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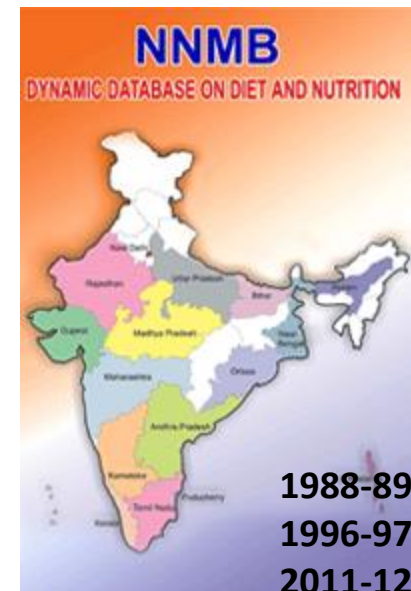
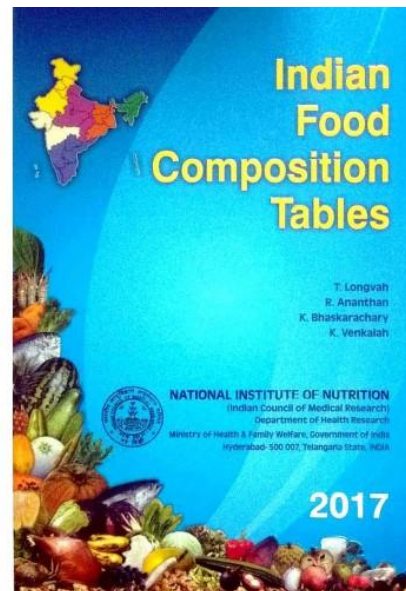
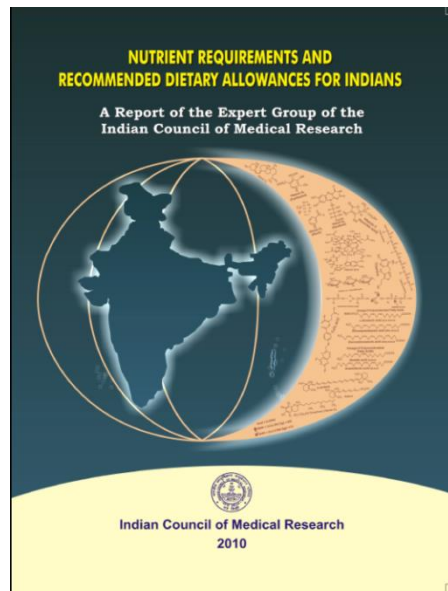
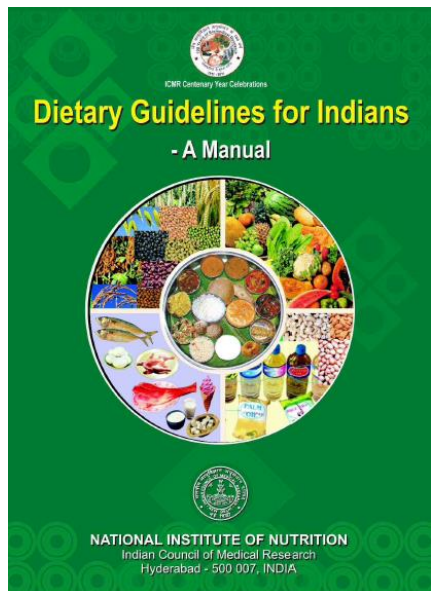
Horticulture Retail Supply Chain : A Promising Stakeholder in Food-Based Nutrition Intervention

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Horticulture Retail Supply Chain :

Promising Stakeholder in Food-Based Nutrition Intervention

Food-Based Nutrition Intervention :

A sustainable approach to promote dietary diversity and the consumption of nutritionally enhanced foods

