating while ICDS's cost allocation per beneficiary remains constant.

Renewed Focus on Decentralization

Despite these issues, the calls to decentralize have persisted, most notably because the current centralized system has failed to deliver the much-needed THR to the most backward districts of the state, where malnutrition is rampant. However, since Madhya Pradesh's first stint with decentralization, a lot has changed. According to a Supreme Court order issued to Secretaries in-charge of ICDS on 9th May, 2012, energy-dense fortified food provided to children between 6 to 36 months should be manufactured at a facility that minimizes infection through any form of contamination, preferably through an automated facility.

This directive has important implications, warranting a re-examination of the financial feasibility of the decentralized model, because it adds two important infrastructure and labor-related cost drivers. There is a need to have a semi-automated plant and it is estimated that it would take a minimum of 15 women as plant operators and 5 administrative staff to manage the functions of finance, engineering etc., to run each plant. Given this context, CHAI developed and analyzed three possible decentralization scenarios for financial feasibility. This analysis was undertaken in 2015 and has been slightly updated by the *Sight and Life* team to reflect the new administrative geography of Madhya Pradesh.

Scenario 1

One automated plant at divisional level with the production capacity of 1600 Metric Ton (MT) per month

Scenario 2

One automated plant for two districts with the production capacity of 700 MT per month

Scenario 3

One block level plant with the production capacity of 60 MT per month

Investment needs for the different decentralization scenarios

Scenario 1

One automated plant at divisional level with the production capacity of 1600 MT per month

Investment Needs:

The total establishment cost of setting up a 1600 MT plant would be approximately INR 11.4 crore (Table 1). Madhya Pradesh would need about 10 such plants to cater to the entire THR demand in the state and the total cost of setting up these units would be about Rs. 114 crore. A full transition from the current centralized model to 10 decentralized automated plants at the district level, across the state, would take approximately two years.

Scenario 2

One automated plant for 2 districts with the production capacity of 700 MT per month

Investment Needs:

The total establishment cost of setting up a 700 MT plant would be approximately INR 4.8 crore (Table 2). Madhya Pradesh would need about 25 such plants to cater to the entire THR demand in the state and the total cost of setting up these units would be about INR 120 crore. A full transition from the current centralized model to 25 decentralized automated plants

TABLE 1: Scenario 1 | Capital cost structure of one automated plant (production capacity of 1600 MT /month) at divisional level

S. NO	PARTICULARS	RS. (CRORE)
1.	New building construction (Rs.500 per sq ft)	1.00
2.	Plant & machineries, power connections (as per details)	5.00
3.	Atomization including modern equipment	3.00
4.	Miscellaneous assets (furniture and fittings)	0.26
5.	Expenditure for statutory licenses	0.16
6.	Total	9.42
7.	Preliminary & preoperative expenses (@ 10% on #6)	0.94
8.	Total capital expenditure (after #7)	10.37
	Contingencies (@ 10% on #8)	1.04
	Total establishment cost (in crore)	11.4
	Total establishment cost (in Rs)	11,40,28,205

at the district level, across the state, would also take approximately two years.

Scenario 3

One block level plant with the production capacity of 60 MT per month

Investment Needs:

The total establishment cost of setting up a 60 MT plant would be approximately INR 75 lakh. Madhya Pradesh would need about 333 such plants to cater to the entire THR demand in the state and the total cost of setting up these units would be nearly INR 250 crore. This is nearly double of the district and divisional level needs, immediately rendering it unviable.

Viability of each scenario

CHAI's analysis of the investment needs for each of the decentralization scenarios above highlights very clearly that as the placement of the plants moves lower in the administrative value chain, the financial viability of the model becomes weaker. Among the three scenarios, scenario one offers a higher return to the state and hence is more desirable, as measured by Internal Rate of Return (IRR). IRR is used as a capital budgeting metric to evaluate the attractiveness of a project or investment. It is used to rank projects "internally" and does not account for external factors such as cost of capital or inflation. Another metric that is useful to consider is the break-even period. At the block level it would take eight years to break-even, despite twice the profit margin, compared to the other two scenarios. Even at the district and divisional levels, break-even periods are long – of seven to eight years – with a low profit margin of 6%. This is assuming all the plants operate smoothly and capabilities needed to run these plants are fully utilized, which is often not the case.

"As the placement of the plants moves lower in the administrative value chain, the financial viability of the model becomes weaker."

TABLE 2: Scenario 2 | Capital cost structure of one automated plant (production capacity of 700 MT/month) at district level

S. NO	PARTICULARS	RS. (CRORE)
1.	New building construction (Rs.500 per sq ft)	0.50
2.	Plant & machineries, power connections	2.00
3.	Atomization including modern equipment	1.00
4.	Miscellaneous assets (furniture and fittings)	0.26
5.	Expenditure for statutory licenses	0.16
6.	Total	3.92
7.	Preliminary & preoperative expenses (@ 10% on# 6)	0.39
8.	Total capital expenditure (after #7)	4.32
	Contingencies (@ 10% on #8)	0.43
	Total establishment cost (in crore)	4.75
	Total establishment cost (in Rs)	4,74,78,205

Key Considerations: Centralized or Decentralized?

The above analysis in Madhya Pradesh uncovers key aspects of financial viability that states should evaluate for each of the three decentralization scenarios. These include:

1. Retained earnings of SHGs at each level of decentralization
   - Are these enough to cover technical assistance required for set-up and operation?
   - If not, is a grant available through development partners or a government scheme?
2. Capital expenditure costs at each level of decentralization
3. Access to working capital at each level of decentralization
   - What is the prevailing interest rate?
   - How long is the payback duration?

An evidence-based approach would be to test the SHG model at the divisional level or the district level for a considerable duration before a final decision is taken. The financial analysis makes it clear that block level decentralization plans should be discontinued. At the same time, it is recommended that the centralized model with a barcoding system to improve reach and curb leakage, be tested for evidence-based decision-making. CHAI estimates that rolling out a statewide barcoding system in the existing centralized scenario would cost only INR 31 to 40 lakh. Thus, it was concluded that introducing barcoding in the centralized system would produce better results in Madhya Pradesh with much lower costs, effort and better quality control and assurance, as there are fewer units to monitor compared to the 10 to 333 units in any of the semi-automated decentralized scenarios.

"CHAI estimates that rolling out a statewide barcoding system in the existing centralized scenario would cost only INR 31 to 40 lakh."

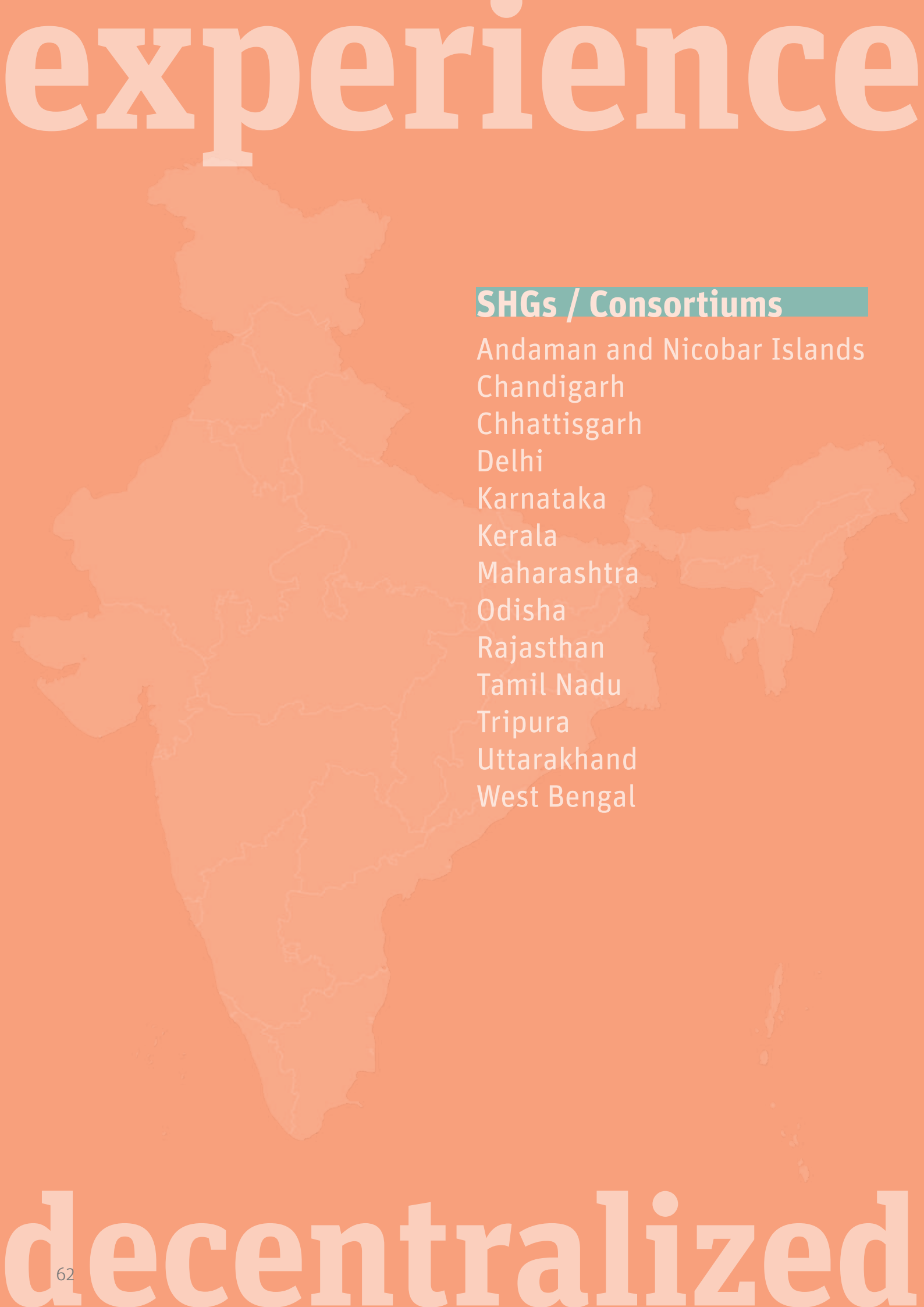
Despite the grave challenges of the existing centralized model, in the past 15 years, Madhya Pradesh has

managed to achieve a 15% reduction in wasting and 21% decrease in underweight for children under five. Just like any other state, Madhya Pradesh should not hurriedly roll-out and transition between the different models, without fully considering the financial implications and health impact on millions of beneficiaries.

FIGURE 1: Comparison of the 3 decentralization scenarios

	IRR	EXPECTED MARGIN	BREAK-EVEN YEAR	NO. OF PLANTS	ANNUAL PRODUCTION (Metric Tonnes)
DIVISIONAL LEVEL	5%	6%	7	10	19,091
DISTRICT LEVEL	2%	6%	8	25	8,400
BLOCK LEVEL	1%	11.5%	8	333	671

experience



SHGs / Consortiums

Andaman and Nicobar Islands
Chandigarh
Chhattisgarh
Delhi
Karnataka
Kerala
Maharashtra
Odisha
Rajasthan
Tamil Nadu
Tripura
Uttarakhand
West Bengal

decentralized

A Cluster Model in Kerala: Experience of Kudumbashree

Shariqua Yunus, Surbhi Dhawan, Rafi P
United Nations World Food Programme, Delhi, India

Key messages

- Ministry of Women and Child Development, Government of Kerala, has adopted a three-tiered decentralized model of production and distribution of Take-Home Rations in collaboration with Kudumbashree State Poverty Eradication Mission, a federation of women's neighborhood groups.
- Kudumbashree has more than 241 microenterprise units that produce a cereal-based mix fortified with 11 vitamins and minerals, for over 4 lakh young children.
- The programme has been successful in meeting the twin goals of empowering poor women by enabling them to become active earners and not just passive recipients, and eradicating malnutrition by fortifying Take-Home Rations.

Take-Home Ration (THR) production in Kerala is one of the few decentralized models in India to integrate fortification in the production process. Fortification of THR in Kerala was initiated in the year 2016 under Integrated Child Development Services (ICDS) by Women and Child Department (WCD) of Kerala and the United Nations World Food Programme (UNWFP), in collaboration with the Kudumbashree Mission in Kerala, to alleviate the high prevalence of anemia and micronutrient deficiencies. In Kerala, 12.5 percent children suffer from anemia, while 19 percent children have Vitamin A deficiency, according to Comprehensive National Nutrition Survey.[1] The blended food that is provided to children between ages 6 and 36 months as THR under ICDS is locally known as '*Amrutham Nutrimix*'. It is produced by the 'Kudumbashree Mission' – a federation of women's self-help groups (SHGs).

