



Review on Home Fortification Multi Nutrient Powders (MNP) in Preventing Child and Maternal Deaths by Malnutrition in Developing and Economically Underdeveloped Countries

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Abstract

The provision of micronutrients is ranked as one of the most cost effective interventions for economic development according to the 2012 Copenhagen consensus. MNP can be sprinkled on the home prepared foods for the children as part of home fortification programmes. Sprinkling MNP on home prepared foods can improve the dietary quality of food which can be given for children from 6 months to 2 years of age and above. MNP as part of home fortification tools caregivers to improve the dietary quality without bringing changes in their dietary practices. Knowledge generation from home fortification programming is important, especially because home fortification is a new concept and rapidly evolving. Adopting the healthy practices together with preventive care and proper treatment protocols of infectious diseases we can minimize micronutrient depletion.

Keywords: Malnutrition; Micronutrients; MNP; Food

Introduction

Around the world, the diets of hundreds of millions of children are critically deficient in essential micronutrients such as iodine, iron, and Vitamin A. Sustained deficiencies – particularly during the critical “1,000 days” time period between conception and age two – can devastate the physical, cognitive, and behavioural development of a child [1]. The pervasiveness of these deficiencies in high-burden countries – for example, 70% of children in India are thought to be anemic [2] – can translate into society-wide economic constraints, shaving up to approximately two percentage points off potential GDP due to cognitive and physical productivity losses. Vitamins and minerals together known as micronutrients are important components of good quality diet and can affect quality of health. Micronutrients being essential for the entire body metabolism they are required in trace quantities for our body to have healthy brain function, and healthy bones.

Breastfeeding along with nutrient diet is an ideal method for young children to get all micronutrients in their diet. In many parts of the world diets of children are often insufficient with micronutrients leading to malnutrition.

Micronutrient deficiencies cause drastic damage to the body unless they are detected early stages. Millions of children suffer from undeveloped cognitive features, growth and weak immunity because of micronutrient deficiency. Increased risk of low birth weight and birth defects and even death are always been a big problem in pregnant women with micronutrient deficiencies.

Main Deficiencies include

Iodine deficiency is primary cause for the undeveloped brain in new born children. 30 per cent of the world’s population are living in iodine deficient areas.

Vitamin A deficiency affects many children in low income areas mainly from Saharan Africa and South Asia. Vitamin A deficiency causes immune related contradictions in children and many children die from infectious diseases.

Iron deficiency is the leading cause of maternal deaths which results in anemia and other blood related diseases. Because of which infants born prematurely and will have learning abilities and delayed development.

Zinc deficiency associated with impaired immune function and gastrointestinal impairment of functioning. A Child death due to diarrhoea is one of the factors caused by zinc deficiency.

Calcium, vitamin D, and folate deficiencies are more of concern during pregnancy and can cause many health complications for mother and child.

Prevention methods of nutrition deficiencies

Supplementation camps and programmes can provide specific micronutrients that are not available as part of the regular diet. Early supplementation plays important role during development of human body and it times of requirement of -for example during pregnancy – iron and folic acid micronutrients that are difficult to meet with diet alone can be replaced with supplementation.

Addition of micronutrients to foods consumed by population such as flour and other food consumables is termed as Mass fortification. Micronutrient deficiencies can be prevented by conducting cost effective fortification programmes– often only a few cents per person per year. Iodization of salt and flour fortification successfully implemented in many countries.

Because of cost and other factors intake of nutritious foods is been a challenge and readily accessible. For example Iron rich foods like red meat, eggs, fish and other whole grain foods etc. are not available in abundant and many families cannot afford. Both nutrient deficiencies and Infectious disease can be together cause problem to the community. Because of infections micronutrients depletes from the body and makes immune system weak and further body becomes less capable of fighting infections.

Poor sanitation and unhygienic practices around household lead to increase of infections and also reaching vulnerable population are also challenges to implement proper fortification programmes.

Use of multiple micronutrient powders (MNP) for home fortification of foods

Sprinkles as a low cost nutrient product also termed as Micro-nutrient powders (MNPs) [7]. In 2007 in order to improve iron and anaemia affected populations MNPs were first introduced mixed by caregivers into home-made foods [8].