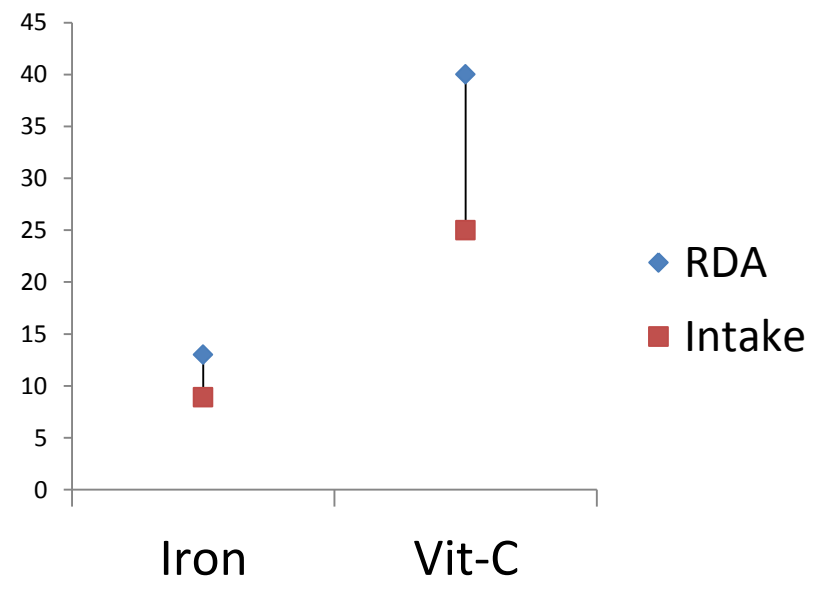
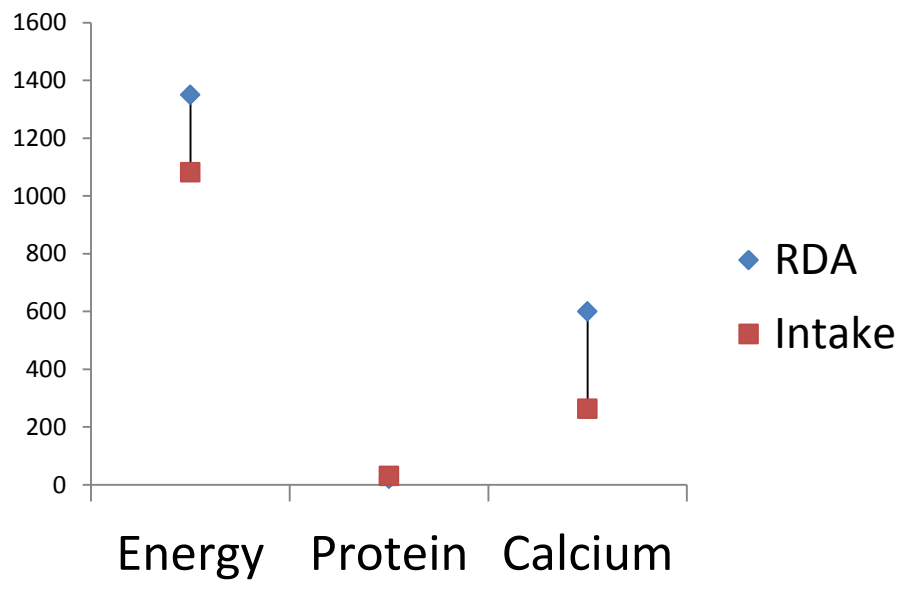