The Kudumbashree Model

Kudumbashree, meaning 'prosperity of the family', is the poverty eradication and women's empowerment programme implemented by the State Poverty Eradication Mission, Government of Kerala. It has a three-tiered structure for its women's community network.[2]

The three-tiered framework

The community-based organizations in Kudumbashree are built at the panchayat or municipality or corporation levels. At the base, there are NHGs with 10 to 20 members. The membership of Kudumbashree is through the NHGs and is open to all women belonging to both poor and 'non-poor' households. These NHGs are affiliated to an Area Development Society (ADS) at the village or ward level. All the ADSs in the Panchayat, Municipality or Corporation are then affiliated to a Community Development Society (CDS). As of January 1st, 2020, there were nearly 45 lakh women registered in the organization through nearly 3 lakh NHGs, which is looked after by 19,854 ADSs under 1073 CDSs (Figure 1).[3]

The Neighborhood Groups

NHGs are formed with 10 to 20 members from economically backward families (only one woman per household). Weekly meetings are convened in the houses of NHG members where they pool their weekly savings, which is a fixed amount equal to the weekly savings of the poorest member of NHG. The collection is deposited in the bank regularly and after six months of operations they start internal lending. In each NHG, five office bearers are democratically selected for undertaking various functional activities – President, Secretary, Income Generation Activities Volunteer, Community Health-Education Volunteer and Infrastructure Volunteer.

Area Development Society

ADS is a cluster formed by federating all the NHGs in the ward. It functions through two bodies: the general body consisting of a president, secretary and three sectoral volunteers, and the governing body

consisting of the elected president, secretary and five members to the committee from the general body. The duties and responsibilities of the ADS include, but are not limited to, conducting monthly meetings, monitoring credit and savings, monitoring NHGs, and organizing training in accounting.

Community Development Society

CDS is a registered body formed by federating all ADSs in the local bodies. Like the ADS, the CDS functions through a general body and a governing body. The general body consists of all the members of the respective local ADSs as well as representatives of the local government involved in implementing poverty alleviation and women's empowerment programs. The chairperson, vice chairperson, the member secretary and seven other members from the general body of the ADS come together to form the governing body.[5] The duties and responsibilities of the CDS include, but are not limited to, exploring government and other schemes, organizing trainings and seminars, providing guidelines to the Panchayat for poverty eradication programs, and monitoring credit and savings.

With the patronage and guidance of Kudumbashree NHG selected members from every district of Kerala operate microenterprise units that produce the *Amrutham Nutrimix* as THR for children under three years of age.

THR Production

Amrutham Nutrimix is a fortified food supplement suitable for six-month to three-year-old children.[7] It is a cereal-based powder mix developed by Central Plantation Crops Research Institute (CPCRI), Kasaragod. The product consists of wheat, bengal gram, textured soya chunks, groundnut and sugar. It adheres to the nutritional values of energy and proteins prescribed by GOI for ICDS foods. It is fortified with 11 micronutrients (Calcium, Iron, Zinc, Vitamin A, Thiamine, Riboflavin, Niacin, Vitamin B6, Vitamin C, Folic Acid and Vitamin B12). (Table 1.)

Production and supply chain

Each microenterprise at the NHG level consists of five to ten trained members. The first production unit of this kind was formed in Kasaragod District and by 2007 all the districts in the state had Nutrimix units. As of today, there are 241 production units across the state, which produce approximately 1,200 to 1,300 MT Nutrimix monthly for 400,000 children. The details of investment required for setting up such a unit are illustrated in table 2. Production process of Nutrimix is illustrated in figure 2. After blending, Nutrimix is packaged in an aluminum-coated tetra material. Currently, Nutrimix units across the state procure packaging material either as a district consortium or in certain districts individually. In both cases the units have to follow the specifications mandated by Kudumbashree.

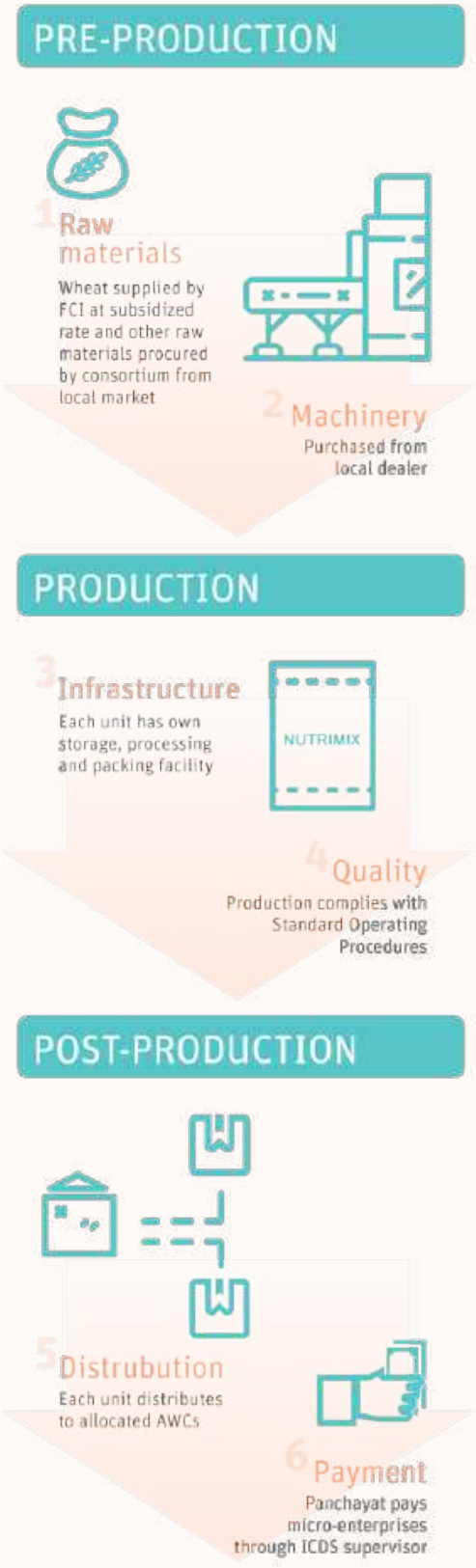
Procurement and distribution process between ICDS

FIGURE 1: The three-tiered structure of Kudumbashree[4]

TABLE 1: : Nutritive value per 100g of Nutrimix

Energy (kcal)	365
Carbohydrate (g)	59.1
Fat (g)	7.4
Protein (g)	13.9
Vitamins / Minerals	
Calcium (mg)	54
Thiamine (mg)	0.38
Riboflavin (mg)	0.13
Niacin (mg)	2.83
Total Folates (mcg)	79.63
B-carotene (mcg)	29
Iron (mg)	3.87

FIGURE 2: Key processes of Nutrimix production[2]



and the microenterprises are outlined in figure 3. Since May 2019, with the technical support of WFP, fortified Amrutham Nutrimix is provided in all of the 33,115 AWCs across the state, reaching over 4 lakh children every month. Adhering to the provision of supplementary nutrition under ICDS Scheme that every child in the age group of 6 months to 3 years is entitled to receiving 500 calories of energy and 12-15 grams of protein per day through food supplement, a total of 3.375 kg of Amurtham Nutrimix is supplied to every child every month.

Nutrimix Financials

Having started with an initial investment of INR 2,50,000, the Nutrimix microenterprise units across the state have undergone various upgrades over the years. As of today, each production unit in the state has a minimum investment of INR 11 lakh. The procurement cost of Nutrimix by the WCD or Local

TABLE 2: Details of infrastructure costs for a Nutrimix production unit[3]

	CAPITAL EXPENDITURE (FIXED COSTS)	COST (IN INR)
1	Wheat cleaning Allur machine with a motor	1,00,000
2	Uruli Roaster (capacity of 50 kg)	1,50,000
3	Groundnut peeling machine	1,50,000
4	Pulverizer - double head with a motor (15HP) including installation	2,50,000
5	Swifter	75,000
6	Blender (capacity of 100 kg)	1,50,000
7	Cooling trays (8 ft by 4 ft), 4 units (2 cooling trays are needed for cooling raw materials after roasting and 2 trays are needed for cooling the final product before packing)	1,20,000
8	Electronic weighing machine (2 units) (one for weighing raw materials and other one is for weighing final product)	30,000
9	Date coding machine	45,000
10	Band sealing machine	40,0000
11	Stainless steel utensils (different types)	50,000
	TOTAL	11,60,000
	VARIABLE EXPENSES	
1	Cylinder making expense for packing cover	50,000
2	Cost of packing cover (INR per cover)	INR 1.4 to 1.8

Self-Government (LSG) has been adjusted with inflation due to an increase in the cost of raw materials and wages. From INR 37 per kg in 2007, the cost of procurement of Nutrimix is now at INR 73 including GST, in 2020.

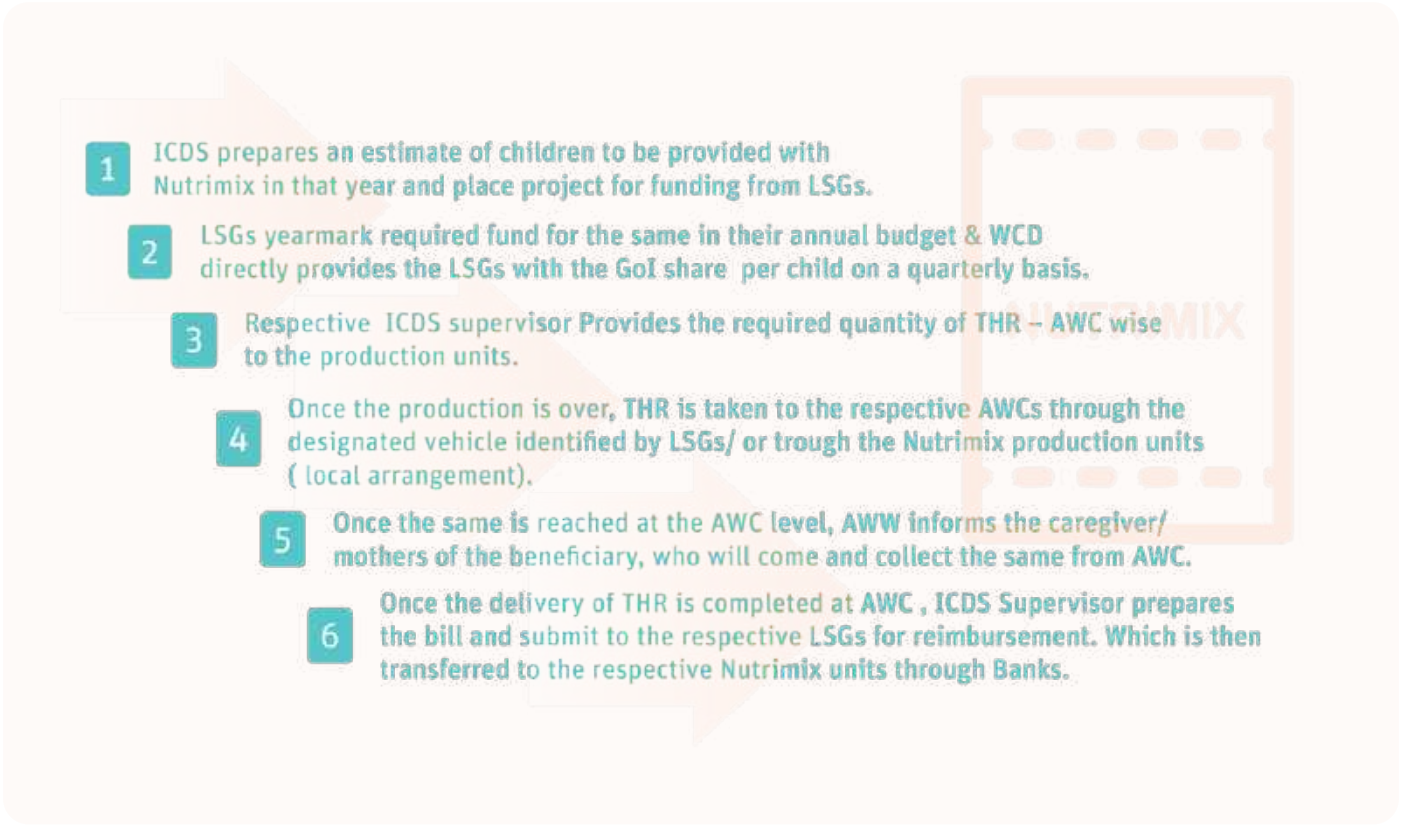
Achievements

The programme has been successful in empowering poor women, by enabling them to become active earners and not just passive recipients. Kudumbashree management confirmed that there are 1659 women members operating the 241 production units across the state. While wages differ across the units, a minimum of INR 600 per day is received by each unit member. The most laudable achievement of this model is the rollout of state-wide THR fortification with 11 micronutrients, which has increased the demand for the product among mothers and primary care givers. This is a praiseworthy step towards increasing compliance to regular supplementary feeding and thus preventing malnutrition.

Conclusion

The Kubumbashree example illustrates how a strong federation of women woven through different levels of society can make a difference in the coverage, compliance and thus success of THR distribution. It also highlights that a multiple micronutrient fortified product,

FIGURE 3: Supply Chain of Nutrimix in the Kudumbashree model[6]



such as Nutrimix, is in demand among mothers and caregivers as seen through the increased uptake across the state. The three-tiered model from Kerala has been demonstrated to be replicable, scalable and sustainable towards achieving the twin goals of tackling malnutrition and empowering women from low socioeconomic groups.

