D4N 2025

Delivering for Nutrition in South Asia

Towards Impact at Scale

Revolutionizing Child Nutrition

A Predictive ML Model for Last-Mile Public Health Delivery

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Global Solutions

Dimagi

Problem Statement

The Challenge

148.1M
Children stunted globally
(2022)

45M
Children wasted globally
(2022)

Worldwide, undernutrition accounts for 45% of deaths among children under five, significantly impacting long-term health and community prosperity. India contributing 1/4th of it

India's Current Status
(NFHS-5, 2019-21)

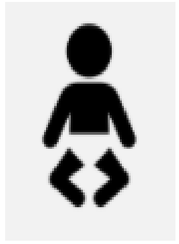
Stunted	Wasted	Underweight
35.5%	19.3%	32.1%

Introduction to Program and Predictive Model

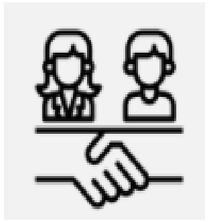
Dimagi Nutrition Solution

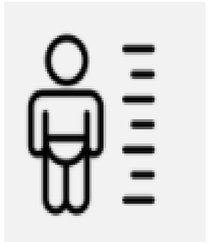
- **Improved Service Delivery**
- **Targeted Interventions**
- **Undernutrition Tracking**
- **Interoperability**
- **Data Sharing**
- **Behaviour change**

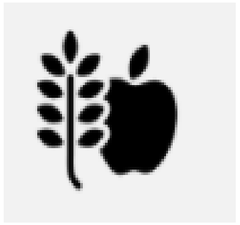

Pregnancy & Childcare


Delivery


Health Check-ups


Events


Growth and Development


Nutrition


Counselling


Assessment & Upskilling


Adolescence


Pregnancy


Lactating


New born


0-3 years


3-6 years

Critical Life Stage Coverage

Offline Capability

Designed to work in resource deficient environments

Multi-lingual

Designed to cater to a diverse set of workers and gives regional touch

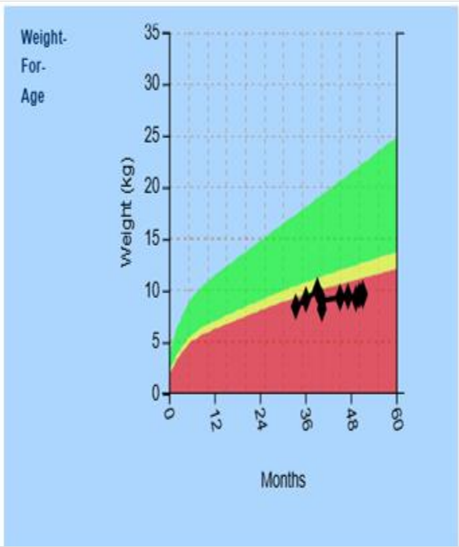
Multimedia Capability

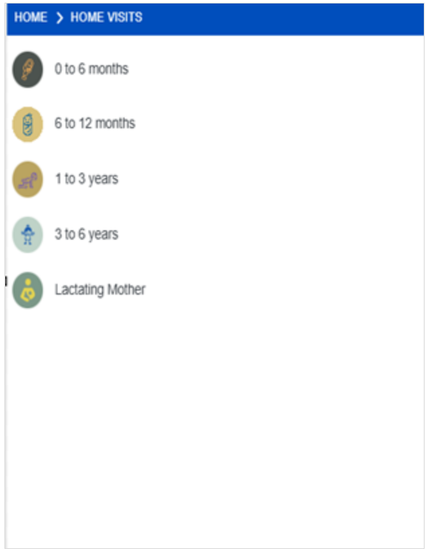
Enhance counselling effectiveness using videos and images

