

Micronutrient Powders: A Novel Way of Supplementation

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Abstract - An innovative way of supplementation called micronutrient powders, home fortification aims to improve the diet quality of nutritionally susceptible populations, like young children. Micronutrient Powders (MNP) are sachets of dry micronutrient powder that may be mixed with any food that is solid or semi-solid and is ready for ingestion. The goal of home fortification with MNP is to guarantee that the diet satisfies individual nutrient requirements. Home fortification raises vitamin consumption, which improves micronutrient status and, in turn, can enhance child health by lowering morbidity and mortality rates and enhancing growth, cognition, appetite, and other functional outcomes.

Key Words: Micronutrient Powder (MNP)

Background:

The biggest known illness burden among micronutrients is associated with iron and vitamin A deficiency, particularly in low- and middle-income countries. Given the substantial vitamin and mineral intake they require to maintain their rapid growth and proper development, infants and children are the groups most at risk for micronutrient malnutrition. The majority of plant-based diets typically don't provide enough of the essential micronutrients (especially vitamin A, zinc, and iron) to meet the daily recommendations. The inclusion of items from animal sources that could close the nutrient gap raises the price and might make them unaffordable for those with the lowest income levels.

Over 2 billion individuals suffer from vitamin and mineral deficiencies globally. Although there is evidence of the effectiveness and affordability of micronutrient interventions in enhancing vitamin and mineral status, there is still a significant need for study on how interventions are delivered and used. MNP use and distribution is evolving into a preferred method for correcting micronutrient deficits. In cases where supplemental foods fall short in terms of critical nutrient content, home fortification is advised.

History of MNP development:

MNPs, or micronutrient powders, are easily ingested, powdered vitamins and minerals that come in handy packaging. MNPs are simple to use, safe to keep without refrigeration, and economical to transport. Dr. Stanley Zlotkin created the first MNPs in 1997 at the Hospital for Sick Children in Toronto, Canada, in response to a challenge from the United Nations Children's Fund

(UNICEF) to find novel treatments for micronutrient deficiencies that might help kids all over the world.

The initial purpose of MNP was to supply iron and other minerals needed to treat nutritional anemia. This is due to the fact that young children cannot swallow iron and folic acid tablets, and syrups had not proven to be a successful intervention, most likely as a result of their poor acceptability due to a strong metallic taste, tooth discoloration, bulky packaging, and the possibility of overdosing. Due to this, the effectiveness of MNP was assessed in relation to how it would affect anemia and iron deficiency. Three to five micronutrients, which are recognized to be essential for treating nutritional anemia, were included in the formulation of the product. It has been demonstrated that MNP is effective in treating anemia.

The potential of MNP to also prevent other micronutrient deficits emerged during the course of this research. Formulations containing a significantly higher number of micronutrients—typically 15, based on the understanding that supplemental feeding diets are frequently lacking in many micronutrients—were created for preventing micronutrient deficiencies in general.

It is now generally established that MNP can be used for point-of-use fortification at home to replace nutritional inadequacies in the diets of young children and infants in particular. The current WHO guidance is based on studies that focused on treating nutritional anemia, but this brief focuses on that goal, i.e. using MNP to prevent micronutrient deficiencies generally.

Micronutrient powders Definition:

A combination of vitamins and minerals that are contained in single-dose sachets and added to a serving of food just before consumption.

MNP is a powdered vitamin and mineral single-dose sachet that can be sprinkled on any ready-to-eat semi-solid food eaten at home, school, or any other location. The powders are designed to boost a child's intake of micronutrients while maintaining their regular eating patterns.

The MNP should:

- Include a variety of necessary micronutrients in a bioavailable form, in the right dosages.
- Be used appropriately by the target audience, which necessitates acquiring or purchasing the product and using it in accordance with the advised frequency and duration of use.
- Not require changes to the typical diet, not affect existing dietary practices, or undermine exclusive and continued breastfeeding; and

• Neither cause negative side effects nor have a contraindication.

Uses of Micronutrient Powders (MNP's):

When vitamin levels are insufficient to support normal growth in children or pregnant women, micronutrient powders are frequently employed to fortify diets. One of the most common and promising initiatives in public health is the use of micronutrients.

In the coming years, sales of micronutrient powders are projected to increase due to the simple accessibility of handy and reasonably priced micronutrient powders to improve the health and wellbeing of children and women. Since they are in encapsulated form, it is simple to sprinkle them over everyday meals, enhancing the food with vitamins without altering its flavor. Children who often have difficulties in swallowing vitamins or pills can be properly dosed with the help of micronutrient powders. With the abundance of affordable raw materials and labor available in emerging nations, it is anticipated that a number of small-scale businesses will enter the market.