References

1. Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council. 2019. Comprehensive National Nutrition Survey (CNNS) National Report. New Delhi.(accessed 27 January 2020)
2. Department of Local Self Government, Government of Kerala. Kudumbashree, About. n.d. Internet: http://www.kudumbashree.org/pages/171 (accessed 27 January 2020)
3. WFP team interactions, Delhi, India. January-April 2020
4. Shihabudheen N. Role of Micro Enterprises in Women Empowerment: Evidence from a Field Study of "Kudumbashree" Units in Ernakulam District in Kerala. Nov-Dec 2012. Internet:http://www.kudumbashree.org/storage//files/qmhbj_role%20of%20micro%20enterprises%20in%20women%20empowerment.pdf (accessed 27 January 2020)
5. Nidheesh K.B, "Kudumbashree in Kerala is Jeopardize or Conducive?", paper presented in the 1st international seminar on microfinance organised by Pondicherry University, Pondicherry, 1st October 2007
6. Amrutham Nutrimix Consortium, Kerala. Amrutham Nutrimix: A Successful Business Model of 'Kudumbashree'. 22 August 2016. Internet: http://www.kudumbashree.org/storage/files/2l7ve_best%20practice%20nutrimix.pdf (accessed 27 January 2017)
7. Kudumbashree. Nutrimix- A Success Saga. Internet: http://www.kudumbashree.org/storage/files/zutiy_40.nutrimix%20document.pdf (accessed 8 April 2020)

Governance and Accountability: Experience of Odisha

This is an abridged version of a study by NITI Aayog on the decentralized model in Odisha. Reproduced with permission.

Key messages

- Commitment from government bodies at the state, district, and village levels has been crucial to the development of a Take-Home Ration production and distribution system that meets the needs of beneficiaries and maintains desired levels of quality.
- The involvement of local stakeholders as monitoring committees and Take-Home Ration producers has made the system more responsive to local conditions and requirements.
- *Jaanch* Committees and Mothers' Committees reinforce standards of quality for production and distribution through increased accountability from independent oversight of the process.
- The Odisha model shows that, when implemented properly, decentralized Take-Home Ration systems can produce and distribute nutritional products that meet standards and serve communities without adding to overall costs.

Introduction

In recognition of the Supreme Court's issue regarding universalization with quality and decentralization of procurement, the Government of Odisha reformed the Integrated Child Development Services (ICDS) system and took the necessary steps towards decentralization in April 2011. In the new system, all raw materials except rice and wheat are procured locally by Anganwadi Workers (AWWs) to reduce the chances of pilferage during transportation. In addition, the system allows greater community involvement during implementation to ensure accountability in the timely distribution of high-quality Take-Home Rations (THR) to beneficiaries.

Key Stakeholders

The new system follows a three-tier structure, with well-defined roles for stakeholders at the state, district, and village levels (Figure 1). This system is designed to ensure statewide standardization of THR composition and quality.

To encourage community participation and ownership of the programme, the Department of Women and Child Development has institutionalized community level monitoring through the formation of Mothers Committees (MC) at each AWC and *Jaanch* Committees (JC) at each revenue village. The role of MCs is to ensure quality of hot cooked meals and Chhatua distributed at AWCs and the role of JCs is to ensure that all the feeding programs maintain prescribed quality and quantity. Both the committees are constituted of well-educated individuals from the locality.

Key Strategies

In early 2011, the state government held consultations with primary stakeholders of the ICDS system, including AWWs, Panchayati Raj Institutions (PRIs), officials from the Ministry of Women and Child Development (WCD) and other related departments.[1] These consultations resulted in five actionable steps (Table 1) highlighting the potential gaps that could emerge from the decentralization process, as well as developing systems and procedures to ensure the initiative's success.

First, the norms and entitlements for morning snacks, hot cooked meals and THR (named Chhatua in Odisha) were revised (Table 2).[1] The resulting guidelines

established the content and quantity of THR based on the target beneficiary group, prescribed regular supply at a 15-day interval, and outlined requirements for packaging that is color-specific to each target beneficiary group. For example, yellow packets are prescribed for mothers and red packets for children in the severe acute malnutrition (SAM) category. These standards are displayed at every AWC in the form of pictorial charts and are used as the basis for verifying the capacities of self-help groups (SHGs) to produce, distribute and supply THR.

"Standards are displayed at every AWC in the form of pictorial charts and are used as the basis for verifying the capacities of Self-Help Groups."

Only graded SHGs must be selected and preference must be given to SHGs with experience in drying, grinding and packaging. The SHG selection and THR production unit installation is done by District Collectors supported by Mission Shakti, Tripti, Orissa Rural Development and Marketing Society (ORMAS), National Rural Livelihood Mission (NRLM), Odisha Tribal Empowerment & Livelihoods Programme (OTELP) and Western Orissa Rural Livelihoods Project (WORLP).

Second, allocated funds for procurement of raw materials are directly transferred via e-transactions into the joint accounts of AWWs. This helps local procurement by AWWs, reducing delay in payments to SHGs. Management Information System and Treasury Management System at the state level facilitate monitoring of funds.

FIGURE 1: Key stakeholders in the ICDS decentralization initiative

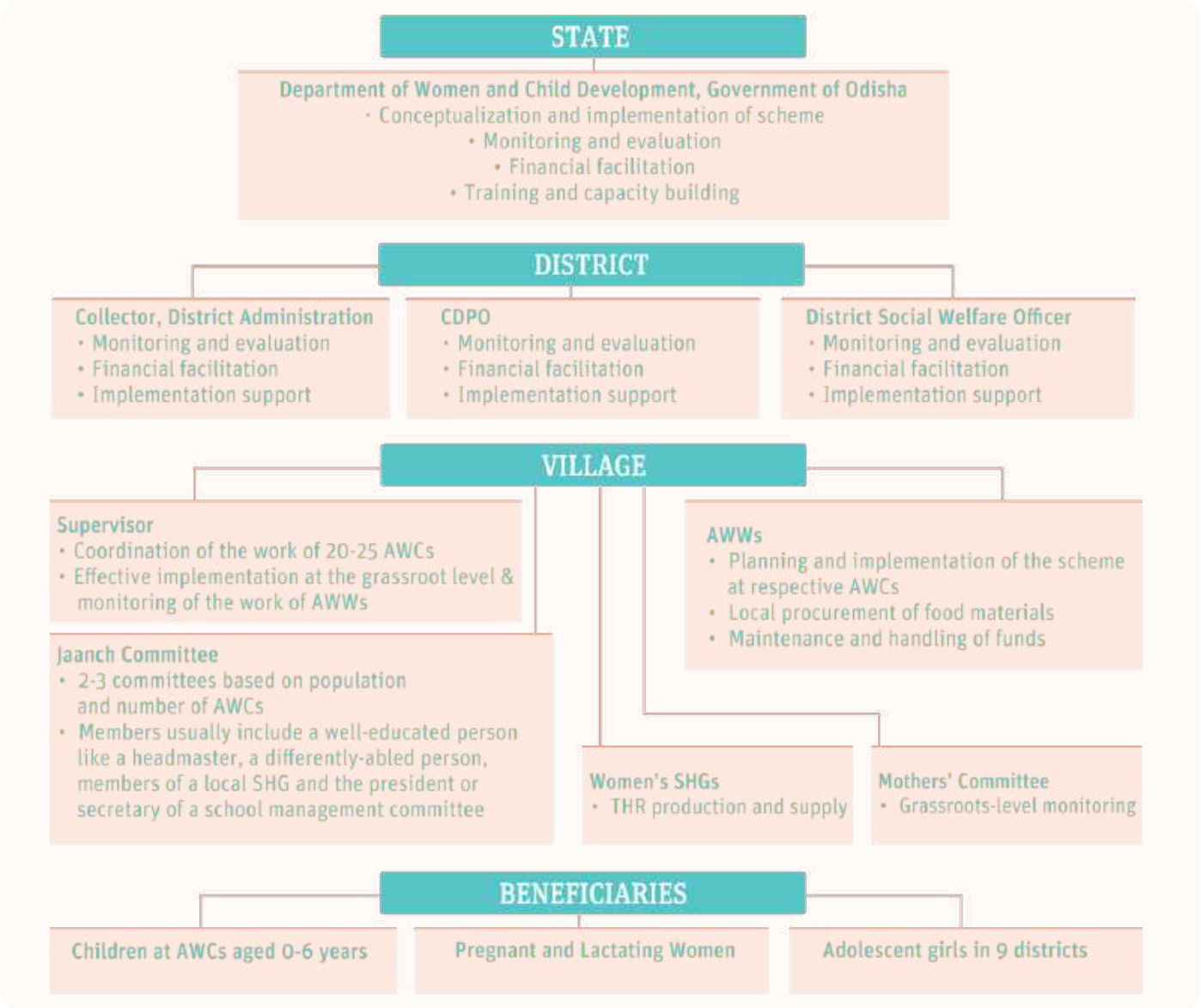


TABLE 1: Five actionable steps for effective decentralization in Odisha

REFORM	RATIONALE
All procurement, save for rice and wheat, will be carried out locally at the village level. Rice and wheat will be procured from the Food Corporation of India	• To prevent transmission loss and eliminate the existing contractor system • To address the problem of inadequate checks on quality and quantity • To avoid spoilage of foods and materials resulting from storage of supplies for 1-3 months
Joint accounts will be opened for each AWC in the names of the AWW and a ward member	• To create greater accountability by ensuring beneficiaries and interested parties have direct access to the key implementing stakeholders
Only e-transfers will be permitted for all fund transactions under the system	• To prevent pilferage of funds • To streamline the fund flow system
A new grassroots body called *Jaanch* Committee will be formed	• To engage active participation of the community in monitoring the program • To assess the needs of each AWC and support procurement strategies
Renewed and rigorous efforts will be undertaken to train all the community stakeholders in accordance with the new guidelines	• To increase awareness of children's entitlements to adequate nutrition under ICDS • To determine a more effective way of communicating training materials

"Allocated funds for procurement of raw materials are directly transferred via e-transactions into the joint accounts of AWWs."

Third, training and capacity building of community stakeholders is done through video recordings of guidelines, recipe demonstrations, and cookery shows. During the first six months, the videos were played at an interval of 7-10 days at the Child Development Project Office and at all Gram Panchayats. Now, the videos are played only for refresher trainings. In addition, Jaanch Committees and Mothers' Committees have both undergone one-on-one trainings, where they were taught to use the participatory learning appraisal tool.

Fourth, publications and communication material are used by the state government to increase awareness of the initiative.

These four actions by the Government of Odisha have been instrumental in facilitating exchange and cooperation among the various stakeholders involved in the decentralization process and subsequent THR production and distribution.

Process

The THR procurement process involves members of local AWWs, a PRI member, the Jaanch Committee, and the Mothers' Committees who come together for meetings each month. At these meetings, the stakeholders

identify the number of beneficiaries to be supplied under each category, devise monthly expenditure estimates, and outline a procurement plan for the month, which includes items to be purchased and the shops where they will be bought. For rice and wheat, the only items not purchased locally, supplies are provided by the FCI. On the distribution end, SHGs supply AWCs with THR twice a month. AWWs, who have a list of identified pregnant women, distribute to mothers every month at AWCs, with some AWWs supplying THR directly to the houses of beneficiaries.

Key Challenges

At the beginning of this reform, the system faced challenges related to capacity building at the ground level. There was widespread apprehension and resistance on the part of AWWs and PRIs to open new bank accounts, in addition to AWWs' concerns of being overburdened and reluctance on the part of SHGs to invest in THR production. However, these perceptions changed after seeing the benefits and efficiency of the system in ensuring timely and good quality THR. There are still cases of SHGs lacking infrastructure, AWCs not having dedicated buildings and delays in the supply of wheat and rice by FCI.

Impact and Key Success Factors

Improved functioning of the ICDS:

A social audit carried out in late 2011 suggested that decentralization is serving its objective of streamlining and strengthening the ICDS programme without any added cost. Within six to seven months of decentralization, 71% of the beneficiaries felt that the menu chart was being followed as per plan. Transparency and efficiency improved because of the elimination of contractors and middlemen. Most importantly, the revised packaging of Chhatua ensures minimal intra-household consumption, resulting in improved nutrition of intended beneficiaries.

Empowerment of women:

Decentralization provided a new source of income to SHGs and empowered their women members.

The success factors of the decentralized model in Odisha have been documented in numerous surveys

"Within six to seven months of decentralization, 71% of the beneficiaries felt that the menu chart was being followed as per plan."

TABLE 2: Revised feeding norms as of 2013

BENEFICIARY	THR TYPE
6 months to 3 years	Two boiled eggs per week + Chhatua one packet (Net 1.700 kg) every 15 days
Pregnant women and lactating mothers	Two boiled eggs per week + Chhatua one packet (Net 1.700 kg) every 15 days
Severely malnourished children (6 months - 3 years)	Two boiled eggs per week + One packet of Rasi ladoo of 100 gms once in a month + Chhatua one packet (Net 2.550 kg) every 15 days
Severely malnourished children (3 - 6 years.)	One packet of Rasi ladoo of 100 gms once in a month + Chhatua one packet (Net 1.700kg) every 15 days + Hot Cooked Meal + Morning Snack

and case studies. In 2012, for example, the Odisha model was named as a "best practice study" and highlighted for its positive impacts on SHG members who had increasingly become economically stable, leading to regular earnings. The system has also been credited with improving nutrition through its success in providing 50% of Recommended Dietary Allowance (RDA) through supplemental nutrition. These achievements have been linked to a number of factors, including the oversight of the Jaanch and Mothers' Committees, patterns of cooperation among AWCs, and thorough training regimens for community stakeholders.[2] Still, the element that has been the most pivotal throughout the process is the commitment and active involvement of government officials at all levels, from participation in the initial stakeholder consultations prior to decentralization, to involvement in SHG producer selection, to continued support for trainings and procurement of materials.