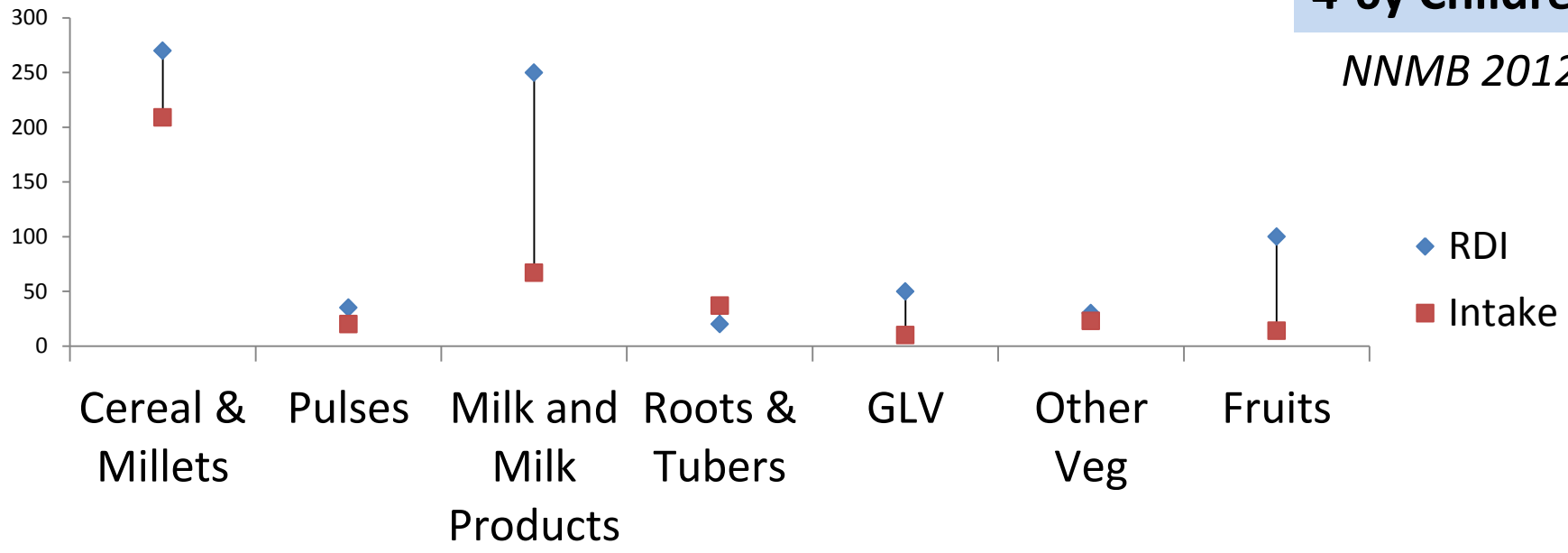
Purpose of Food-Based Nutrition Interventions