A potential strategy for addressing micronutrient deficiencies in recent years has been point-of-use fortification of home-cooked meals with supplements in the form of powders, crushable pills, and lipid-based spreads. In example, MNP contains vitamins and minerals that can be added to any home-cooked food right before consumption in the form of powder, frequently in single-dose sachets. In essence, MNP are created to deliver one RNI of micronutrients per individual in a limited amount (1 g of powder). The powder has a nearly tasteless consistency and barely perceptible effects on the food's flavor, color, and texture when added. Through improving the nutritional value of people's diets, the addition of MNP is anticipated to improve the micronutrient status of individuals. It is especially advised for young children under the age of five in places where malnutrition and micronutrient deficiencies are common, dietary nutrient adequacy is low, especially for complementary foods, and industrial food fortification (i.e., specially fortified foods) is not available or practical.

Multiple micronutrient powders, which are a combination of vitamins and minerals in powder form, have been developed in response to interest in alternative methods of supplying micronutrients to populations where supplementation has proven challenging to implement or where the target group is challenging to reach through mass fortification. The powders are provided in tiny, single-serving packets that can have their contents mixed with semi-solid food before being consumed. These micronutrient powders can be used to fortify food in a variety of contexts, including the home or any other location where meals are served, including a school, nursery, or refugee camp.

Micronutrients are important for both humoral and cellular immunological responses, cellular signaling and function, learning and cognitive abilities, work capacity, reproductive health, and even the evolution of microbial

virulence. Due to their increased growth and metabolic needs, infants, children, and pregnant women have higher vitamin and mineral requirements than other age groups. However, their dietary consumption frequently falls short of these needs. These micronutrient deficiencies in children can impair the immune system, impair growth, and induce anemia. They can also impede motor and cognitive development. The health and productivity of the population are affected over the long run by under nutrition in women and children.

To provide additional micronutrients to women and children, a variety of ways have been used. These include food provision, supplementation, fortification, and dietary change. To combat the pervasive micronutrient deficiencies, point-of-use or at-home fortification of maternal and pediatric meals has been popular in the past ten years. Multiple Micronutrient Powders (MNPs), also known as Sprinkles, are encapsulated vitamins and minerals that can be added to cooked dishes without significantly altering the flavor or consistency of the food. The target populations of MNPs are intended to receive the required daily dietary intake of at least two vitamins and minerals.

MNP's as a Innovative Strategy For Addressing Micronutrient Deficiencies In Infants And Young Children

Micronutrient powders (MNPs) have been marketed as a caregiver-controlled, at-home method of enhancing the nutritional content of newborns and young children's diets. It is obvious that there has been a serious issue with inadequacies of the important micronutrients contained in these powders in environments where the use of MNPs has been advocated (presented as at-home or point-of-use "fortification"). Additionally, in theory, we would anticipate benefits (namely, increased iron status) consistent with what has been seen in the published trials if these products are consistently ingested several times per week. It has been shown that it is possible to achieve relatively high effective coverage where there are dedicated, adequately funded, and well-managed implementers along the entire supply chain down to the community level to support MNP logistics and where context-specific challenges with adherence are adequately addressed (i.e., a large proportion of those who could, in principle, benefit from such an intervention actually do.). But in order for the intervention to achieve its desired population health and nutrition aim, that difficult set of requirements must be satisfied.

Success factors for usage of MNP's:

• **Affordability:** Understanding ability and willingness to pay and testing price points is a crucial first step in developing a market-based strategy in low-income settings. If behavior change communication strategies are in place, efforts to lower the product's selling price, such subsidies or vouchers, may be particularly successful for boosting sales.

• **Behavior change:** When thinking about the home fortification product and the design, labelling, container

size, and behavior change methods, the local context and preferences must also be taken into account. These elements may influence adherence and coverage. Additionally, the initial and continuous marketing and communication efforts are crucial for raising awareness and demand for the product. These initiatives may target consumers as well as various distribution stakeholders (such as private and public channels). Person to person marketing can have a high-yield in terms of raising awareness/buy-in and demonstrating how to use the product properly and effectively.

• **Availability:** Home fortification items must be consistently available (avoiding stock outs) and of high quality in order to meet and sustain demand. Depending on the demographic that is being targeted, different population groups can be reached through expanding access to home fortification items through a variety of channels. Additionally, the product is available for purchase at other access points by the same target audiences. In order for consumers to maintain the established practice of regularly purchasing and using the home fortification items, it is especially crucial to prevent stock outs.