Replicability and Sustainability

Social sustainability of the initiative is high, owing to the successful run of the community-driven model that has been institutionalized for the Supplementary Nutrition Program (SNP). Following the success of Jaanch Committees in SNP, the system will now also be extended to other components of ICDS on a trial basis to encourage more community participation in implementation. Long-term sustainability requires the state administration to create an enabling environment. For the purposes of introducing reforms, support for this initiative was garnered from the apex to the grassroots level and the required trust was invested in grassroots functionaries. The replication of this model requires a strong administrative push towards identifying context-relevant loopholes in the system. Training and capacity building of the community is also an essential factor for the smooth deployment of the model, which has demonstrated that procuring raw materials at ration rates may be difficult but it is possible, and that contractors can be removed from the supply chain of THR with beneficial results and effective implementation.

"Long-term sustainability requires the state administration to create an enabling environment."

Conclusion

From the outset, Odisha's approach to decentralizing its THR production and distribution systems demonstrated a commitment to meeting the needs of its communities. This is highlighted by the government's decision to consult key stakeholders early in the development process and has continued through the active recruitment of local stakeholders in the form of monitoring committees and SHGs. As such, the Odisha THR production model has been characterized by a high degree of accountability to stakeholders and responsiveness to the local needs and changing conditions. While many aspects of the Odisha decentralization process have been specific to the regional context, the principles displayed throughout the government's approach offer insights that can help inform better accountability in decentralized models across the country.

References

1. Decentralization of ICDS Supplementary Nutrition Programme: Ensuring timely and quality nutrition to all beneficiaries in Odisha, Social Sector Service Delivery: Good Practices Resource Book 2015 (150-157). New Delhi, India: UNDP; 2015
2. Rao, Veena S. National Framework for the production and procurement of Take-Home Ration (THR) under ICDS. GAIN, 22

Situation Analysis of Rajasthan's Take-Home Ration Program

Priyanka Kumari, Madhavika Bajoria, Kalpana Beesabathuni
Sight and Life, Bangalore, India

Alex Burns, Alex Hardin, Danielle Minnett, Nayantara Bhandari
John Hopkins University Research Team, USA

Key messages

- Rajasthan uses the decentralized approach for producing Take-Home Rations, which has many drawbacks and challenges.
- Transitioning to a more centralized model at the divisional level with small scale production facilities managed by women, a social enterprise development model, could be beneficial.

Introduction

Rajasthan is one of the largest states in India where Take-Home Ration (THR) production is mostly operated by small kitchen-based facilities through Self-Help Groups (SHGs). Each SHG produces THR for one or a few anganwadi centers (AWCs) in their local communities.[1]

Product

In Rajasthan, children under age three and pregnant and lactating women (PLW) receive the same product in different quantities, i.e. 750g per child and 930g per PLW. These quantities last for one week. The product is a mixture of wheat and pulses (Figure 1) and it is typically consumed by adding hot water or ghee. Since the THR is being produced and packaged by women in home kitchens, the recipe is simple and is not fortified with micronutrients. The main reason for the lack of fortification is that these facilities do not have the economies of scale, production tools and skills to support it.

In addition, the THR is also packaged by SHG. Typically, the packaging has only one thin layer with a plastic seam. If dropped, these packages can tear. Even less constructively, some SHGs, particularly in rural areas, use staples to seal the package, a practice discouraged by food safety professionals. These staples can come loose and get accidentally mixed with the product itself.

The shelf-life of this product is also short due to rapid absorption of moisture. Once the pack is opened, beneficiaries are asked to store it in air-tight containers, however not everyone owns such containers. Even those who do, complain of the short-lived nature of the product.

Production

To become a producer, SHGs sign a contractual 18-month Memorandum of Understanding (MoU) with the Child Development Program Officer (CDPO). This MoU describes the THR recipe, proportions, and quality standards. Raw materials are grounded and roasted by

Figure 1: THR packet for children under 5

hand.[1] If it is not properly roasted, the product becomes bitter. THR is packaged and stored at the facility or at the homes of SHGs prior to delivery.[1]

To purchase raw materials, the Integrated Child Development Services (ICDS) pays an SHG a fixed amount per THR packet. The women are then responsible for procuring the ingredients locally. Due to seasonal variations in raw material prices and limited working capital for raw material procurement, it becomes difficult for SHGs to maintain the THR composition according to the recommended standards. For example, prices of bengal gram and soybean fluctuate more than other raw materials, which results in these sources of protein being excluded when there is a cash crunch. As a result, protein content is lowered and the nutritional value of THR is compromised.

Quality Testing

The MoU authorizes the CDPO to test the quality of the THR and supervisors are expected to visit SHGs once a month to ensure good sanitation and hygiene practices are being followed. If any issues arise, the MoU specifies that the contract may be temporarily or permanently discontinued.[1] In practice, however random quality checks and inspection of production area are infrequent. Even when standards are not met, there is no censure for the concerned SHG. The SHG receives only a warning and there is no follow up. As a result, there is little accountability and compliance by the SHG to the prescribed standards.

Figure 2: Focus Group Discussion involving women and children at Anganwadi Centres in Jaipur, Rajasthan

Consumption

Several focus group discussions were conducted by the *Sight and Life* and Johns Hopkins University student research teams across AWCs in Jaipur to gauge reactions of beneficiaries to product attributes, the consumption pattern and so on, of THR (Figure 2). Consumers mentioned that they find THR to be bland which gives them the flexibility to use it as an ingredient and prepare a variety of recipes by adding spices and other flavors as per their taste preferences. A respondent explained that while the product was almost exclusively fed to her child, an occasional spoonful was given to other family members. Her breastfeeding child consumes half a small bowl of THR, three to four times a day. Usually, she mixes THR with hot water, and sometimes with milk. During her pregnancy, she did not consume the ICDS recommended THR because of a preference to eat foods that were suggested by elders at home.

Upon enrollment as beneficiaries with at an AWC, PLWs receive a 5000-rupee cash benefit from the government. To train PLWs on how to use the THR, each PLW receives an information card about best practices for pregnancy, which includes complementary feeding practices. The AWC staff also provide immunization and home counseling visits, thus converging other ICDS and National Rural Health Mission services.

THR Ordering

Each Saturday a demand letter, stating the quantity required and number of beneficiaries, is finalized by the AWC staff. The Anganwadi Worker verbally confirms with mothers their availability to pick up THR products that week. The demand letter is then sent to the supervisor who coordinates with SHGs. Every Thursday, the THR product is available for pick up at the AWCs. If beneficiaries are added after the ordering process has been completed, staff will contact other AWCs to see if there is any remaining product.

Challenges

The main challenges of Rajasthan's decentralized THR model are summarized in table 1. In addition to the program not seeming to meet adequate nutrition standards, there are also instances where it fails to empower women through SHG formation. At times, women

are SHG leaders on paper, but it is their husbands who are responsible for the unit. In the words of Mr. Pramod Mahnot, a senior food technologist, "*you cannot travel on two boats*", implying that you can only fulfill the nutrition or gender objective at one time. He urges the ICDS to separate women's empowerment and nutrition mandates and calls for an independent evaluation of SHG production in Rajasthan.

JVS Foods and THR Production

JVS Foods was the first private enterprise involved in THR production in Rajasthan. The company specializes in fortified foods (Figure 3), including encapsulated iron salt and multigrain cereals. In 2001, the People's Unions for Civil Liberties filed a claim that cited deaths from starvation despite grain stocks being available in the storage houses of the Food Corporation of India. As a result, the Supreme Court issued orders that large contractors shall no longer be used for the supply of nutrition in AWCs.[3] Instead, the order emphasized that contracts for the production and distribution of ICDS foods should be given to local-level SHGs and other women-led community groups. By 2006, Rajasthan decentralized its procurement in a third of its projects.[3] However, the court deemed that decentralization progress was too slow and ordered the state to decentralize procurement in the remaining projects within one year.[3] As a result, JVS and other medium to large manufacturers could no longer produce THR for Rajasthan. Today, Part III no. 9 of the central government's guidelines says that state governments and UT administrations, as well as other stakeholders, must ensure "regular supply of Supplementary Nutrition at Anganwadi Centers without disruptions" and "use iodized or iron fortified iodized salts".[4] Under the same order, they mandate the "engagement of SHGs".[4] While in practice these two objectives have been incompatible, state governments have been wary of moving to a more centralized model for fear of losing funding.

TABLE 1: Summary of challenges in THR model in Rajasthan

CHALLENGES	CAUSE
Inconsistency in THR composition and preparation	Seasonal fluctuations in raw material prices result in changes to THR composition
	No standard weights used for measuring the quantity of THR - often stones or bricks are used as weights
Reduced protein content	Prices of bengal gram and soybean fluctuate more than other ingredients. These are sources rich in protein and are usually excluded when there is a cash crunch
Increased cost of production	Raw material is procured at retail price instead of wholesale price
Poor quality control	No awareness that low-cost methods of maintaining hygiene such as cleaning the floor, using a plastic sheet to cover THR can be followed
Sub-optimal social and financial empowerment of women	Mostly run by one family, with a male relative in the lead, and other women in the SHG hired as labour. Defeats the purpose of social and financial empowerment of women
Poor monitoring & evaluation	Limited manpower at ICDS department implies that at most only one monthly visit per SHG is possible
Economically unsustainable	Each SHG covers only two AWCs. Economies of scale don't apply. Further, SHGs buy raw materials at retail prices from village markets resulting in high cost of production
Underfunded & leakages	Division and allocation of villages to different blocks. Leakages across supply chain in the form of lower weight of THR packs or leftovers being used in subsequent cycles

Figure 3: Sample of JVS Food's Fortified Products

The Solution: An Enterprise Development Model

While under the current system there is no future for bonafide manufacturers such as JVS Foods to provide THR, they continue to advocate for better quality THR and are willing to support production improvements where possible. Their solution: women-managed production facilities. In an enterprise development model SHGs are transformed into enterprises each covering at least 500 AWCs. Successful enterprises are locally rooted, trade for the benefit of the community, are accountable to the community and aim to create a broad community impact. With good technical assistance, community-led enterprises can be supported at scale.

In advocating for a better system, state governments can plan to set up small-scale production plants, managed by women, at the divisional level. Centralized procurement will ensure raw materials are purchased at the lowest prices with assured quality, are protected from price fluctuations and thus paving the path towards economic viability. In this model, the facilities would still be operated by SHGs and the state would not risk losing central government funding. At the same time, it would allow for improving the quality of THR through fortification with micronutrients and have the capacity to ensure regular quality checks. Ending malnutrition is not just the responsibility of the government and international agencies but includes a much broader range of players – academic experts as well as industrial houses with the expertise, infrastructure and experience, must be at the table as partners or stakeholders. Such an important burden cannot be borne by SHG women alone.

"State governments can plan to set up small-scale production plants, managed by women, at the divisional level."

Decentralized versus Centralized

Overall, there seems to be stark differences between the centralized and decentralized models. When a manufacturer produces a product for ICDS or for all the NGOs that use their fortified foods, the production facilities utilize silos for raw material storage, mixers to add ingredients, extruders for high pressure cooking, hammer mills to grind the pellets, and automated packaging machine. Human hands are used only for maintaining the equipment and no one touches the product before consumption. Standards for packaging are derived from

World Food Programme guidelines and Codex. Meanwhile samples are taken twice daily and tested in labs for four to five days. Independent laboratory tests occur twice weekly. Finally, the products offered are customized for children and PLWs based on their nutritional needs. Major differences between the two models seen in Rajasthan are listed in table 2.

Transitioning: A More Centralized Model

Shifting from a decentralized to a more centralized model involves some barriers that would need to be addressed. First, many SHG women rely on income from the THR program. Turning to a district-level or a division-level model would impede their livelihoods. As a result, state governments would need to find alternative income sources for these women. Second, small, medium or large processing facilities require longer term contracts (of at least a year) to ensure they can cover the fixed costs required to establish THR production. To provide THR for four million consumers through 50,000 AWCs while ensuring an acceptable quality is a herculean task. Quality of THR and economic viability of the program can be sustainable only when the number of production units are manageable, i.e the government should consider significantly reducing the several thousand SHG units to a more practical number of functional, women-led facilities.