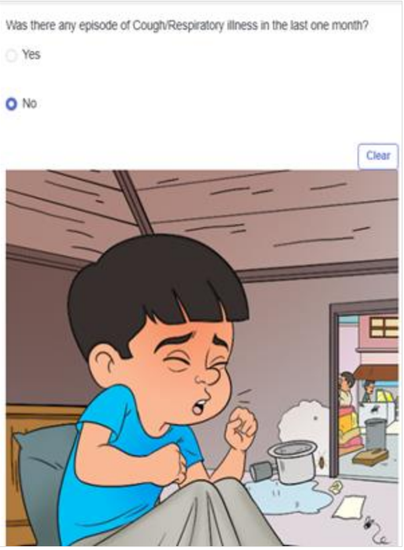
Scalable

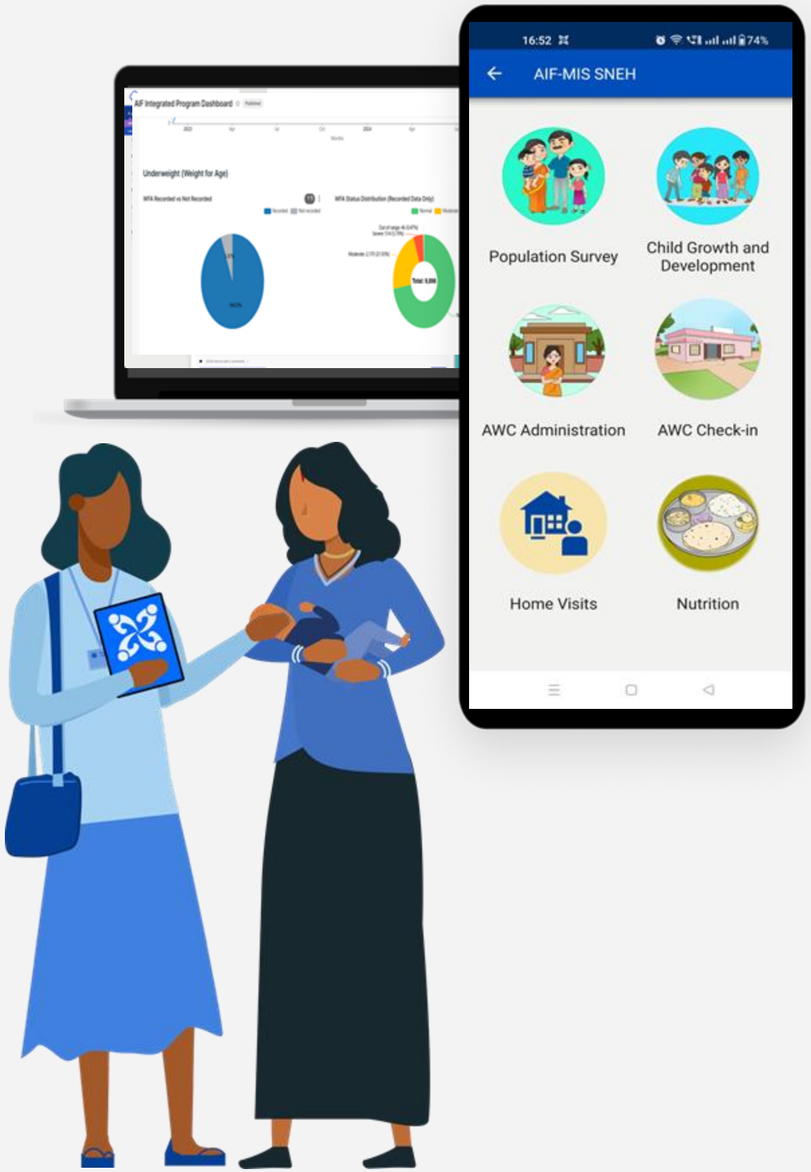
Built using a platform that has been proven to work at scale