• **Regulatory environment:** Communication regarding the benefits of using home fortification products, including their nutritious content and health effects, is crucial for the effectiveness of behavior change communication campaigns (e.g., prevention and treatment of anemia; cognitive development). Home fortification items can be registered as foods, food supplements, or medications, and each of these classifications has different regulatory requirements. Home fortification products may fall under the Code of Marketing of Breast-milk Substitutes and later World Health Assembly decisions, which prohibit nutrition and health claims if they are intended for infants and young children, if they are registered as foods. It is crucial to comprehend this and involve individuals who can make sure the approach complies with the Code and applicable local, state, and federal laws and regulations.

CONCLUSION

MNP products are very suitable for addressing micronutrient deficiencies among different target groups. A high-quality product, preserved and presented in appropriate packaging, will enhance acceptability, compliance, and effectiveness and hence facilitate expanded use. MNP can be distributed in a variety of ways, including as through free public distribution or sales where customers can either pay the full retail price or a discounted, subsidized price.

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REFERENCES

- [1] Afsana, K., Haque, M. R., Sobhan, S., & Shahin, S. A. (2014). BRAC0 s experience in scaling-up MNP in Bangladesh. *Asia Pacific Journal of Clinical Nutrition*, 23(3), 377–384.
- [2] Angdembe, M. R., Choudhury, N., Haque, M. R., & Ahmed, T. (2015). Adherence to multiple micronutrient powder among young children in rural Bangladesh: a cross-sectional study. *BMC Public Health*, 15, 440.
- [3] Avula, R., Menon, P., Saha, K. K., Bhuiyan, M. I., Chowdhury, A. S., Siraj, S., Frongillo, E. A. (2013). A program impact pathway analysis identifies critical steps in the implementation and utilization of a behavior change communication intervention promoting infant and child feeding practices in bangladesh. *Journal of Nutrition*, 143(12), 2029–2037.
- [4] Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., Maternal and Child Nutrition Study Group, Maternal and Child Nutrition Study Group (2013). Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost? *Lancet*, 382(9890), 452–477.
- [5] Bonvecchio, A., Pelto, G. H., Escalante, E., Monterrubio, E., Habicht, J. P., Nava, F., Rivera, J. A. (2007). Maternal knowledge and use of a micronutrient supplement was improved with a programmatically feasible intervention in Mexico. *The Journal of Nutrition*, 137(2), 440–446.
- [6] Coffin, C., & Diaz Varela, A. (2014). Review of the Early Learning Partnership: Executive Summary for the Early Learning Partnership Advisory Group. Retrieved from <https://ciff.org/library/review-early-learning-partnership-executive-summary/>
- [7] Creed-Kanashiro, H., Bartolini, R., Abad, M., & Arevalo, V. (2015). Promoting multi-micronutrient powders (MNP) in Peru: Acceptance by caregivers and role of health personnel. *Maternal & Child Nutrition*.
- [8] de Pee, S., Moench-Pfanner, R., Martini, E., Zlotkin, S. H., Darnton-Hill, I., & Bloem, M. W. (2007). Home fortification in emergency response and transition programming: experiences in Aceh and Nias, Indonesia. *Food and Nutrition Bulletin*, 28(2), 189–197.
- [9] De-Regil, L. M., Suchdev, P. S., Vist, G. E., Walleser, S., & Peña-Rosas, J. P. (2013). Home fortification of foods with multiple micronutrient powders for health and nutrition in children under two years of age (Review). *Evidence-Based Child Health: A Cochrane Review Journal*, 8(1), 112–201.
- [10] Flay, B. R. (1986). Efficacy and effectiveness trials (and other phases of research) in the development of health promotion programs. *Preventive Medicine*, 15(5), 451–474.
- [11] Funnell, S. C., & Rogers, P. J. (2011). Purposeful program theory: Effective use of theories of change and logic models. San Francisco, CA: Jossey-Bass/Wiley.

- [12] UNICEF. (2002). From results-based planning tools to integrated M&E plan. In M&E Training Modules. Retrieved from http://www.ceecis.org/remf/Service3/unicef_eng/module2/index.html
- [13] World Health Organization, & UNICEF. (2008). Strengthening action to improve feeding of infants and young children 6-23 months of age in nutrition and child health programmes: Report of proceedings. WHO.

BIOGRAPHIES



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