References

1. Pharos Global Health Advisors (2018). Flanagan, K. F., Soe-Lin, S., Hecht, R. M., & Schwarz, R.K.. THR Production and Distribution Models- Challenges and Opportunities for Improvement. Policy Brief 4. Pharos Global Health Advisors
2. Down-to-Earth. Jitendra. 2015. SC directs Gujarat, Rajasthan to decentralize food procurement under ICDS. https://www.downtoearth.org.in/news/sc-directs-gujarat-rajasthan-to-decentralise-food-procurement-under-icds--46114
3. JVS Foods, About US. n.d. Official Website. http://www.jvs-foods.com/about-us
4. Supplementary Nutrition Rules (2017). The Gazette of India. Part III—Maintenance of Standard and Quality of Meal, Their Enforcement and Monitoring

TABLE 2: Synthesized by authors based on information provided by JVS Foods

	SELF-HELP GROUP MODEL	AUTOMATED PRODUCTION FACILITIES
Food Production	THR produced locally by SHGs constituted of typically unskilled or semi-skilled women workers. Fortification is not possible	It is a very precise process that can only be done in an organized plant. THR is fortified with various essential vitamins and minerals, as per the guidelines of Government of India
Packaging	They are manually packed and product is touched by human hands, leaving the product susceptible to contaminants	Packed by automated packing machines in food grade pouches containing ration for a one-week period without human touch or intervention
Raw material & Ingredients	Raw materials that are available locally are used. Important ingredients such as soya beans or pulses are not always available in villages or are expensive. Hence the product can be deficient in critical nutrients	Raw material must be of high quality in order to clear the stringent government checks
Quality Assurance	It is time-consuming, difficult to monitor, sample and test THR from each of the 50000 SHGs as mandated by the Food and Nutrition Board (FNB)	It is easy to ensure the quality of THR food manufactured by a few automated units. The FNB can regularly test the THR and inspect the units
Shelf Life	Not mentioned	4-month shelf life is guaranteed
Availability & Consistency	Rampant shocks in supply and inconsistency in the quality of raw materials available locally affects THR supply	Raw materials are procured in bulk, THR is produced in a large scale and best practices in storage are followed. Hence no disruption in supply is expected
Expert Technical Supervision	Unskilled or semi-skilled workers with no supervision	Team of food technologists, engineers and skilled food processing operators
Measurements	Crude measurements of inputs and THR	Weighing machines available for all types of measurements from micronutrients to THR

The Banswara Model: An Experience from Rajasthan

This is an abridged article based on Global Alliance for Improved Nutrition (GAIN)'s reports. Reproduced with permission.

Key messages

- A factory with a capacity of producing 1 metric tonne of Take-Home Ration per day has been proven on a pilot scale to be the minimum viable unit for the Self-Help Group model.
- The impact of this model has been threefold. It empowered rural women, boosted their livelihoods, and improved the health and nutritional status of beneficiaries of Take-Home Ration.
- This model highlights 3 key factors for a single factory run by a Self-Help Group to be scaled up at the state or the national level: 1) an enabling environment for the formation and operation of Self-Help Groups, 2) access to low-cost capital for land and factory infrastructure and most importantly 3) technical assistance and capacity building of Self-Help Groups to handle food processing operations and factory management.

Introduction

Every morning after completing household chores, Shakuntala walks to the factory where she works. A proud member of the Shitalamata Self-Help Group (SHG), she begins her work by moving and emptying heavy bags of wheat into a cleaning machine. Shitalamata SHG is a 10-member women group, all of whom belong to a marginalized tribal community. They own and operate this nine-year-old factory in Baridaylab, a village located about six kilometers from the Banswara district headquarters in Rajasthan. The team works six days a week, producing a fortified blended food, *Raj Nutrimix*, which is distributed throughout the region as a Take-Home Ration (THR). [1]

Before working at the factory, Shakuntala was a community volunteer and her husband was a driver. The factory has given her family a steady and significantly higher stream of income that supports a steady purchase of basic food and amenities as well as her children's education. This has been possible because of the central and state government's initiative driven by the Supreme Court directives: The ruling emphasized on decentralization of supplementary nutrition production, and adherence to industrial quality standards for THR. Therefore, Government of India (GoI), in collaboration with Global Alliance for Improved Alliance (GAIN) and the World Food Programme (WFP), launched a decentralized model for THR production. This model is worth examining critically to identify insights regarding its successes, challenges, and sustainability.

The Banswara Model

This model is centered on developing small-scale production facilities run by a SHG whose members are both owners and workers in the factories. The Government of Rajasthan, through its social welfare program, acts as both a buyer and distributor of the THR product to pregnant and lactating women (PLW) and to children under three years of age.[1]

Three principles are at the core of the Banswara model:

1. Invest in women entrepreneurs and local production facilities – role of GAIN
2. Explore the small-scale production model by concentrating on one pilot project – role of the Shitalamata unit and WFP
3. Connect with an existing supplier and distribution network – role of state's Integrated Child Development Services (ICDS)

THR Production

WFP, in partnership with the Department of Women and Child Development, Government of Rajasthan, selected the Shitalamata SHG to run the first factory in Banswara. The objective in setting up a pilot was to

TABLE 1: Nutritive value of 100g of *Raj Nutrimix*[2]

Nutrients	ICDS requirement	Raj NutriMix
Energy(kcal)	500	501.4
Protein(g)	12-15	21.4
Iron(mg)	6	14.1
Vitamin A(µg)	200	227.7
Calcium (mg)	200	296.8
Thiamin (mg)	0.3	0.9
Riboflavin (mg)	0.35	0.6
Niacin (mg)	4	8.8
Vitamin C (mg)	15	15.1
Free Folic Acid (µg)	15	29.5
Zinc (mg)	N/A	5.8
Vitamin B_6 (mg)	N/A	0.4
Vitamin B_{12} (µg)	N/A	0.3

Note: ICDS requirement and *Raj Nutrimix* contents are shown for 6-36 months children here; weekly ration of 822g was divided by 7 days to reach daily ration, which was pro-rated according to nutrition content per 100g. Government 2009 guidelines, WCD ministry website; *Raj Nutrimix* packet

help the state government support small-scale production and improve the quality of supplementary fortified food rations. Therefore, GAIN and WFP designed a mechanized process that could produce quality THR in an operationally feasible, easily replicable and economically viable manner.

The production facility was completed in June 2011.[1] Women members were given 10 days of comprehensive training in topics such as procurement, production management, processing, hygiene, accounting, quality management and record keeping.[1] After a five-day trial run, the production facility was fully operational and two months later, received its first order.[1]

Product

Raj Nutrimix is a weekly THR meant for children aged 6 months to 3 years and PLWs. It is a mix of wheat flour, chickpea, soybean, oil and sugar, fortified with necessary micronutrients (Table 1).

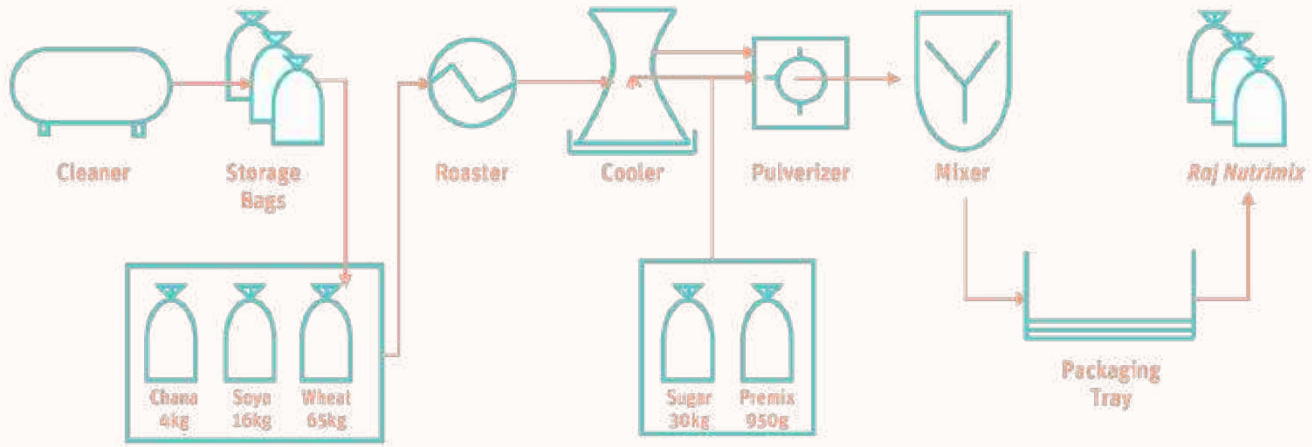
Processing

The unit comprises of a single production line (Figure 1) that manufactures THR complying with the guidelines from GoI.

Procurement

Prior to November 2013, subsidized wheat grains were obtained from the State Food Corporation of India (FCI) of Rajasthan. Owing to this, Banswara factory's THR production cost was lower than Telangana Foods

FIGURE 1: Production process and operational details[2]



(see page 41 for more details). However, they no longer qualify to purchase wheat at a subsidized price due to the enforcement of Rajasthan government's policy that no SHG should receive a wheat subsidy. As a result, cost of raw materials increased by 30% and exposed the SHG to operational risks of price volatility and seasonal fluctuations of raw materials.[3]

Soya beans, sugar and lentils are purchased as per predefined procurement protocols that list out quality criteria for raw materials, procurement process through tendering and placement of orders and receipts.[3] Premix is bought through the GAIN Premix Facility, a reliable source, and the SHG has never faced any disruption in its procurement.[3]

Delivery and distribution

Based on the purchase orders received from the government, the product is delivered to the block level and then it is distributed to the ICDS centers. Delivery to ICDS has been regular and on time. The service rate (percentage of products delivered on-time) is close to 100% and is laudable. However, having a defined stock management policy will ensure a perfect service rate.

Quality Control

Standard operating procedures (SOPs) are strictly followed. Machines are regularly checked and cleaned. Internal quality checks are diligently done during handling of raw materials and finished products, processing and packing. External quality checks are performed on composite samples from every batch of raw material and finished product by an independent lab in Delhi. The product has always conformed to the standards and no complaints have been made thus far. However, there is no policy on how to deal with negative test results and its subsequent impact on disruption in supply, and the financial impact due to inventory write-off.[3]

Coverage

The factory delivers 30 MT of *Raj Nutrimix* per month, reaching over 6,000 children under age three and nearly 3,000 PLW through a network of 172 Anganwadi Centers (AWCs) in the block of Sagwada.[1]

"The factory delivers 30 MT of *Raj Nutrimix* per month, reaching over 6,000 children under age three and nearly 3,000 PLW."

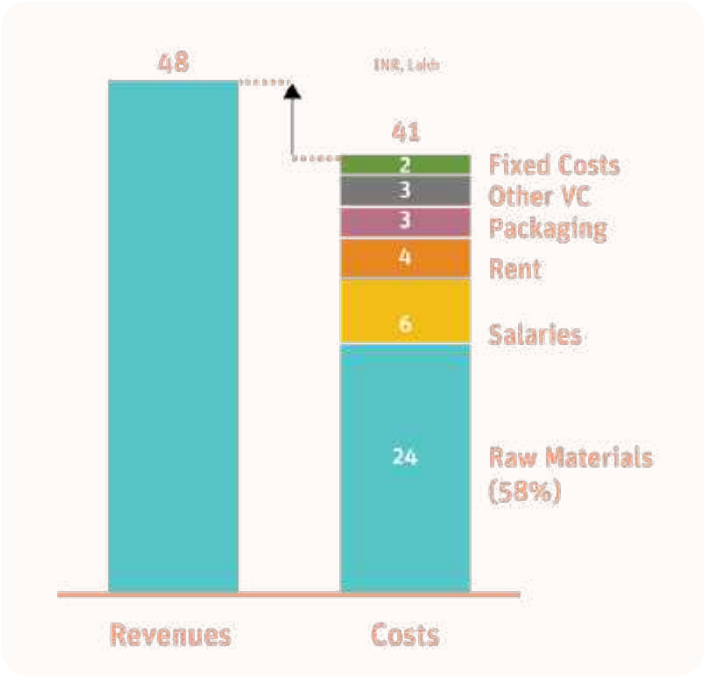
Financial Analysis

The setup of the Banswara model was sponsored by GAIN with grants worth INR 40 lakh for capital expenditure, initial working capital and continued technical assistance, over four years.[4] The operating unit reached the current production volume of 30 MT per month during the first month of operation, suggesting that the SHGs can run semi-automated plants. However, they would need ongoing technical support to be able to maintain such an efficiency. The unit had retained earnings of INR 18 lakh in the first four years despite the withdrawal of the wheat subsidy in 2013, with an average of 12% profit margin (Figure 2).

FIGURE 2: SHG Factory Retained Earnings, FY2011-15[4]

In 2014, the SHG factory had a revenue of INR 48 lakh, with nearly INR 8 lakh in operating profit, which was used to cover other expenses such as technical assistance, depreciation of machinery and interest payments on bank loans (Figure 3). Nearly 60% of total expenses is the cost of raw materials and any volatility in their prices can make the model financially vulnerable. Assuming an interest of 11% and a depreciation of assets over five years, it was estimated that any loan payback period for the setup costs would be 8 to 9 years (as estimated in the year 2015). The fact that the factory is still running and filling the government's THR orders suggests that it is on the path to full financial sustainability.

FIGURE 3: SHG Income Statement for FY 2014[5]



Impact

First, the model achieved its primary objective of a high quality THR. THR supply is also regular to all assigned blocks. SHG women are able to raise awareness on the benefits of good nutrition and THR, leading to increased acceptability among the beneficiaries.

Second, women in the SHG are managers and co-owners of the factory. As a result, the project improved their self-confidence and social status within their community, while empowering decision-making on food consumption, children's education, and household expenditure. This agency has instilled a higher level of aspiration in these women.

