MICRONUTRIENT SPRINKLES TO ADDRESS MULTIPLE NUTRIENT DEFICIENCIES IN SCHOOL AGE CHILDREN

Salha Hamdani
WFP School Feeding, Rome
April 2008

A simple powdered sachet that could be the key to addressing micronutrient deficiency in school age children

In mid 2005, WFP held fruitful discussions with a private pharmaceutical company – DSM (SIGHT AND LIFE) that agreed to support a pilot project to test the acceptability and use of Multiple Micronutrient powder referred to as "Sprinkles" in WFP School feeding programmes. It was agreed that during the pilot phase sprinkles would be tested in two countries - Tanzania and Cambodia. 10 schools with a total beneficiary number of 5000 school age children in each pilot country would participate in this project with the objective of evaluating the acceptability of sprinkles within the community and school children.
DSM agreed to provide both budgetary support and sachets of sprinkles to cover a period of six months in the two countries under WFP School feeding programme. The financial support included implementation, monitoring & evaluation. Cambodia decided to engage and work with two NGOs – KAPE and World Vision for the pilot phase. Tanzania employed a consultant to carry out the pilot activities.

Governments in both countries supported the piloting of the projects. In each country, community awareness and sensitisation were carried out and WFP was actively involved with partners and government counterparts. Other Partners for this project included: Sight &Life, DSM, Ministries of Education, World Vision, KAPE and Helen Keller Foundation..
During the **initial design**, a consultative process took place between WFP Headquarters, DSM, WFP Cambodia and WFP Tanzania Country Offices as well as Regional Bureaus (Kampala & Bangkok). A Teleconference was held to agree on the objectives and purpose of the pilot study. The contentious issue was whether the pilot should include "efficacy" of sprinkles or simply acceptability.

Micronutrient "Sprinkles" has been piloted in several countries under emergency settings among pregnant/lactating women and under 5 year old children. Previous research has established the bioavailability of iron provided in the multi-micronutrient powder and its impact on reducing anaemia in children 0-59 months[1]. In sprinkles, the iron is encapsulated within a thin lipid layer to prevent it from interacting with food. This means that there are minimal changes to the taste, colour, or texture of the food upon adding Sprinkles. Several research trials and community based studies in Asia (China, Indonesia, Bangladesh, Pakistan and India), Africa (Ghana) and Latin American (Bolivia and Haiti) have found that "Sprinkles" was effective in preventing and treating anaemia and other micronutrient

[1] Zlotkin et al. (2006) J. Nutr. Apr; 136 (4): 920-5.

deficiencies. It was therefore felt that there was no need to do an efficacy study and the main objective of the pilot project was to assess the acceptability of the micronutrient powder.

Sprinkles however have never been used in school age children and no study has been done to evaluate acceptability and operational feasibility of its fortification strategy with school age children. Since this was **the first trial on school age children in the world**, DSM in consultation with WFP developed a specific daily micronutrient formulation for school age children in the age range of 5-15 years.

The "Sprinkles"[2] is a blend of microencapsulated iron and other essential micronutrients in a powder form packaged in a small single-serving sachet that can be sprinkled on to any homemade food before consumption.

Composition of Sprinkles for children 5-15 year old:

Vitamin A	500 mcg
Vitamin B1	0.9 mg
Vitamin B2	0.9 mg
Vitamin B6	1.0 mg
Vitamin B 12	1.8 mcg
Vitamin C	35 mg
Vitamin D3	5 mcg
Vitamin E	7 mg
Folic Acid	0.300 mg
Niacin	12 mg
Iron	12.5 mg
Zinc	5.6 mg
Copper	0.6 mg
Iodine	120 mcg
Maltodextrin	Q.S.

In situations where dietary or fortification strategies are not logistically or economically feasible, supplementation using micronutrients in a powdered form and easily sprinkled onto any cooked food could be an alternative strategy. The use of micronutrient powder ensures that independent of the type or quality of food provided; there is almost no change in taste or colour of food and adequate amounts of essential micronutrients will be consumed if properly mixed.

Cost per sachet ex factory range between $0.013 – 0.025 USD, depending on the volume, content and production site. Packaging is done in bulk.

[2] Developed by the Sprinkles Global Health Initiative (SGHI) at the Hospital for Sick Children in Toronto in 1996, (Dr Stanley Zlotkin)

Findings are taken from reports provided by WFP Cambodia and Tanzania Country Offices who put a lot effort and time to carry out the pilot projects. The two offices mobilised governments and relevant partners and conducted sensitisation campaigns for children, teachers and communities as a whole. WFP Headquarters in Rome provided the technical support and coordination.