- improving food production and availability,
- processing and conservation,
- supply and commercialization,
- **food consumption**

FAO 2006

4-6y Children

NNMB 2012



Integrated Child Development Service (ICDS)

ICDS is the largest government supported community based welfare programme in the world

Launched on 2nd October, 1975

to provide early childhood care and development for preschoolers and healthcare for nursing mothers

It covers 8 million children <6 years & 2 million of pregnant and lactating mothers (2015) with **24,700 cr. GOI allocation (2017-18)**

A national program that provides –

- early child nutrition, preschool education, immunisation to the children of **6-59 months**
- Health check up, IFA for **pregnant and lactating women**
- Nutrition education to **adolescent girls**

Functional Unit : Anganwadi Centre (AWC)

AWC
Govt. Managed
Preschool



Equipped with
Infrastructure
and
Human
Resources

Supplementary Nutrition Programme (SNP) for Preschool Beneficiaries of ICDS

500 Kcal and 12-15g protein

Rice + Pulse Soup with GLV or Other Veg + Eggs : 6 Days/Week

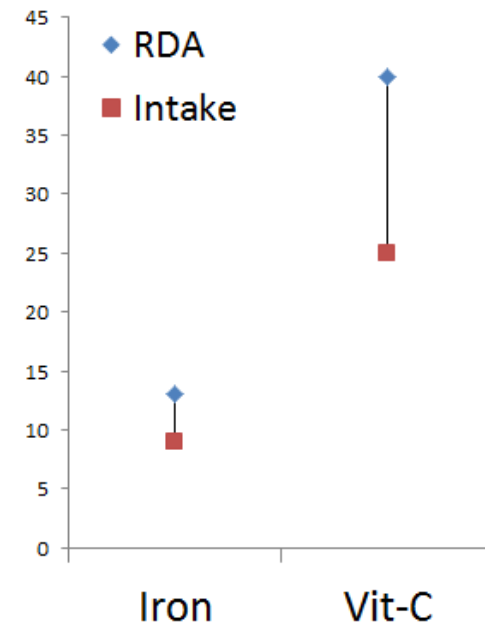
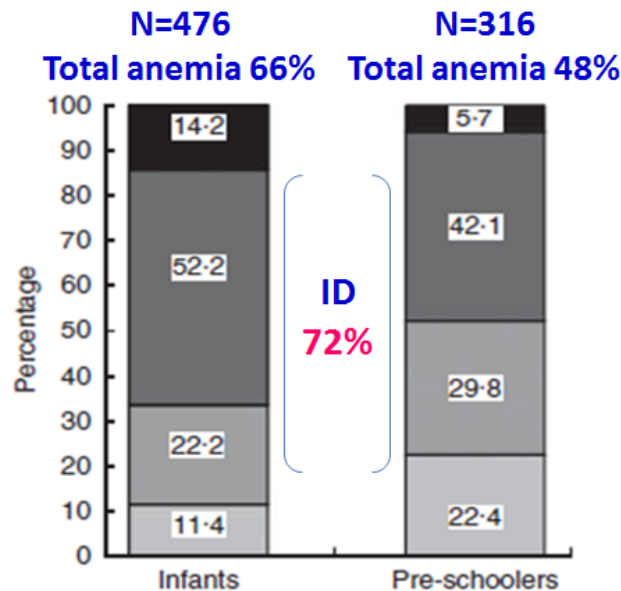
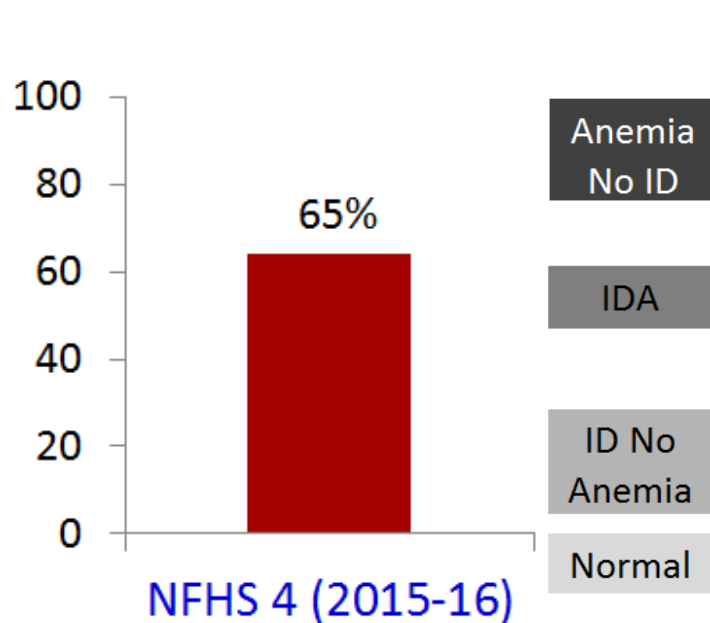
Rice	75 g
Pulses	15 g
Vegetable	25 g
Oil	5 g
Egg	1 No.



Spot Feeding



DWCD Revised Norms for Preschoolers, 2013



Inclusion of Guava Enhances Non-Heme Iron Bioavailability but Not Fractional Zinc Absorption from a Rice-Based Meal in Adolescents^{1,2}

Krishnapillai Madhavan Nair,^{3*} Ginnela N.V. Brahmam,⁴ Madhari S. Radhika,⁴ Roy Choudhury Dripta,³ Punjal Ravinder,³ Nagalla Balakrishna,⁵ Zhensheng Chen,⁶ Keli M. Hawthorne,⁶ and Steven A. Abrams⁶