Third, each woman receives a minimum wage of INR 200 per day for 300 days of work per year, is eligible to a share in the profits from the factory and has group accident and life insurance.[5] Further, they have become financially more independent through their own bank accounts and savings.

However, some challenges remain to be addressed by the government. Many families do not exercise their entitlement to THR and among those who do, field observations have raised the issue of intrahousehold sharing.

Scalability

Rajasthan has 62,000 AWCs. The Banswara unit supplies to only 172 centers. Few considerations for the model to scale up are described as follows:

First, this model is proven to be viable at a minimum capacity of 1 MT a day. A higher volume of production is possible. A business case would be needed to analyze different factory sizes for supply at block, sub-district and district levels. It's important to remember that scale is achievable through a semi-automated or fully automated facility and not through a kitchen-based model of operation.

Second, a single SHG-run factory cannot be scaled up at the national or even state level without an enabling environment for the operation of SHGs, low cost capital and production infrastructure development. In Rajasthan, for example, one would need 360 such factories to cater to all AWCs. Governance and oversight would become key issues and hence a federation of SHGs would be needed. There should be access to low cost credit, inputs, equipment and land, technical assistance for building capacity in SHGs, and clear guidelines on how both central and state governments can support scale. In this model there were several instances over the five-year period where the SHG required daily technical assistance and managerial skill development to ensure smooth operations.

"Scale is achievable through a semi-automated or fully automated facility and not through a kitchen-based model of operation."

Replicability

To be able to replicate this model, here is a checklist of conditions:

- Guaranteed offtake by ICDS at a 'cost plus' price, i.e. at least a small profit must be ensured
  ICDS's guaranteed offtake enables Shitalamata SHG to cover operating costs and become financially viable. This particular factory-based model needs a minimum of 1 MT production per day to be viable.
- Ability to procure quality inputs and negotiate competitive prices through an open market
- Strong technical assistance and capacity building for the SHG in food processing and management of the factory
- Access to reasonable cost and terms of financing or grant support from a development agency

- Selecting a mature SHG
  Shitalamata SHG has been operational since 2008. They had strong internal functions (e.g. clear norms, bookkeeping) before they undertook factory operations, allowing them to make a smoother transition from a kitchen-based operation to an enterprise.
- Access to input and services
  Availability of inputs in the local market at reasonable costs has played a major role in the operational success of this model. For example, subsidized wheat boosted financial viability in the early years. Relatively easy access to support services such as laboratory testing of the product, equipment repair and maintenance is required.

To see how this model was replicated in Bihar and Karnataka, see pages 83 to 93.

Conclusion

While the positive impacts of the model are clear, critics questioned the practicality of hundreds of SHGs meeting the full demand of the state. Replication of the model to new regions will depend on the willingness of policymakers to create the organizational structure necessary to support it. In the meantime, women like Shakuntala prove that with appropriate investment, training and support, a primary school drop-out can be empowered and successful both at work and home.

References

1. A decentralized model for producing supplementary nutrition to a state. Internet: https://www.gainhealth.org/sites/default/files/publications/documents/case-study-a-decentralized-model-for-producing-supplementary-nutrition-to-a-state-rajasthan.pdf (accessed 27 January 2020)
2. Global Alliance for Improved Nutrition. Rajasthan SHG Model Overview. 09 January 2014. PowerPoint Presentation
3. Clémentine Antier MD, Salil Kumar CA, Sadhana Bhagwat MD, Rajan Sankar MD. Production of fortified food for a public supplementary nutrition program: performance and viability of a decentralized production model for the Integrated Child Development Services Program, India. Asia Pacific Journal of Clinical Nutrition 2014;23(Suppl): S20-S28. Internet: https://www.researchgate.net/publication/268228141_Production_of_fortified_food_for_a_public_supplementary_nutrition_program_performance_and_viability_of_a_decentralized_production_model_for_the_Integrated_Child_Development_Services_Program_India (accessed 27 January 2020)
4. Global Alliance for Improved Nutrition. An effective decentralized model for ICDS Food production. March 2015. PowerPoint Presentation
5. Empowering women entrepreneurs to produce fortified food for mothers and children in Rajasthan. Internet: https://www.gainhealth.org/sites/default/files/publications/documents/case-study empowering-women-entrepreneurs-to-produce-fortified-food-rajasthan-india-2014.pdf (accessed 27 January 2020)

Operational Guidelines: A Case Study from Bihar

This is an abridged article based on Global Alliance for Improved Nutrition (GAIN)'s reports. Reproduced with permission.

Key messages

- Global Alliance for Improved Nutrition, Nidan and Bihar Rural Livelihoods Promotion Society established five decentralized women-led production units that produce fortified Take-Home Rations in Gaya, Khagaria and Muzaffarpur district, covering ~800 Anganwadi Centers and nearly ~55,000 beneficiaries.
- Village organizations and cluster level federations are primarily responsible for the construction and operation of the facilities.
- Challenges include a shortage of warehouses in Bihar and the extensive time needed to train staff and receive government approvals for operations.
- These plants are now running at full capacity and a monitoring framework is in place. The Government of Bihar is exploring ways to scale up the project and have at least two decentralized extruder facilities for two blocks in every district.

Introduction

Global Alliance for Improved Nutrition (GAIN), Nidan, and Bihar Rural Livelihoods Promotion Society (BRLPS) collaborated in 2013 to pilot three decentralized Take-Home Ration (THR) production units (funded by Bill and Melinda Gates Foundation) and in 2016 to replicate the unit in two districts (funded by BESTSELLER Foundation). These units are managed by women's groups from local communities. Three units in Gaya and Khagaria districts and two units in Muzaffarpur district (Mushahari and Bochahan blocks) can provide THR to Integrated Child Development Services (ICDS) centers in two blocks, covering ~800 Anganwadi Centers (AWCs) and nearly ~55,000 beneficiaries.[1]

BRLPS was responsible for procurement of raw materials at subsidized prices and guarantee the purchase of THR till the unit became sustainable. Nidan, a grassroots NGO, engaged with and mobilized the formation of Self-Help Groups (SHGs) to operate the units. It also assisted in the daily operations and logistics of the units. GAIN funded the machinery, electrification, establishment of the unit, pre-operative expenses as well as the working capital. GAIN also invested in food processing training for the women. This article describes the steps taken to set up the facility in Muzaffarpur.

Coverage

Once funding amount was known, the capacity and coverage of the facilities were determined. Each production unit can cover 100 to 250 AWCs, reaching 8,000 to 16,000 children and mothers (Table 1).

Product

Two products, referred to as *Wheatamix*, are manufactured:

A 1 kg pack of extruded mix for children and a 2 kg pack for pregnant and lactating women (PLW). The ingredients – wheat, rice and lentils – are the same for both the products, while the quantities differ and match different needs (Figures 1,2,3). Both products are fortified with vitamins and minerals. The THR for children has added sugar. This extruded instant mix can be reconstituted with hot water, hot milk, or used as a primary ingredient in a variety of recipes to make barfi, sweet and savory cheela, upma, namkeen or laddoo. Recipe booklets are also provided to the beneficiaries.

Management and Governance

1. Village Organization (VO): Each VO consists of 15 to 20 SHGs

2. Cluster Level Federation (CLF): In each block, one women's group is recruited to form a CLF (Figure 4). A group of at most 35 VOs are part of the CLF. Together with BRLPS, CLF scouts and selects the land for the facility.

Comprehensive procedures for recruitment, quality and compliance can be found in the full report, now in the public domain.[2]

Recruitment

GAIN developed the guidelines for recruitment (Table 2). Each production unit hires a maximum of 19 staff (Table 3) and no officials or office bearers of the CLF, VO, marketing committee, or audit committee, can be an applicant. All hired staff were trained by the machinery manufacturer Pilotsmith in this case. Women leaders from both the clusters were sent to the Bodh Gaya to learn about all the processes involved, from procurement to billing to sanitation and hygiene.

Certifications and Inspections

The ICDS Director formed a three-member committee to inspect the units prior to placing the THR work order. All licenses, certificates and clearances were checked (Table 4) and the sanitation and hygiene processes as well as the packaging and product, were tested. A monitoring framework (Table 5) was approved.

Trial Run

Upon completion of the plant, 6.5 MT of THR was produced in a trial run. The product was tested and verified by the laboratory and then distributed to SHGs to get feedback from the target community.

Financial Summary

The startup capital for production units – including

TABLE 1: Estimating coverage of 1 production facility

#	Line Item	Value	Unit
A	Food needed / child / day	100	g
B	Food needed / PLW / day	150	g
C	# of children /AWC	60	
D	# of PLW / AWC	10	
E	Total food needed / day/AWC (C*A + D*B)	7500	g
F	Exigencies, sampling (2% * E)	150	
G	Total food produced / day/AWC (E + F)	7.65	g
H	Capacity of the extruder	80	kg/hr
I	Uninterrupted extruder operations	9	hr
J	Quantity of food produced (H * I) / day	720	kg
K	Max. quantity of food produced as two shifts	820	kg
L	# of AWCs covered by 1 unit (K / G)	107	
M	# of days food provided per month	25	

plant and machinery, building renovation, licenses, product formulation, initial project management and initial working capital (Table 6) – was funded by a grant. Thereafter 75% of the total working capital was covered through a bank loan and the rest was contributed by owners (Table 7). The unit was estimated to breakeven when operational at 50% production capacity, i.e. nearly 11 MT of THR produced per month (Table 8). Based on extrapolation of six months' data, the production units are financially sustainable. They started generating profit within a month of receiving orders from ICDS. The maximum gross profit margin achieved was 24% compared to the projected 27% in the business case (Table 9). This was due to a lower capacity utilization, owing to inconsistent and lower order quantities from ICDS.

Product formulation : 100gm

Formula 1 (For L& E Mother)	
Ingredient	%
wheat	80
Rice	15
Green Gram/ Bengal Gram	5
Formula- 2 (For Children)	
Ingredient	%
Wheat	78
Rice	14
Green Gram/ Bengal Gram	8
Sugar	Added (6-8% additional)

Name of the ingredient	For Children	For Women
VITAMIN PREMIX		
Vitamin A (mcg)	167	320
Vitamin B 1 (mg)	0.25	0.4
Vitamin B 2 (mg)	0.3	0.47
Vitamin B 3 (mg)	3.4	5.4
Vitamin B 9 (mcg)	12.5	134
Vitamin C (mg)	12.5	27
MINERALS PREMIX		
Calcium (mg)	167	335
Iron (MG)	5	13
Nutritional Value		
Calories	400-410 kcal	400-418 kcal
Protein	11-13 gm	12-14 gm

Figure 1: THR Product formulation

TABLE 2: Staff Recruitment Guidelines

1	The applicant should be a member of a local SHG.
2	The applicant should be in good health and between 20-45 years of age.
3	Educated and unemployed women applicants shall be given priority.
4	Landless/widowed/divorced/poor and SC/ST women shall be given utmost priority.
5	If there is a very poor family that is a member of the SHG and the woman member is not capable of working then the male member will be selected.
6	Only one member of a family shall be eligible.
7	For night guard and male jobs, priority shall be given to members of the SHG.

Figure 2: *Wheatamix* for children and PLW

Raw materials are the main component of ongoing production costs, with wheat, rice and moong dal constituting 50% of cost (Table 10). Cost of THR production varies from INR 60 to INR 66 per kg.

Figure 3: Possible usage of THR as base ingredient in various recipes

At this cost, driven by fluctuating raw material prices, it may not be possible for BRLPS to supply THR at the stipulated budget of Rs. 8 per child (Table 11). This budget also includes hot cooked meals and other fortified food item under Special Nutrition Program (SNP). In order to meet the costs stipulated under the ICDS budget, the following measures are recommended:

- Acquire power supply for the unit and use the generator only when necessary. The reduction in power costs can reduce the production cost by 20-25%
- Procure wheat, rice and moong dal at a subsidized rate from Food Corporation of India and National Agricultural Cooperative Marketing Federation of India. Wheat procurement at subsidized rates reduced the production cost in the Rajasthan model (decentralized model replicated in Bihar) to lower than that of Telangana Foods (centralized model) despite their economies of scale.[3,4,5]

Figure 4: A meeting to identify a Cluster Level Federation

TABLE 3: Staff Roles, Responsibilities and Compensation

ACTIVITY	RESPONSIBILITY	NO. OF STAFF REQUIRED
Storage of Raw Material (Grain, Sugar, Premixes, Packets)	Plant Supervisor	3
Storage (Diesel) DG maintain	Plant Supervisor	1
Cleaning Section (Grain Storage area and Hopper)	Plant worker	3
Roasting area	Plant Supervisor	1
Powder Storage Area (collection bin)	Plant Supervisor	2
Blender area including Premixes	Plant Supervisor	1
Packaging Area	Plant Supervisor	2
Finish good product storage	Plant Supervisor	2

DESCRIPTION	NO. OF PERSONS	SALARY/HEAD /MONTH (INR)	TOTAL SALARY/MONTH (INR)
Unskilled female workers	16	₹ 6,000	₹ 96,000
Skilled male workers	2	₹ 7,500	₹ 15,000
Security staff	2	₹ 6,000	₹ 12,000
Total	20		₹ 123,000

TABLE 4: List of licenses and certificates required

TYPE	APPROVED BY
MSME License	District Industries Centre
FSSAI License	State Food Safety Authority, Department of Health and Family Welfare
Sanitary Inspector's Clearance	District Health Authorities
Sanitary Inspector's Clearance	
Fire and Safety Clearance	
Weights and Measure Certificate	
Health Certificate of Workers	

Impact

Based on an evaluation conducted by Oxford Policy Management Group,[6] the project has helped boost the women's self-confidence, and they took pride in being able to contribute to the family income. Thus, the project has the potential to improve women's economic empowerment, but it has not yet resulted in changes in women's participation in household decision-making or their responsibilities for domestic work, in part due to the short duration of the project.