Approach: ML Algorithm Design







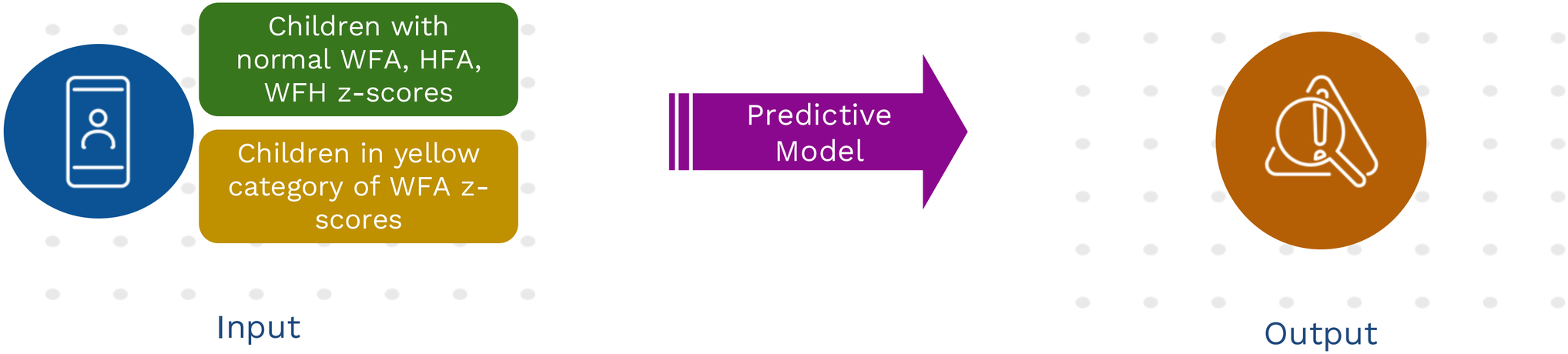


Data recorded on CommCare Server is input into the predictive model

ICFs conduct home and AWC visits, using CommCare to register families, record anthropometry, track development, and log follow-ups. As data is synced to the CommCare server, it becomes the key input feeding the predictive model that identifies high-risk children.

Approach: Predictive Modelling

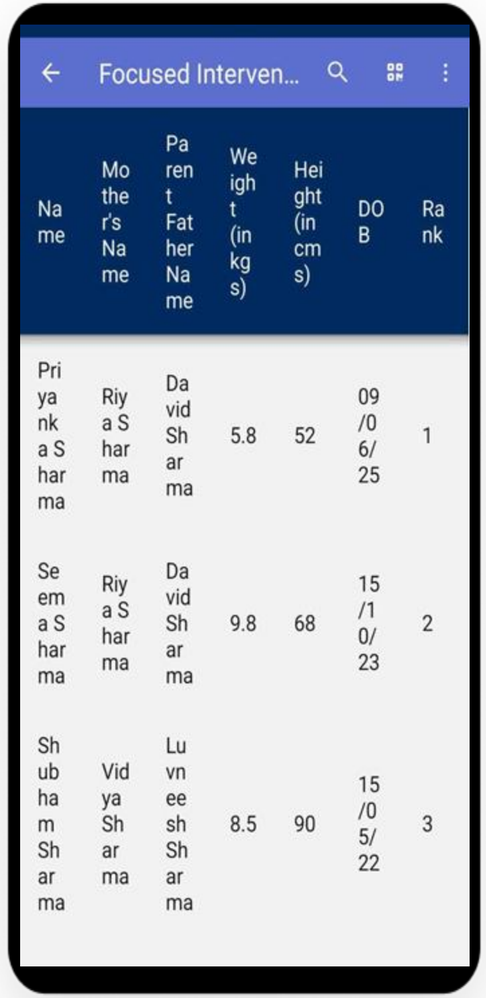
The machine learning predictive model uses existing data to generate nutrition risk scores, forecasting undernutrition/malnourishment in children aged 6 to 55 months who are currently normal or moderately underweight for stunting, wasting, and underweight.



The foundation of the model is a comprehensive, high-quality dataset covering 22,767 children aged 6 to 60 months over an 18-month period.

Approach: Risk Score Integration

View Case	@case_id	div_intervention_eligibility	div_risk_score	div_intervention_visit_num
View Case	f34a3d01-06ce-4ab1-8946-8e534acee8dc	yes	0.1551975657	2
View Case	887afd96-27c9-4ad4-bc83-762558dd7f38	yes	0.1928687078	2
View Case	e209e19e-ad46-4ea4-a051-0bc8aab6f486	yes	0.1958245904	1
View Case	9c09f333-5b95-4dda-ba53-ab0c6436b49c	yes	0.2245338979	2
View Case	1f2ec381-f248-4e6e-b8b1-faf121d365ff	yes	0.2404583035	
View Case	db0b7af1-f136-42ff-9828-0576f6f9bcb0	yes	0.2405638379	2
View Case	3a962e64-4ab2-4116-972e-a2173f75d153	yes	0.3092472586	2
View Case	283bb4ce-f34f-42fd-af86-7553712ada57	yes	0.3123405317	1
View Case	be6985a9-3515-4301-9578-17fa4a1e9191	yes	0.321885901	2
View Case	3bfe9e15-74d5-4321-a44d-dbc7e458d98d	yes	0.3225840332	3