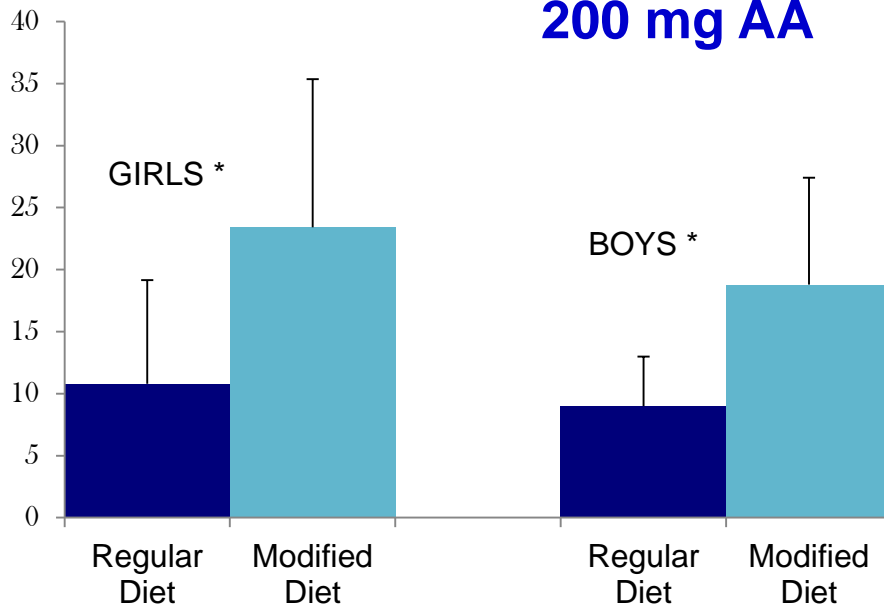


Habitual Meal

+



100g Guava
200 mg AA



A 3-arm food based Cluster RCT

(CTRI/2014/09/004983)

Hypothesis

ICDS preschool beneficiaries randomized to receive Guava (high in vitamin C) with SNP meal will have better iron and vitamin C status along with functional outcome than children in the control group receiving fruits containing low vitamin-C or no-fruit

Study Design

Alair Sub-District
Villages / AWCs
n=26/47

Excluded AWCs : n = 19

Selected
Villages/AWCs: n=16/28

Required 130 Intv. days

- ↑0.8g/dL Hb,
- 1.5mg Fe/200g SNP meal
- 20% Absorption

Enrollment of Participants
↓
Consent Collection
↓
Recruitment of Participants
↓
Deworming
n=399

