

A decorative graphic consisting of a vertical blue line on the left side and a horizontal blue line across the top. A small green square is located at the intersection of these two lines.

# Nutri-candy

Jennifer

# Presentation Outline

- ☑ Product Description
  - ▶ Product Description/use
  - ▶ Product Formulation
  - ▶ Nutrient Bioavailability and its Interactions
  - ▶ Package, storage, shelf life, and price/cost
- ☑ Safety
  - ▶ Hazard Analysis
  - ▶ Home Usage
- ☑ Impacts
  - ▶ Culture Appropriateness

# Product Background: India's country profile

Population: 1,168,714,600

Children-under-5 mortality rate: 79 per 1000

Vitamin A deficiency, in children 6 to 59 months old: 57%

Iodine deficiency: 33%

Prevalence of anemia, in children 6 to 59 months old: 69%

Prevalence of anemia, in women: 62%

# Product Description/use



- **Nutri-candy is a hard-boiled candy developed by the Micronutrient Initiative.**
- **The candy is fortified with multiple micronutrients, which are vitamin A and C, folic acid, and Iron.**

# Product Description/use

Target region: India

Target population: 2-6 yr old children,  
adolescent girls, pregnant and lactating  
women

Objectives:

- to improve micronutrient status in the target population
- to promote the attendance of beneficiaries at the supplementary feeding centres

# Product Formulation

prepare the ingredients (sucrose, citric acids, and fortificants)



mix together the ingredients



boil the mixture until the desired temperature has been reached ( $160^{\circ}\text{C}$ )



cool



shape



pack

# Nutrient Bioavailability and its Interactions:

## Nutritional content of nutri-candy

Nutrients	Levels per 3 gram lozenge
Vitamin A	500 IU
Vitamin C	10 mg
Folic acid	50 mcg
Iron	7 mg

# Nutrient Bioavailability and its Interactions:

- Vitamin A: inadequate bioavailability
- Iron: affected by diets
  - phytates ↓ iron bioavailability by binding to iron to form insoluble complexes
  - phenolic compounds:
- Vitamin C: ↑ non-haem iron absorption from foods
- Folic acid: not readily available in cereal-based diets



# Package, storage, shelf life, and price/cost

- Storage: avoid contact with sunlight or heat.
- Packaging: high density poly-ethylene bags which can withstand higher temperatures
- Nutri-candy has a shelf life of at least 6 months
- Cost: 0.4 cents of USD/candy

# Hazard Analysis

Two important properties of hard-candies:

- Clarity or transparency for attraction
- A minimal tendency to absorb water from the air
  - Difficulty in separating candy & wrapper
  - Dental caries

# Home use:



## Safety hazards:

- tooth decay or dental caries

Solution: children should only receive 1 candy/day and be educated with proper oral hygiene

- toxicity effects: highly unlikely

# Culture Appropriateness

- India: emphasize on home/family cooking using traditional and fresh ingredients.
- Fortification of centrally processed foods: may not be as effective
- No changes in diets or lifestyle.

A decorative graphic consisting of a vertical blue line on the left side and a horizontal blue line across the top. A small green square is located at the intersection of these two lines.

**Thank You**

# References:

- ✓ Bangalore, N.V. (2011) Indian confectionery industry on a growth trajectory driven by rising consumerism and young consumers. Retrieved from F&B news from <http://www.fnbnews.com/article/detarchive.asp?articleid=29378&sectionid=1>
- ✓ Black, R. (2003). Micronutrient deficiency: An underlying cause of morbidity and mortality. Bulletin of the World Health Organization, 81, 79.
- ✓ Bulusu, S. and Joshi, T.P. (2006). Suck it and see: Fortified lozenges delivering multiple micronutrients to the community in India. Nutrition, Retrieved from <http://www.a2zproject.org/pdf/A%20wise%20combination%20of%20several%20strategies%20is%20needed%20to%20combat%20anaemia%20-%20journal%20article%20in%20Nutrition.pdf>
- ✓ Fellows, P. and Hampton, A. (1992). Small-scale food processing - A guide for appropriate equipment. Southampton Row, London: Intermediate Technology Publications.
- ✓ Food-Info. (2011). What is citric acid (E330) and is it synthetic or natural? Retrieved from <http://www.food-info.net/uk/qa/qa-fi13.htm>
- ✓ Gonze, M. et al. (1994). Process for the production of hard candy. Retrieved from <http://www.freepatentsonline.com/5314708.html>
- ✓ Health Canada. (2009). What are Functional Foods and Nutraceuticals?. Retrieved from <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1171305207040&lang=eng>
- ✓ Jamison, D.T., Breman, J.G., Measham, A.R., et al. (2006). Disease Control Priorities in Developing Countries. Washington, USA: World Bank.
- ✓ Joshi, T.P. et al. (2006). Micronutrient-fortified "Nutri-Candy" Increases Participation in Integrated Child Development Services in Bihar, India. Retrieved from [http://www.micronutrient.org/cmfiles/MI%20Around%20the%20World/Asia/Poster-7-Saraswati-Bulusu-\(NutriCandy\).pdf](http://www.micronutrient.org/cmfiles/MI%20Around%20the%20World/Asia/Poster-7-Saraswati-Bulusu-(NutriCandy).pdf)
- ✓ MicroNutrient Initiative (2010). Multiple Micronutrient Programs. Retrieved from <http://www.micronutrient.org/english/View.asp?x=582>

# References

- ☑ MicroNutrient Initiative (2010). MI Toolkit-Fortified candies/lozenges. Retrieved from <http://www.micronutrient.org/CMFiles/What%20we%20do/New%20Solutions%20-%20Emergencies/Lozenges.pdf>
- ☑ MicroNutrient Initiative (2010). India Country Profile. Retrieved from <http://www.micronutrient.org/english/view.asp?x=603>
- ☑ Sari, M. et al. (2001). Effect of iron-fortified candies on the iron status of children aged 4–6 y in east jakarta, indonesia. *American Journal of Clinical Nutrition*, 73(6), 1034-1039
- ☑ Singh, A. (2006). India: A Challenging Growth Market. *Nutraceuticals World*. Retrieved from <http://www.nutraceuticalsworld.com/contents/view/13611>
- ☑ Sloan, E. (2002). Candy Is Dandy. *Functional Ingredients*. Retrieved from <http://newhope360.com/recipes/candy-dandy>
- ☑ The Food Safety and Standards Act. (2006). Retrieved from <http://fda.up.nic.in/Legislation/food%20safety%20and%20standards%20Act%202006.pdf>
- ☑ Willis, F.M. and McDowell, J.L. (2001) Candy's a dandy process industry. *Today's Chemist at Work*, 10(12), 28-32.
- ☑ World Health Organization (WHO) and Food and Agriculture Organization (FAO) of the United Nations. (2006). Guidelines on food fortification with micronutrients. Retrieved from [http://www.who.int/nutrition/publications/guide\\_food\\_fortification\\_micronutrients.pdf](http://www.who.int/nutrition/publications/guide_food_fortification_micronutrients.pdf)
- ☑ World Health Organization (WHO). (2004). Nutrition labels and health claims: the global regulatory environment. Retrieved from <http://whqlibdoc.who.int/publications/2004/9241591714.pdf>