Although the product was reaching all the targeted AWCs, improvements could be made in its the distribution and coverage. The product was distributed to 58.7% of eligible beneficiaries, and of the households that received Wheatamix, 77.1% of eligible children actually consumed the product. In addition, there was a preference for traditional THR (dry grains) over Wheatamix, primarily due to knowledge gaps on how to prepare the new product. Behavioral change interventions on how to use Wheatamix could improve the distribution and uptake of the new improved product from the AWCs.

TABLE 5: Operations Monitoring Checklist

S. No	FORMAT	FREQUENCY	RESPONSIBILITY	VERIFIED BY
1	Daily operation and waste monitoring tools; daily raw materials, premix and finished products stock register; and attendance register for workers and staff	Daily	Supervisor	In-charge
2	Diesel Logbook	Daily	Technician	Supervisor/In charge
3	Ledger book	Daily	Bookkeeper	CLF
4	Cash and Bank book	Weekly	CLF	BPIU*
5	Monitoring tools on operational and financial performance, infrastructure status, procurement process of raw materials, finished product order delivery, worker payment and external laboratory testing	Monthly	In-charge	CLF
6	Monthly cost of production	Monthly	Bookkeeper	CLF
7	Quarterly procurement process of raw materials – Monitoring tool	Quaterly	CLP	BPIU

*Block Project Implementation Unit

TABLE 6: Details of capital expenditure in setting up one production unit

S. No	PARTICULARS	AMOUNT (INR IN LAKH)
	PLANT AND MACHINERY COST	
A	Machinery cost	₹ 50.15
B	Installation cost @ 10% of machinery cost	₹ 5.02
C	Packing, forwarding and transport to Gaya @ 3%	₹ 1.50
D	Tax @ 2% against "C" form	₹ 1.00
E	Total (A + B + C + D)	₹ 57.67
	LAND AND BUILDING DEVELOPMENT COST	
F	Advance for leased land	₹ 1.00
G	Control room panel board	₹ 1.00
H	Cables from control room to individual unit DB	₹ 2.00
I	Internal wiring and DB	₹ 4.00
J	Total (F + G + H + I)	₹ 8.00
	Total fixed cost (E + J)	₹ 65.67

TABLE 7a: Details of working capital requirement per month

SI	DESCRIPTION	TOTAL	BANK*	EQUITY
1	Raw material – 30 days stock	₹ 6.70	₹ 5.03	₹ 1.68
2	Packing material – 30 days stock	₹ 0.40	₹ 0.30	₹ 0.10
3	Finished goods stock of 2 days	₹ 0.88	₹ 0.66	₹ 0.22
4	Outstanding debtors of 30 days	₹ 10.97	₹ 8.23	₹ 2.74
5	Salaries and wages – 30 days	₹ 1.23	₹ -	₹ 1.23
6	Power, water and fuel – 30 days	₹ 3.58	₹ -	₹ 3.58
7	Repairs and maintenance – 30 days	₹ 0.06	₹ -	₹ 0.06
8	Contingencies – 30 days	₹ 0.11	₹ -	₹ 0.11
	Total working capital	₹ 23.93	₹ 14.22	₹ 9.71

*Bank share is assumed to be 75% for expense items 1 to 4 while the remaining 25% is the owner's margin. Expense items 5 to 8 are ineligible for a bank loan

The unit in Gaya received award from the Honorable Vice President of India in 2019. The project was reviewed further by the Principal Secretary, and a proposal for scaling up the model for 200 similar factories has been submitted to the Government of India by the state government. Furthermore, GAIN has received a request from the Government of Bihar to establish at least 10 more such factories. GAIN is currently undertaking activities to secure funding to be able to facilitate this.

"GAIN has received a request from the Government of Bihar to establish at least ten more such factories."

TABLE 7b: Details of working capital requirement per month

DETAILS OF OTHER COST			
Power, water and fuel cost per month (22 litres / hour x 10 hours / day x 25 days a month x INR 65 per litre of diesel)	₹	3,57,500	Will operate for 10 hours
Repair and maintenance cost		0.10%	of fixed cost
Contingency		0.10%	of variable cost
Rent of land	₹	27,000	per year

TABLE 8: Break-even analysis per month of one production unit with 20.463 MT/month production capacity

S. NO	PARTICULARS	AMOUNT (INR IN LAKH)
A	Raw material consumed	₹ 6.81
B	Power	₹ 3.58
C	Direct wages and salary	₹ 1.23
D	**Total variable cost (B + C + D)**	**₹ 11.61**
E	Indirect salary	-
F	Lease premium	₹ 0.27
G	Repairs and maintenance expenses	₹ 0.06
H	Selling and administrative expenses	₹ 0.00
I	Interest on term loan	₹ 0.00
J	Interest on working capital loan	₹ 1.85
K	Interest on unsecured loan	₹ 0.00
L	Depreciation	₹ 0.50
M	**Total fixed cost**	**₹ 2.68**

TABLE 9: Profit margin calculation per month

PARTICULARS	PROJECTED (2015)	ACTUAL (MAR 2018)
Total quantity of THR supplied (in kg)	20,463	18,564
THR procurement rate by ICDS (per kg)	87.24	87.24
Revenue (A)	₹ 17.85	₹ 16.19
COGS		
Raw material cost	₹ 6.70	₹ 6.09
Packing material cost	₹ 0.40	₹ 0.37
Salaries and wages	₹ 1.23	₹ 1.23
Finished goods stock	₹ 0.88	₹ 0.88
Power, water and fuel	₹ 3.58	₹ 3.58
Repair and maintenance	₹ 0.06	₹ 0.06
Contingency	₹ 0.11	₹ 0.11
Total (B)	₹ 12.85	₹ 12.31
Gross profit (B - A)	₹ 5.00	₹ 3.88
Gross profit margin [(B-A)/A]	28%	24%

THR procurement rate did not change between 2016 and 2018

TABLE 10a: Total cost of raw material requirement per month

SI	DESCRIPTION	QUANTITY(KG)	COST/KG (INR)	COST OF COMMODITY (INR)
1	Wheat	6,123	18	110,214
2	Rice	7,435	22	163,570
3	Corn	5,423	15	81,345
4	Moong Dal	2,449	100	244,900
5	Sugar	437	48	20,976
6	Oil	437	56	24,472
7	Vitamin and Minerals	Qs	Varies	25,000
	Total	22,304		670,477

TABLE 10b: Details of packaging material cost

SI	Particulars	Amount (INR)
A	Rate of 500 g pouch	0.55
B	Cost of pouch to hold 20463 kg (20463*1000/500*A)	22,510
C	Wastages @ 2% (2%*B)	450
D	Total cost of primary packing material required per month (B + C)	22,960
E	Secondary packaging material – HDPE woven sacks of capacity 20 kg @ Rs. 16 per bag (20463/20*16)	16,384
F	Bag stitching thread cost	1000
G	Total cost of packing material per month	40,344

TABLE 11: Mapping of stipulated price and cost of production per kg of THR

Stipulated supply price of THR/child (in INR) (A)	Cost of production /kg (in INR)* (B)	Cost of production/ child (in INR) (C)	Cost of production including gross profit margin @28% (D)	Difference between stipulated price and cost of production (in %) (A - D)
6	63	6.3	8.7	- 45%
7	63	6.3	8.7	- 24%
8	63	6.3	8.7	- 9%
9	63	6.3	8.7	3.3%

*Average of INR60 and INR66 – range of cost of production per kg THR

Since the difference is positive when the stipulated price is INR9, the supply of THR by BRLPS is possible at a stipulated price of INR9 per child.

Challenges and Way Forward

There were, as expected, some challenges of increased expenses faced by GAIN and Nidan. First, there was a shortage of industrial warehouses in Bihar, therefore, the installation of these units had to be financed, leading to additional capital expenditure. Then, a single roaster cannot operate for eight hours continuously because of the excess heat generated that can lead to a fire or breakdown of the machinery. Hence, two roasters are being used. Finally, the urgency to set up the unit in a short period of time was a challenge. Initially, the MoU between GAIN, Nidan and BRLPS was supposed to last from September 2016 to June 2017. There were two extensions and it finally ended in May 2018. However, the CLF continued to need technical as-

sistance, particularly to help discuss work orders with the District Programme Officer and Child Development Project Officer, on using the monitoring tool, and to develop social marketing of the THR. It would, therefore, be pragmatic to consider two years as the time taken to set up a production unit and ensure its smooth operations for all future projects.

Currently, Bihar's Social Welfare Department and the ICDS Director have taken full ownership of this model and plan to scale it up, with at least two production units for every two blocks in every district, throughout Bihar.

References

1. Decentralized Production of Supplemental Foods for ICDS in Bihar. July 2016-June 2018. Internet: http://nidan.in/nidanwp/wp-content/uploads/2019/05/Gain_compressed.pdf (accessed 27 January 2020)
2. Global Alliance for Improved Nutrition. 14 December 2018. Internet: https://www.gainhealth.org/sites/default/files/publications/documents/production-of-fortified-blended-complementary-food-by-women-self-help-groups-in-india-2018.pdf (accessed 27 January 2020)
3. Global Alliance for Improved Nutrition. Financial Sustainability Factsheet. Internet: https://www.gainhealth.org/resources/reports-and-publications (accessed 27 January 2020)
4. Global Alliance for Improved Nutrition. Women Empowerment Factsheet. Internet: https://www.gainhealth.org/resources/reports-and-publications (accessed 27 January 2020)
5. Global Alliance for Improved Nutrition. Operational Guidelines for Decentralized Production of Fortified Food in Bihar. Internet: https://www.gainhealth.org/resources/reports-and-publications (accessed 27 January 2020)
6. Tom Newton Lewis. Bihar Child Support Programme: Impact Evaluation Baseline Report. May 2014. Internet: https://www.opml.co.uk/files/Publications/7597-improving-child-nutrition-maternal-health-bcsp/bcsp-evaluation-baseline-report.pdf?noredirect=1 (accessed 27 January 2020)

A unique synchronized approach paves the way for effective THR implementation in Karnataka

By Veena Rao and summary of Global Alliance for Improved Nutrition's reports and pilot. Reproduced with permission.

Providing good quality and tasteful Take-Home Ration (THR) to bridge the wide macro and micro nutrition deficit among poor families is the most direct nutrition intervention in the World Bank-funded Karnataka Multi-sectoral Nutrition Pilot Project piloted in two of the most backward blocks of Karnataka: Devadurga Block, Raichur District and Chincholi Block, Gulbarga District. The pilot project was implemented under the Karnataka Comprehensive Nutrition Mission (KCNM) with Karnataka Health Promotion Trust selected as the implementing partner.

The pilot project followed the KCNM inter-generational strategy of simultaneously targeting and addressing the nutritional needs of infants, children, adolescent girls and pregnant and lactating mothers (PLW). The interventions directly addressed the root causes of malnutrition, namely,

- bridging the information gap through a sustained, multi-layered, general public awareness campaign, most importantly through interpersonal communication,
- bridging the calorie-protein micronutrient deficit among the inter-generational target groups by providing appropriate nutritious and tasty THR produced by women Self-Help Groups (SHGs),
- creating demand, converging, and tightly monitoring the ongoing multi-sectoral programmes that have an impact on malnutrition, such as Immunization and Vitamin A Supplementation, Anaemia Control, Water and Sanitation, etc., and
- real time monitoring of the beneficiaries' nutrition and behavioral indicators, particularly regarding underweight, stunting and wasting of children, body mass index of adolescent girls, pregnancy weight gain, and incidence of low birth weight babies.

Figure 1: Production site

The unique feature of the Pilot Project was that it was not a food programme alone. It was a comprehensive programme that first attempted to bring about behavioural change by bridging the information/awareness deficit regarding proper nutritional and health practices, and followed it up by addressing the macro and micro nutrition deficit.

Global Alliance for Improved Nutrition (GAIN) supported the pilot project for setting up two decentralized production units for THR called *Shakti Vita*. Each unit has a capacity of 2 MT per day (Figure 1). Standard Operating Procedures were followed while setting up the plant and during its operations. Raw material for the fortified blends was procured locally, using stringent World Bank criteria for sourcing. Twenty-five SHG women have been trained and employed in running these enterprises that supplied THR to 35,000 beneficiaries, including children 6 months to 3 years, adolescent girls from 11-18 years, and PLW.