Cluster Randomization

GG

Villages: 5

SNP+25g Guava



BG

Villages: 6

SNP+25g Banana



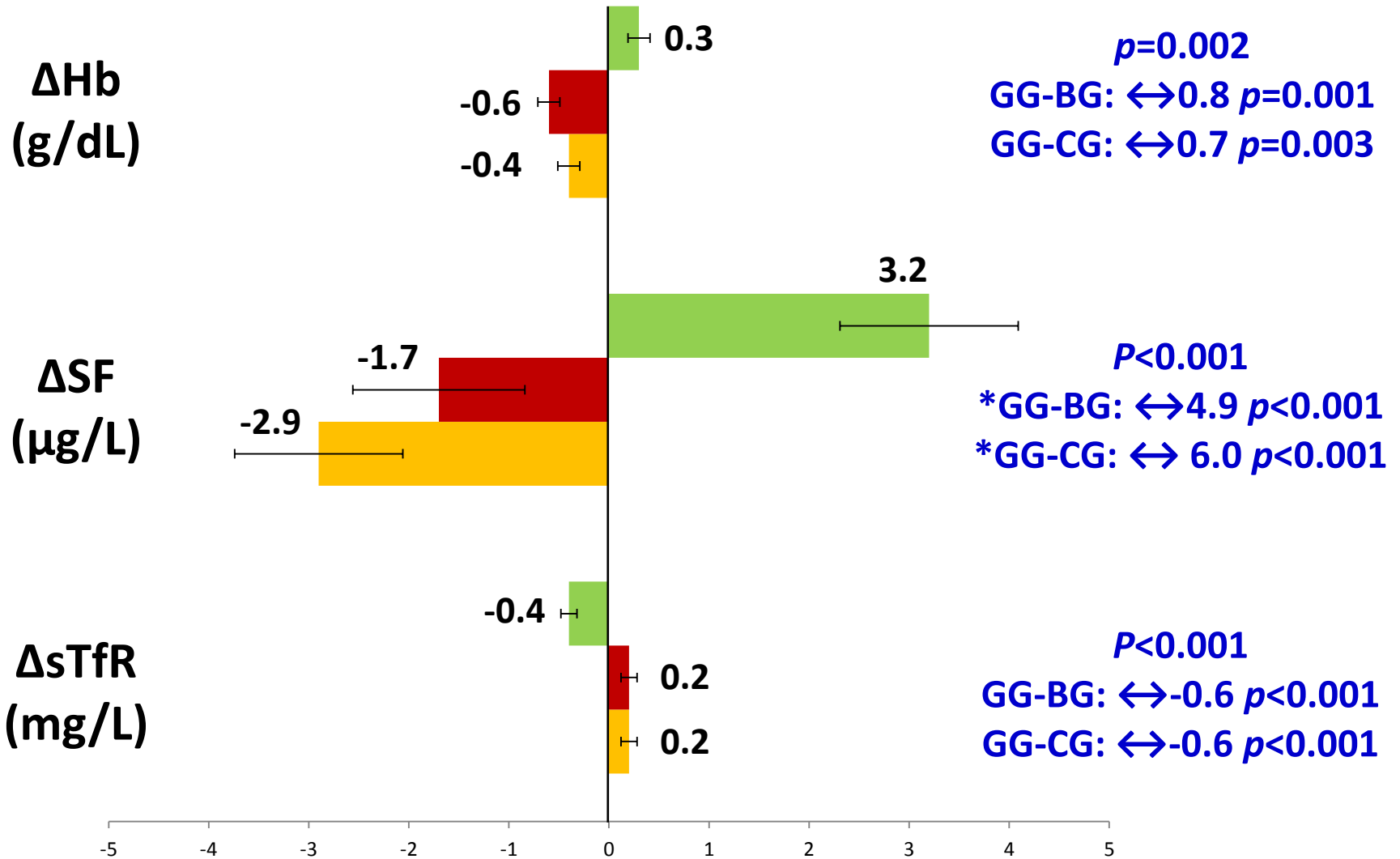
CG

Villages: 5

SNP+25g Cucumber

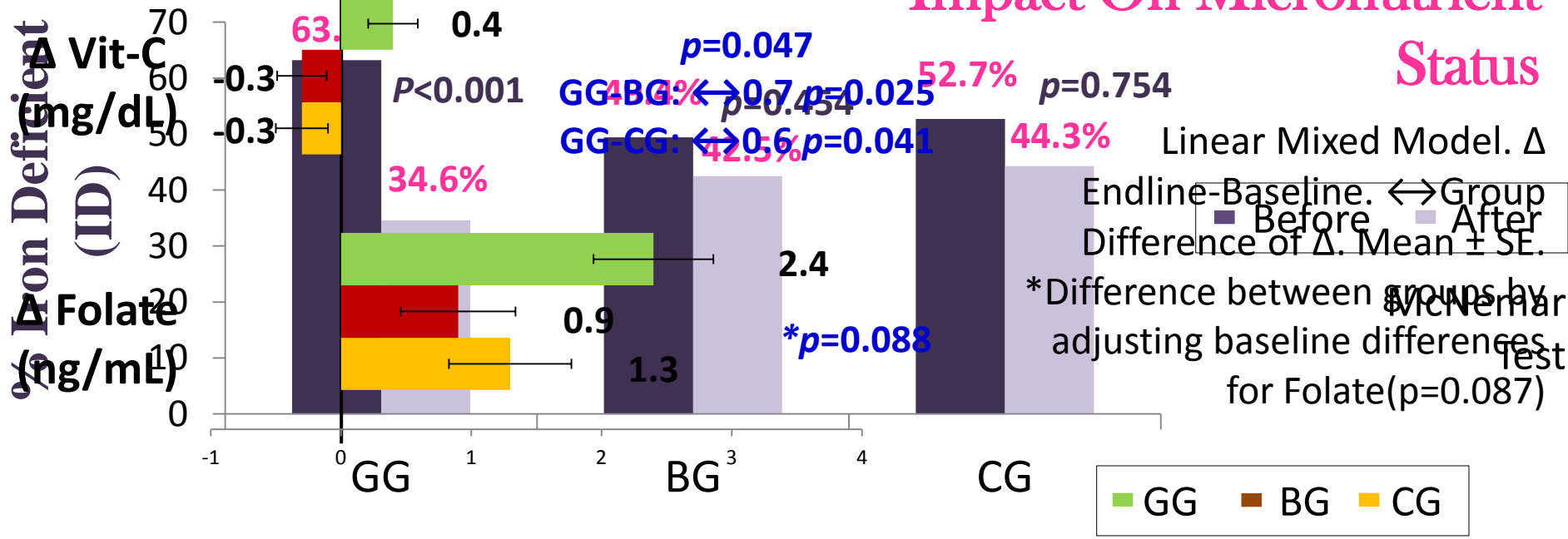


Impact On Iron Status