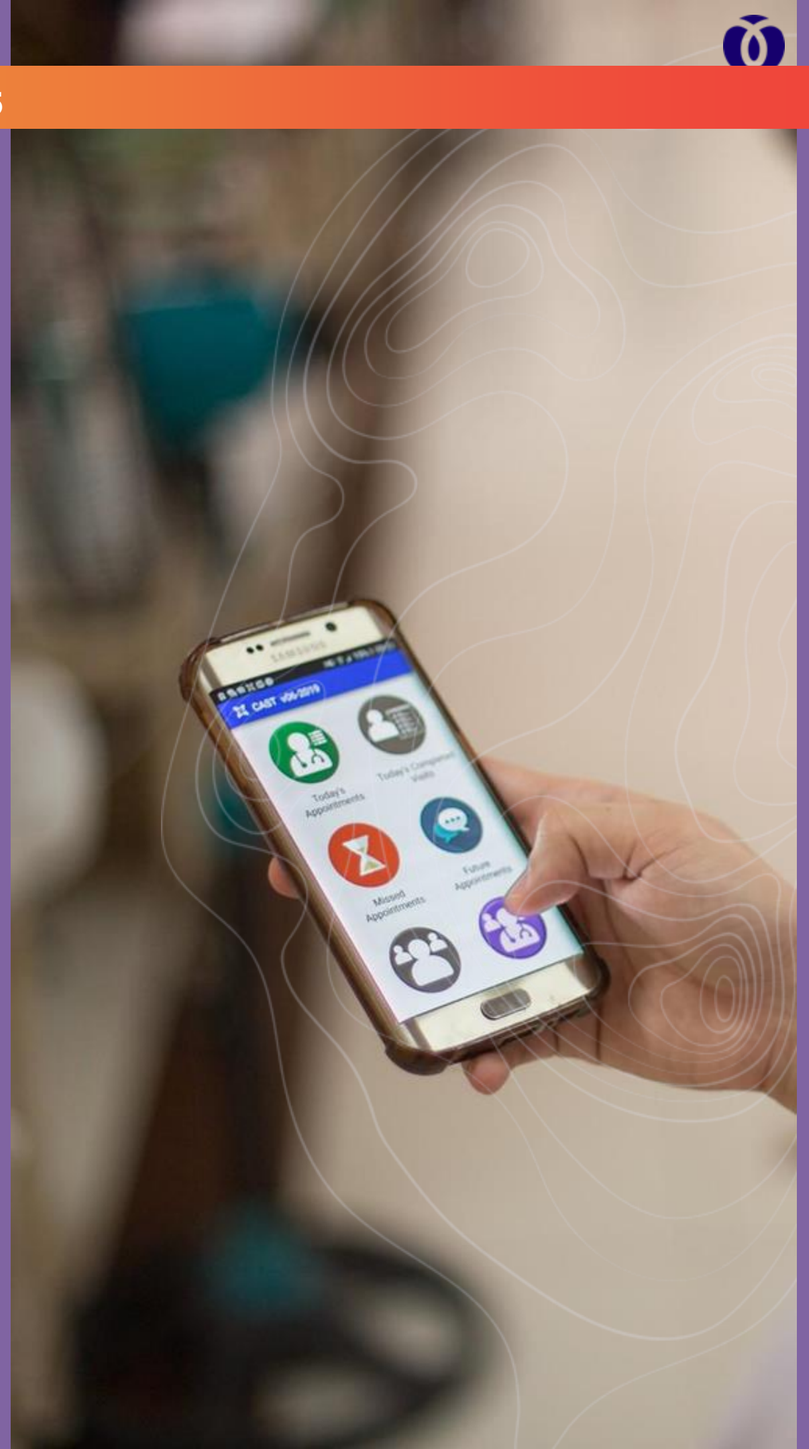
The model assigns risk scores (0 to 1) to all children in the base data, indicating the probability of transitioning to a worse nutrition status. A ranked list of children is then generated based on these scores.

Implementation Specification

Targeted Intervention implemented for top 4 ranked at risk children identified via predictive modeling

1. Targeted additional home visits for children currently healthy but at risk of malnutrition, as predicted by the model.
2. Visits focussed on diagnosing factors impacting children's nutritional status
3. Provide knowledge and personalized counseling to caregivers on optimal nutrition and practices that promote wellbeing
4. Create awareness about general cleanliness and sanitation, regular anthropometric assessment, admission to NRC, etc