In 2011 world health organisation (WHO) guidelines strongly recommends 45 foods [11]. About 190 million infants and children are affected by vitamin A deficiency along with anaemia. WHO guidelines been implemented among the members of state based on effects and safety of MNPs for infants and children age of 6-23

months containing at least iron. Vitamin like A and minerals like zinc are strongly recommended to the children of age 6-23 months to reduce iron deficiency and anaemia. Intervention programs with fortification with MNPs should be implemented at national level among infant and young children.

Among the largest documented vitamin and mineral diseases iron and vitamin A deficiency are a big problem in micronutrients [1,2] in developing countries. 6-23 months of age infants and children are mostly affected by micronutrient malnutrition [3]. Plan based diets usually provides insufficient amount of micronutrients compared to recommended nutrients in take among the children. Cost implication is high in case of animal source food is not practical for the low income groups to cover nutrient gap [4,5]. Global estimates of vitamin and mineral deficiency among the children of 2 years are affected by vitamin A deficiency have anaemia [6]. Zinc and iron deficiency are linked together but no published data is not available [2]. Vitamin and mineral deficiency have combined effects on pre conception period and to infant age of 23 months are mostly related to increased mortality and morbidity of neonates which are having irreversible adverse effects on physical and cognitive features that lead to lifelong consequences affecting health productivity and economic growth as per the publisher report vitamin and mineral deficiency particularly vitamin A iron or zinc and other nutritional risk factor including underweight below optimal breast feeding are responsible for 3.9 million deaths and disabilities in children less than 5 years of age 2 MNPs and fortification of foods along with breast feeding to the children of 6 months age can control parasitic infection micro nutrition and malnutrition.

Intervention with fortification of foods by vitamin A zinc iron or economical efforts for health improvement globally because of dose related side effects and poor supplements dosing methods another safety concerns being a concern for successful implementation of MNPs programme despite of well recognized benefits . Fortification of foods to increase vitamin and mineral in take been suggested with MNPs among the children. MNPs are provided as sprinklers in single- serving sachets over the food before the consumption by MNPs intervention the foods can be fortified at home or any other places where meals or provided to the children, which is also called as “point of use fortification”.

MNPs Product and Quality

In order to improve vitamin A iron and zinc deficiency among anaemia affected infants and children above 2-12 years age World Health Organisation use of MNPs. A 15 component micro nutrient powder been promoted by UNICEF in sachets packed in a 30- unit box/pouch (Table 1).

Presentation	Composition of 1 sachet	Use frequency	Comments
1 box or pouch =30 x 1 gram sachets	15 vitamins and minerals (including iron, zinc and vitamin A)	1 sachet a day	Available with standard and customized layout
1 box =30 x 1 gram sachets	5 vitamins and minerals(iron, zinc, vitamin, vitamin A and folic acid)	1 sachet a day	Only available as customized layout

Table 1: 1 MNP Sachet.

Source: UNICEF supply division

MNPs are increasingly procured by international organisation like UNICEF and would food program (WFP) in order to support child nutrition. Would Food program project in coloration with UNICEF are working together to standardize the quality testing methods of MNPs. At present no official monographs being published for the quality standards of active ingredients and formulations on MNPs. Many private organisation are manufactures including regulatory authorities are working together to check the quality of MNPs. Recently UNICEF in collaboration with US Pharmacopeia convention (USP) developing a monograph for MNPs setting a reference standard for the quality and purity of MNPs. Commonly available ingredients giving in table 2. UNICEF refers to USP for dietary supplements in MNPs.

Ingredient Active
Vitamin A
Vitamin D
Vitamin E
Vitamin B1
Vitamin B2
Vitamin B6
Vitamin B12
Niacinamide
Folate
Vitamin C
Iron
Zinc
Copper
Selenium
Iodine

Table 2: List of common Vitamins and Minerals in MNP Sachet.

Conclusion

Effective intervention of Home fortification of foods using MNP's can reduce anemia and iron deficiency in children six months to 23 months of age. MNP can a better provision than in placebo and can comparable to daily iron supplementation. Intervention of MNP'S at home level fortification using local persons can improve social economic status of the developing and underdeveloped countries and also improve infants and children health standards and prevent early deaths caused by malnutrition. Different forms of Multinutrient can be prepared in liquid or solid dosages, which more palatable for the children in day to day food supplementation to improve quality standards of life.

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10. Information in this guide was obtained from UNICEF, WHO websites
11. “Guideline: Use of Multiple Micronutrient Powders for Home Fortification of Foods Consumed by Infants and Children 6–23 Months of Age”. WHO, (2011).

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