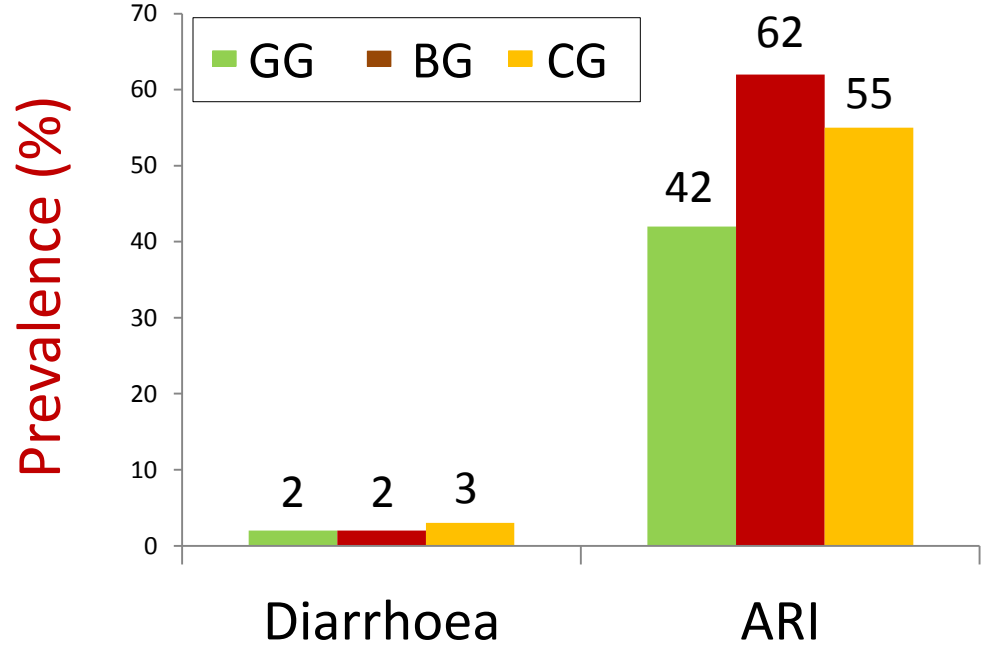
Linear Mixed Model, Δ Endline-Baseline. \leftrightarrow Group Difference of Δ , Mean \pm SE.
*Difference between groups by adjusting baseline differences for SF ($p=0.082$)