Pilot project in Cambodia & Tanzania:

A. **In Cambodia**,

The pilot intervention was implemented in WFP assisted schools in Kampong Cham province. Research activities were conducted by Kampuchean Action for Primary Education (KAPE) and World Vision Cambodia (WV). WFP piloted the introduction of micronutrient sprinkles in ten primary schools in the province, which KAPE is currently monitoring. The actual distribution of the sprinkles is integrated into the general preparation of the School Breakfast Program, which consists of rice, fish, and vegetables (the latter is provided by the community). **Orientations occurred early in the school year.** The materials used to develop the structure and content of these orientations included resource documents on nutrition published by WFP as well as some developed by Ministry. Topics covered in orientations included general topics of nutrition (e.g., the basic food groups), diseases that result from lack of nutrition, and how micronutrient sprinkles can help children's bodies and minds. From December 2006 to January 2007, research team members visited each school several times in order to collect **baseline data.** Following the completion of data collection activities, data was entered into SPSS matrices for analysis in February and March 2007**. A second stage of data collection** occurred at the end of the academic year in May and June 2007 leading to the compilation of the Final Report. Factors studied in this respect focused on how the sprinkles were stored, transported, and distributed as well as what happened to the sachets when they were disposed. The number of individuals actually interviewed or who completed questionnaires was 667 persons. The research team developed four separate **questionnaires** for school directors, teachers, students, and parents during July 2006. KAPE and WV staff conducted awareness raising orientations at each school that included parents, students, and teachers. On average, about 1,767 MS packets were distributed to children on a weekly basis in each school.

Findings:

In terms of perceptions, orientations were well received by parents as well as students, and teachers in Cambodia. Initially 66% of the community members interviewed indicated willingness for their children to participate in the intervention prior to implementation. At a follow-up orientation, 94% of parents reported that their children were receiving micronutrient powder to sprinkle on their food and were happy for their children to be doing so. This major change in parental opinion of the intervention by the time the school year was

ending **is a strong indicator of the intervention's success in terms of community acceptability.** 82% of students reported that they had explained the intervention to their parents in positive terms and probably later greatly impacted parents' opinions of the intervention. 93% of the teachers interviewed reported seeing some change in children's behaviour. The change most commonly cited by teachers appears to be a lower incidence of sickness with 81% of teachers reporting such a change. Other changes included improved learning capacity (68%), better attendance (64%), and less inattentiveness (55%). 90% of students indicated that they were either 'satisfied' or 'very satisfied' with taking the sprinkles. Only 10.5% were not so happy to be using MS powder on their food. 92% of students indicated that they would like MS to continue the following year. There was approval rating of about 94% of the parents interviewed. 86% of parents reported that they had noticed some positive effect of the sprinkles on the health of their children against 14% who did not see any difference or were not sure if there had been any change. The implementation of Micronutrient Sprinkles distribution as part of School Feeding programming appears to have been successful **in terms of its overall acceptance by stakeholders both at school, in the community, and among children. In this respect, it was found that approval ratings among all key stakeholders were in the 90% range.** Changes in the perceptions among community members demonstrated the most radical change from baseline values with acceptance of the intervention moving from 66% at the start of the study to 94% by the time it ended. Based on interviews with students, researchers believed that changes in community attitudes were fostered mainly by explanations from children in their homes. Despite all this, there was still a hard-core group of 6% of parents who maintained some opposition to the intervention in spite of school meetings, orientations, and explanations from children at home, and the perceived positive effects on health and nutrition. These observations suggest the need for a watchful attitude during implementation.

Teachers' perception:
Interviews with teachers generally yielded very positive findings in terms of changes in student behaviour. In this respect, 93% of the teachers interviewed reported seeing some change in children's behavior. The change most commonly cited by teachers appears to be a lower incidence of sickness with 81% of teachers reporting such a change. Other changes are as noted earlier. About 84% of teachers reported that a majority of the children in their classrooms actually use the powder on their food.

Children's perception
The perception of micronutrient sprinkles among the vast majority of students interviewed appears to be positive. In this respect, about 90% of students indicated that they were either 'satisfied' or 'very satisfied' with adding the sprinkles on to their food.

Most students are aware of the high nutrient content of the sprinkles, especially with regards to its vitamin content. Following upon this finding, about three-quarters of the students interviewed also indicated that they had noticed some improvement in their health since they started taking the sprinkles. The other quarter indicated that they saw no change or were not sure. Nevertheless, when asked whether they would like to see MS distribution continued next year, 92% of the student sample indicated that they would like it to be continued.

Community perception
As noted earlier, data collection among community members yielded an approval rating of about 94% of the parents interviewed. This satisfaction level appears to have influenced willingness to send children to school with a very high proportion (95%) saying that the intervention had made them more willing to send their children to school.

Operational management: In terms of operation, there were no major problems with respect to the transportation, distribution to the schools, or storage of the powder. About 1,767 sachets were distributed to children on a weekly basis in each school. School directors and

teachers conducted spot checks to observe whether the children consumed the micronutrient powder and about 78% of school directors and 84% of teachers reported that most students sprinkled the powder on their food. In many large schools, distribution of powdered sachets was problematic in terms of the logistical planning. However there was no problem in terms of disposal of the sachets.