Value Proposition & Usability

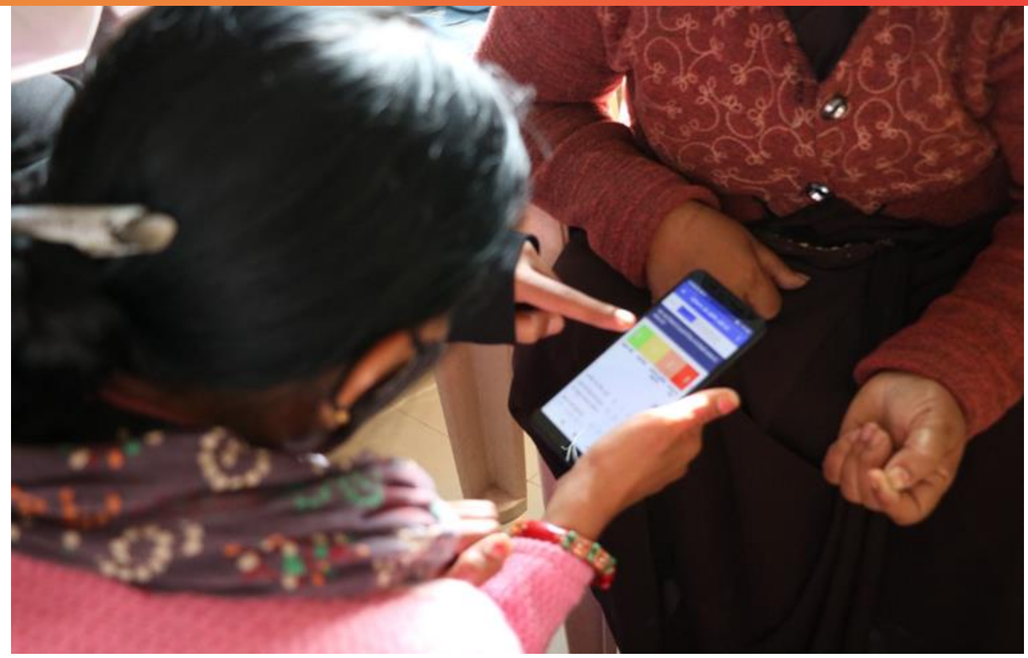


Model Performance Metrics

The final model's performance on the holdout test dataset showed:

- **Average Precision:** 0.53
- **Precision at 0.5 Recall:** 0.55
- **Improvement:** A **3.4-fold better precision** than a classifier that performs completely at random (which would be 0.16 precision at 0.5 recall given the class imbalance of 0.16/.84).

The final design used a **single, unified aggregate model** to predict any of these transitions simultaneously (HFA, WFH, WFA, low WFA), which was found to simplify the decision-making process for frontline workers and achieved superior predictive performance compared to building separate models for each transition type.

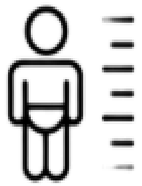


Value Proposition

Our predictive algorithm shifts from reactive to preventive care by proactively flagging at-risk children before malnutrition onset, enabling targeted interventions when they matter most.

Before: Reactive Approach

- Growth monitoring detects malnutrition after onset
- Late intervention with limited impact
- Resource-intensive blanket approaches



After: Proactive Approach

- Predictive model flags children before symptoms appear
- Early identification enables preventive care
- Targeted support for highest-risk families

Impact: Empowers frontline workers with targeted interventions for families who need support most

Learnings & Insights

Reflections

- The Value of Cross-Sector Collaboration
- Performance and Generalizability Trade-Offs
- Operationalizing Precision
- Predictive value and Policy Implications
- Data Quality
- Human Factors
- Digital literacy

Learnings

- Longer intervention duration and sufficient behaviour change opportunities is required for measurable improvements
- The use of the Outlier Detection Tool (ODT) further showed that data-driven insights can strengthen supervision systems
- This integrated approach may address both behavioral and structural causes of undernutrition
- Independent baseline and endline assessments, in addition to program data, can also help strengthen data reliability and minimize bias in evaluations.

Scalability & Sustainability

Opportunity for Scale Up

Proven Success:

- 23,000+ children reached
- CommCare-powered predictive model with targeted interventions
- Strong feasibility and community acceptance demonstrated
- Strategic alignment with Government interventions

Scale Advantages:

- Interoperable with government systems
- Open-source, adaptable to local contexts
- Sustainable through existing FLW infrastructure
- Building System Capacity for AI-Enabled Public Health

Impact Numbers

- **23K+** Children reached in pilot
- **2 States** Successfully piloted (MP & Odisha)
- **Millions** Potential beneficiaries at scale

Success Factors

- **High** Community acceptance
- **Strong** Feasibility demonstrated
- **Proven** Technology platform
- **Strategic** Government alignment

Scan for a quick brief

Thank You!

My participation was made possible with support from **Dimagi**

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