Village Nutrition Volunteers (VNV) were appointed in every village and trained for inter-personal nutrition counselling, particularly infant, child and pregnancy care, care of the adolescent girl, and the importance of safe drinking water, sanitation and hand washing. VNVs also guided families regarding hygienic preparation of *Shakti Vita* and informed them of its benefits for the proper growth and health of children, adolescents

and for a healthier pregnancy. For this, a multi-level communication strategy was prepared and rolled out in a phased manner by KCNM, to bring about behaviour change. These intensive behaviour change efforts through multiple channels were the key factors responsible for the success of the pilot project, both in reduction of malnutrition among the beneficiaries through THR supplementation, and in bringing about behaviour change.

Additionally, decentralized production units were also an investment in building community livelihoods for rural women. Presently, the government, in partnership with Tata Trusts, is in the process of converting the grant-based production units into commercially sustainable units to introduce *Shakti Vita* into the market, where presently there is a complete vacuum for low-cost THR.

Introducing low cost, nutritious THR made from locally available agriculture produce into the market is imperative during the COVID 19 pandemic, when daily diets of the poor are diminishing, and there is an urgent need to prevent and address the expected surge of undernutrition and anemia which will follow.

Figure 2a: The product, *Shakti Vita*.
The packaging was designed to comply with government standards.

Figure 2b: The women trained to operate the factory

The pilot project also created a cadre of trained village nutrition volunteers and empowered women from the SHGs with additional knowledge on child and maternal care as well as balanced diets within their budgets.

A monthly monitoring database was developed by KCNM with both anthropometric and behavioral indicators, specific to the target groups. Both internal monitoring data as well as the Impact Assessment done by NIN, Hyderabad, confirmed a remarkable reduction of undernutrition and anemia among all target groups, and also positive behavioral change. The World Bank has declared the pilot project as successful.

Given the success of the project, Government of Karnataka is in the process of replicating this model in other most backward blocks in the state.

It's time to RISE and Shine

Kalpana Beesabathuni
Sight and Life, Bangalore, India

Dr. Rajan Shankar
Tata Trusts – The India Nutrition Initiative

RISE to the occasion

Over the past two decades, there have been many experiments in the Take-Home Rations (THR) program. Dedicated government bodies, frontline workers and supporting organizations rose to the occasion and have given us better recipes, viable production models and mechanisms for women's participation, better governance and accountability. To further scale these gains, states must **RISE**, i.e. –

Refine THR composition and formulation,
Improve THR production and distribution,
Strengthen THR monitoring and accountability, and
Enhance the THR policy environment.

Refine THR composition and formulation

Accelerating nutritional deficiencies in recent years has made the gaps in composition and formulation of THR more apparent. To address these nutritional gaps, states may explore alternatives to existing formulation and composition. There are some important points to consider while looking at the mechanics of reformulating THR. First, the intake of THR should fulfill crucial micronutrient (including iron, folate, zinc, vitamins B_6, B_{12}, and D) requirements of beneficiaries. Second, macronutrients such as carbohydrates, specifically added sugar content, should be reduced to an acceptable level, and the quantity of high-quality protein (such as pulses, dairy, soy) should be increased. And, last, it should be noted that the dietary requirements and taste preferences of pregnant and lactating women (PLW) and children are different.

Improve THR production and distribution

Both decentralized and centralized models have their benefits and drawbacks. While the centralized model is more economical, its products are not always tailored to beneficiaries' tastes and preferences, often leading to moderate acceptance levels. On the contrary, the decentralized model fares well in consumer acceptance (anecdotal evidence) but is not economically viable and there are many lapses in quality control.

States should consider strengthening both models. Those states with centralized production should get the production unit to invest in technology such as mobile applications to gauge consumer or beneficiary reactions and get real time feedback for improving the formulation. To ensure access at the last mile, producers through these applications can track product delivery from the manufacturing facility to the consumer or the Integrated Child Development Services (ICDS) centers. States with decentralized production can consider procuring raw materials at a block or district level so that better quality at lower prices is ensured – this is needed for the model to be sustainable. Further, conditional contracts and payments linked to THR products satisfying the recommended standards are ways to ensure good quality.

Recommended policy interventions

- *Mandate fortification of ingredients to fulfill micronutrient requirements*
- *Include higher quality protein sources such as milk powder, whey, pulses and egg powder*
- *Reduce the added sugar content in THR*
- *Ensure at least two different products: one customized for PLW and the other for children*

Strengthen THR monitoring and accountability

The quality of THR has always been under scrutiny and is often questioned. Hence, better data monitoring and regular reviews of the existing program metrics at the national, state and local levels is recommended. Feedback from these reviews should be incorporated into future adjustments to legislation and management of THR production. States with both decentralized and

Recommended policy interventions

For centralized models

- *Institute digital monitoring systems for feedback on taste and formulation of THR*
- *Producers can digitally track production and distribution of THR*

For decentralized models

- *Incorporate a system to procure THR ingredients at the block level*
- *Tie contracts and payments to the quality and timely production and distribution of THR*

centralized models should set up oversight committees for Self-Help Groups (SHG) or large-scale producers involved in THR production. For states with centralized models, THR producers can be held accountable for downstream access gaps with some portion of overall compensation directly tied to access by the beneficiaries. At all levels, ICDS should consider implementing performance management systems that link staff performance evaluations and compensation to program outputs and outcomes. Clear metrics for success should be established in order to determine feasible benchmarks for production, coverage and uptake and to improve the systems where shortcomings exist.

Recommended policy interventions

- *Establish a process for regular review of data at national, state, and local levels*
- *Reform quality assurance and quality control procedures to ensure there is independent oversight of both centralized and decentralized facilities*
- *Link compensation of THR producers to beneficiary uptake*
- *Implement performance management systems for ICDS staff and establish clear metrics for success across the THR supply chain*
- *Increase transparency of performance metrics by making it public*

Enhance the THR policy environment

The current form of the decentralized model has two goals: 1) improve access to nutritious food and 2) women's empowerment, and in practice, we often see that these two goals are divergent and incompatible. Women are both producers and beneficiaries in the SHG model. Therefore, if the SHGs do not have the capacity, capital and regular technical assistance to produce and distribute THR according to the established standards, the nutrition status of the women themselves, their children and their communities are affected. Also, there have been instances where male members of the family run the THR operations while the women are deputed to other low-cost employment options, often as daily wage laborers. This is at odds with the outlined agenda of social and financial empowerment of women.
In light of these challenges, the current situation demands that we return to the drawing board and rethink the policies driving the THR program. However, the Supreme Court ruling mandating production of THR via SHGs more or less corners policymakers into adopting one of two options:

Option 1

Reconfigure production systems to improve product quality in the short-term,

and/or

Option 2

Reform the state and national policies that govern THR production and distribution.

In the short term, there should be a thorough assessment of the production and distribution capacity of SHGs in states with decentralized systems. If these facilities are diagnosed to be incapable of maintaining the required standards for nutrition, quality, and accountability, alternate options should be considered. These alternatives could be food processors competing for regional contracts through open tenders, SHG-run production facilities operating at the block or district level, with assistance in food and business operations from private contractors, or other models such as centralized raw material procurement at the state level, capable of meeting predetermined standards. In the

long run, the policy framework guiding THR systems at national, state, and local levels deserves re-evaluation. Should an analysis of the legislative foundation of the THR program conclude that contradictory and incompatible objectives and policy gaps exist, a reform is necessary to ensure coherence of the program goals with legislation at all levels.

Now is the time to RISE and shine!

There is a renewed focus on the THR program as one of the centerpieces of the government's ambitious POSHAN Abhiyaan commitments and targets, making this an opportune moment for states to RISE and use these learnings. The coronavirus pandemic has also given us an opportunity to challenge the traditional food systems and use resources more efficiently. Given the program's broad reach and established presence in communities across the country, policymakers should take advantage of this opportunity to improve nutrition for the millions of beneficiaries who consume THR. Now is the time to shine a spotlight on THR and Refine, Improve, Strengthen & Enhance all facets of the program.

National Framework for Take-Home Rations

Veena S Rao
Adviser, Karnataka Nutrition Mission

Nutrition and health experts universally agree that Take-Home Ration (THR) is a proven and cost-effective intervention for addressing dietary deficit, with quick impact. THR is the most direct intervention of Integrated Child Development Services (ICDS) to bridge the calorie-protein-micronutrient gap among children and pregnant and lactating women (PLW) in India. The term THR entered the ICDS lexicon after a succession of Supreme Court orders (2004-2009), which eliminated contractors as suppliers of Ready to Eat Food under ICDS, decentralized supply sources to Self-Help Groups (SHGs) and other community organizations, and laid down nutritional norms for supplementary nutrition for malnourished children, and PLW. In August 2011, the Supreme Court ordered that fully automated plants would be preferable for producing THR for reasons of safety and hygiene, after which Ministry of Women and Child Development added 'bonafide manufacturers' to the list of approved potential THR suppliers.

"Only 8.7% breastfed children and 14.3% non-breastfed children between 6 to 23 months received an adequate diet."

However, even after these reforms, National Family Health Survey (NFHS) - 4 (2015-16) gives us some very disturbing data regarding the extent of dietary deficit among children. Only 8.7% breastfed children and 14.3% non-breastfed children between 6 to 23 months received an adequate diet. In Karnataka, 25% of children below 6 months are stunted, 28% are underweight and 33% are wasted. This clearly indicates poor maternal nutritional status, inadequate pregnancy weight gain and inadequate dietary intake during pregnancy, indicating, *inter alia*, an unacceptably high dietary deficit. More disturbing is that the percentage of children aged 6-8 months receiving solid/semisolid food and breast milk in India has decreased from 52.6% in NFHS-3 (2005-06) to 42.7% in NFHS-4 (2015-16). High dietary deficit among adolescent girls and boys is also confirmed by the National Sample Survey Office 68th Round, UNICEF's State of the World Children's Report 2011, National Nutrition Monitoring Bureau's Technical Report 26, 2012, and Technical Report 27, 2017.

Clearly, a consolidation and translation of the Supreme Court directives into a National Framework for THR would have served as a definitive blueprint to map the sourcing and production of THR; for setting safety and quality control standards; for monitoring the composition, taste and acceptability of THR and ensuring its distribution and consumption by the undernourished ICDS target groups.

However, that has not happened, and today, we have no method of finding out why in spite of the extremely clear and detailed directives from the Supreme Court regarding THR, the dietary gap and nutritional status of children, adolescents and expectant mothers remains so alarming.

"In many villages, even now, there is no milk or any other food available for children."

THR assumes even greater importance during the COVID-19 pandemic – both during lockdown and post lockdown. Reports from the field categorically inform that poor rural families are on a survival diet of rice and wheat given under Public Distribution System, and sometimes some dal. In many villages, even now, there is no milk or any other food available for children. A study done by Azim Premji University confirms this.[1] In these circumstances, it is logical to expect a surge in underweight, stunting and wasting among children, low birth weight babies, anemia, and lower adolescent

Body Mass Index during and post lockdown. Sadly, the Indian market is completely inequitable when it comes to THR. While there is abundance of high-cost ready to eat nutritious food available for all age groups for the affluent, there is a complete absence in the market of affordable low-cost THR that the poor can access for the additional nutrition that they require, and for building immunity.

A Feasibility Study conducted by Karnataka Nutrition Mission in 2018 through KPMG confirms that there is a wide protein-calorie-micronutrient deficit in the diet of all age groups, particularly among families earning below Rs 30,000/- per month, and that there is a direct correlation between the absence of low-cost energy foods in the market and malnutrition among children, adolescents and adults.[2] The Global Nutrition Report 2020[3] in its Spotlight Section 4.2 also emphasizes that the high cost of nutritious foods for populations most at risk of undernutrition is a major barrier to resolving undernutrition and warrants urgent policy attention.

A National Framework and policy paper for THR is therefore urgently required in accordance with the Supreme Court Orders pertaining to ICDS, and for the open market in the context of the nutritional crisis that is looming over the COVID-19 emergency and thereafter.

The author has been a persistent advocate of THR as the most efficacious intervention to address the vast dietary deficit among India's undernourished population.

Her views are articulated in her first publication, 'Malnutrition, an Emergency: What it costs the Nation' (2008) and in her article on Complementary Foods in the British Medical Journal, 2012. They can be read at the links below.

http://karnutmission.org/documents/Contents%201-131.pdf
http://karnutmission.org/documents/Capart_Book_Final.pdf
Pages 67-69
https://www.bmj.com/content/345/bmj.e8131 2012

Reference

1. Rahul Lahoti, Rosa Abraham, Surbhi Kesar, Paaritosh Nath and Amit Basole. COVID-19 Livelihoods Survey - Compilation of findings. Internet: https://cse.azimpremjiuniversity.edu.in/wp-content/uploads/2020/06/Compilation-of-findings-APU-COVID-19-Livelihoods-Survey_Final.pdf (Accessed 29 June 2020)

2. Karnataka Comprehensive Nutrition Mission. Feasibility Study of Introducing Low Cost Fortified Energy Food in India through Private Sector Participation. Internet: http://karnutmission.org/documents/New_Feasibility_Study.pdf (Accessed 29 June 2020)

3. The 2020 Global Nutrition Report. Internet: https://globalnutritionreport.org/reports/2020-global-nutrition-report/ (Accessed 29 June 2020)