B. **In Tanzania**

The pilot intervention was implemented in schools in Dodoma region from February to June 2007.

Within its School Feeding programme, WFP provides Corn Soya Blend (CSB) as morning porridge. Due to the limited food fortification capacity in the country, CSB is imported from abroad at high commodity and transport cost. This hinders the expansion and long term sustainability of the school feeding programme.

In the current school feeding in Tanzania, the micronutrient supplementation is covered through the CSB that is served in the morning (Table 1). CSB was withdrawn from the ration of the 10 selected schools for the pilot and the food basket was modified to give almost the same amount of kilocalories but with "Sprinkles". In doing so, the amount of cereals and pulses was increased and "Sprinkles" added to it.
Composition of the daily ration

Food commodity	Normal daily Ration Gm. Per child	Modified pilot daily ration (with sprinkles) Gm per child
MAIZE, WHOLE (YELLOW)	150	230
CORN SOY BLEND (CSB)	80	0
BEANS, DRIED	30	50
VEGETABLE OIL	10	10
Sprinkles	No sprinkles	Sprinkles

Sensitisation
Orientation and sensitization seminars were organized early in 2007 for Ward Education Officers, Head teachers and school committee members. A training manual was developed by

WFP in consultation with TFNC and translated in Kiswahili to ensure that all participants would be able to sensitize adequately their respective community on the use of the micronutrient "Sprinkles". Demonstration on how to use the Sprinkles sachets was done and roles and tasks were well defined.

In the pilot schools, the CSB porridge was replaced **by maize porridge** mixed with "Sprinkles". This modified ration involved - distribution of porridge, opening the "Sprinkles" sachets using scissors and stirring it in the porridge with a spoon.

WFP purchased and distributed spoons for each school child and provided scissors to open the single-dose sachet. There were weekly monitoring checklists and monthly reports on distribution and use of sachets.
In April 2007, a joint mission from DSM and WFP Headquarter visited four pilot schools in Tanzania and noted the operational difficulty of distribution of sachets for the morning porridge.

Tanzania has strongly proposed the **use of bulk packaging instead of the single sachets**. This will require detailed instructions and training and also a simple method for measuring out the appropriate amount of powder to add to a variable amount of food that has been allowed to cool down to a temperature (not more than 60 degrees centigrade) before the micronutrient powder is added.

Overall Challenges (Tanzania & Cambodia)

Challenges:
Considering the additional work that would be involved in this project it was important to sensitise the Directors of schools so as gain their full support and cooperation.

Recommendations
Based on the above observations, the following recommendations are made, if WFP is considering scaling up of the intervention:

Taking the Program to Scale:

- Based on the very high acceptability ratings given by both students and parents, it is recommended that the program be taken to scale. In terms of delivery, it might improve program effectiveness if the sprinkles were provided in larger sachets for 20 to 50 children so that it could be mixed with the food while in a large cooking vessel. This would simplify problems relating to distribution of the packets as well as disposal.
- Training to be carried out to involve instructions on ways of distributing uniformly and mixing well into the food. If additional feasibility pilots are successful and best practices are established, WFP should focus on detailed operational guidance and training for program managers, school directors, teachers and cooks.
- The current findings suggest that socialization campaigns and orientations with all stakeholders are useful to ensure acceptance of the micronutrient powder for use in the school feeding program. These orientations should continue with a strong focus on empowering children to disseminate information.
- To produce the "Sprinkles" in a **package that could be mixed during or after cooking** in the pot rather than an individual mixing. This would ensure all the product is added to the food; it would also minimize logistics problem and shorten the feeding time avoiding interference with the teaching sessions.
- Selection of Schools: WFP should be highly selective when determining those schools to participate in any scaling up of the activity. Since the intervention requires significant management capacity. Poorly managed schools should not be allowed to

participate in the activity. This suggests the need for pre-assessments that focus on management capacity as a prelude to implementation.

- Maintain Focus on Orientations with an Important Role for Children: Orientations seemed to play an important role in winning over parents to support the intervention. These orientations should continue but with a strong focus on using children as an important vector for the dissemination of information. This might include giving students simple literature and samples of the packets to bring home with them to explain to their parents as part of the general orientation process.
- More Formalized Orientation Materials: Many of the materials developed for orientations for stakeholders as part of the present pilot had to be quickly translated into Khmer or Swahili. It might be useful to have a more formalized set of documentation developed explicitly for Micronutrient powder implementation.
- Clear Guidelines for Implementation: It is advised that more explicit guidelines for organization of the intervention be developed in order to assist directors, cooks, and teachers in planning and management. These guidelines need not be lengthy but should deal with such issues as the need for prescribed lists for distribution by class. Programming should avoid making major assumptions about local management capacity in order to anticipate possible problems.
- Although the efficacy of micronutrient "Sprinkles" has been studied among pre-school children and pregnant women in several countries and proved to be effective, it would be worth doing an efficacy study where possible since this has not been studied among school age children.