Impact On Micronutrient Status



Impact On Morbidity

- ARI- Acute Respiratory Tract Infection
- Group difference in morbidity adjusted for seasonality and time effect using GEE
- Seasonality (p=0.027) and time effect (p=0.002) is significant for ARI morbidity



Horticulture Retail Supply Chain : Promising Stakeholder in Food-Based Nutrition Intervention

Challenge

To Establish the Uninterrupted Supply Chain
of the Intervention Fruits

Approach

- Understand the procurement process in ICDS
- How to integrate into the existing supply chain of the material

Procurement Process of Ration in AWCs

Non-Perishable
Commodities
(Cereals)

Food Corporation of
India (FCI) Godown

Public Distribution System
Delivery: 1/month

ICDS Project Office
Storeroom

Local Transport

Semi-Perishable
Commodities
(Eggs)

National Egg
Coordination
Committee

Introducing Horticulture
Stakeholder

Local Farm

Anganwadi Centre (AWC)

Perishable
Commodities
(Vegetables)

Cash Deposit to
Anganwadi Teacher

Local Procurement

Immediate Procurement

Plan I



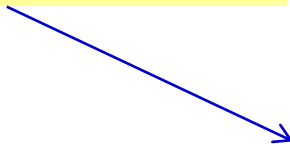
Primary Production



Looked For
Local Orchard Owners



Shifted towards
other cash
horticulture crops



Plan II



District Horticulture Mission



Looked For
Collaboration to Engage Distributers



Guava was found
imported mostly
from other districts



Not Successful

Plan III



Retail

Looked For Local Fruit Vendors

Identified about 10 prospective fruit vendors near the study area

Selection Criteria :

- i) experience in supplying fruits to local institutes
- ii) proximity to the study site
- iii) willing to supply uninterruptedly
- iv) economical rate

Selected : 1

3 times/week and a total of 60 times during 140 days of intervention



Effect of Involving Local Retail Supply in Intervention

Duration	GG	BG	CG	<i>p</i>
¹ Intervention Days	140 138 – 141	140 138 – 142	141 139 – 143	0.504

Intake	GG	BG	CG	<i>p</i>
¹ Fruit (g)	26.6 ± 1.68	23.9 ± 1.72	28.9 ± 2.17	0.241

GG – Guava group; BG- Banana; CG- Cucumber. ¹Linear Mixed Model

- ✓ **direct contact between anganwadi staff and fruit vendor** was possible to establish.
- ✓ AWC staff could monitor the **quality (ripeness, freshness)** and **quantity of the supply** and give their **feedback** to the retailer without much involving the investigator.
- ✓ Vendor **perceived the duty as the stakeholder of the trial** which in turn helped to be **ensured about the fruit quality**.

SUMMARY :

This Trial –

- Established feasibility of introducing fruits in nutrition sensitive national programme.
- Guava group reported improve in hemoglobin and iron store with diminished tissue iron deficiency.
- Uninterrupted regular supply chain was a major contributing factor to attain this impact.
- Involving local vendors into govt run programme helped to ensure quality of material, compliance of intervention and sustainability in supply.
- SNP cost : 6.0 INR/child/d (~0.1 USD)
Inclusion of Guava : ↑0.80 INR/child/d (~0.01 USD)

CONCLUSION

Identifying and engaging a local fruit vendor, who was always available near the study site —

- ensured both feasibility and sustainability of the supply chain
- facilitated the intervention to reach at its aim to improve iron status of the preschoolers
- Enabled community participation as a stakeholder of the intervention

Designing of a food based nutrition intervention trial integrated with national programme and including respective macro/micro level agri/horticulture stakeholder ensures the proper functionality and feasibility of the trial

Key Messages...

- ✓ Cultivating nutritionally important fruits and vegetables should be promoted
- ✓ To encourage the market in-flow of the produce effectively as an important stakeholder of the government programme
- ✓ To create nutritional environment in the community

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Thank You ...

