Title: The use of corn soya blend in the school feeding programme

Author: **Ms M.E Chibe**

Affiliation: **Lecturer**

Institution: **Walter Sisulu University**

Mthatha

Mailing Address: **P.O Box 1145**

THULAMAHASHE

1365

Telephone: **Cell: +2773 1621 612**

Office: +2747 5022 707

Email: **mchibe@wsu.ac.za**

ABSTRACT

Most of the world's children between 5 and 15 years of age attend school, though many do so under difficult circumstances. A large percentage of school children is underfed and poorly nourished (Engelbrecht 2005:1; Worsley 2005:135; DoE 2004:1). The aim of the Non Government Organisation school feeding programme was to reduce malnutrition by providing a mid-morning snack to alleviate short-term hunger, support nutrient intake, enhance active learning capacities and improve school attendance (JAM 2004:4). The equivalent of 100g raw corn soya blend (CSB) was to be provided to the learners on a daily basis. The main objective of this study was to determine the sustainability of CSB porridge use in the Orange Farm school feeding programme.

Adjustments to the ratio of ingredients and portion size (83g) of the porridge served were calculated within practical limitations. The South Africa school feeding guidelines indicated that 25 percent of energy needs for the 7-10 year olds and 20 percent for the 11-14 year olds should be provided; while the NGO indicated that 70 percent of the RDA recommendations (according to UNICEF 2002) should be provided by the product. A comparisons between the applicable RDA for gender and age against daily dietary intake (habitual intake plus CSB porridge) revealed that the need for vitamin A, riboflavin, niacin, folate, iron and zinc have been met, while calcium could not be provided in full. The needs for vitamin C and B12 were provided for in full through the CSB intake. Overall, the CSB intake made a substantial contribution to nutritive intake. Both the perception for taste (school 1 75-80% and school 2 88-83%) and texture (school 1 74-82% and school 2 71-78%) increased over time. As several learners (25%), consumed second servings twice (34%) but up to five times a week (21%), it can be assumed that the additional nutrient intake benefited the neediest learners the most. It is recommended that CSB porridge should be introduced in areas where the dietary intake is compromised.

Keywords: food security, school feeding programme, food compliance and acceptability, food supplementation.

INTRODUCTION

For many children, the reality of childhood is difficult because of hunger (Klugman 2002:2) as short-term hunger is common in most poor households. According to Labadarios findings at national level, one out of two households in South Africa (SA) experience hunger, one out of four are at risk of going hungry and only one out of four households appeared to be food secure (Kuzwayo 2008:183). School children are particularly vulnerable to short –term hunger, especially where diet is inadequate in both quantity and quality are consumed (Joint Aid Management 2004:5)

Aim of the project

The aim of the NGO feeding programme was to alleviate short-term hunger, support nutrient intake, enhance active learning capacity and improve school attendance using a corn soya blend (CSB) porridge. The equivalent of 100g raw CSB was to be provided to the learners on a daily basis.

Purpose of the study: The main objective of this study was to determine the sustainability of the CSB porridge use in the Orange Farms school-feeding programme. Regulatory compliance and product acceptability overtime were addressed.

Theoretical Background of the study

The national household survey (*n*=4 000) of health inequalities among ethnic group in South Africa indicates that 57 percent of the population lived in poverty, whereas 39 percent was vulnerable to food insecurity, while only 25 percent of the households were food-secure (Sayed 2002:11). The South African National Food Consumption Survey (NFCS) reported that although food security is not a national problem, household food security is (Labadarios,

Styn, Maunder, Maclntyre, Swart, Gericke, Huskisson, Dannhauser, Voster & Nesamvuni 2000:492).

Poverty is the situation which is characterised by inability of individuals, households or communities to command sufficient resources to satisfy a socially acceptable minimum standard of living. Poverty is perceived by poor South Africans to include alienation from the community, food insecurity, crowded homes, usage of unsafe and inefficient forms of energy, lack of jobs that are adequately paid and/or secure and fragmentation of families (Budlende, May, Mokate, Rogerson & Stavrou 1998:1).

The nutritional status of children in poor countries frequently documented and the impact of malnutrition on survival and development are repeatedly highlighted. It is well accepted that nutritional status, especially in young children, serves as a general indicator of development, social uplifting and access to resources within communities (Conradie 1999:4). The nutritional status of children also has an immediate effect on growth (Ahmed 2001:1).

Although not severe according to the WHO guidelines, the high levels of under-nutrition were found in South Africa. In addition, the following rights are constitutionally recognized, the rights to basic nutrition and sufficient food and the right to education, they mandate the state in ensuring that all children do not go hungry or remain chronically malnourished (Kalmann 2005:6).

According to Voster *et al* (1997:21) the Statistics South Africa, 2000 results indicate that about 35% of the total population (amounting to 14.3 million South Africans) was vulnerable to food insecurity. Among these, women, children and the elderly are particularly vulnerable (Statistics South Africa 2000). Food insecurity is a major determinant of under-nutrition. There is general agreement that South Africa has national food security but not *household* food security (Kalmann 2005:11-14).

In school level, nutritional and health statuses are powerful influences on a child's learning performance in school. Children who lack certain nutrients in their diet (particularly iron and iodine) or who suffer from protein-energy malnutrition, hunger, parasitic infections or other

diseases, do not have the same potential for learning as healthy and well-nourished children have. Poor health and nutrition among school-age children diminish their cognitive development either through physiological changes or by reducing their ability to participate in learning experiences or both (Del Ross 1999:6).

According to Del Ross (1999) poor nutrition and health among school children contribute to the inefficiency of the educational system. Children with diminished cognitive abilities and sensory impairments perform less well and are more likely to repeat grades and drop out of school than children who are not impaired in this way. They also enrol in school at a later age, if at all, and finish with fewer years of schooling. The irregular school attendance of malnourished and unhealthy children is one of the key factors in poor performance. Even temporary hunger, common in children who are not fed before going to school, can have an adverse effect on learning. Those who are hungry have more difficulty concentrating and performing complex tasks, even if otherwise well nourished. Research and programme experience shows that improved nutrition and health can lead to better performance, fewer repeated grades, and reduced drop-out rates (Kalmann 2005:7).

School feeding programmes throughout the world have successfully attracted poor children to school and retained them by offering what they would probably not get elsewhere: hot food or nourishing snacks. The primary objective of a school feeding programme is therefore to provide meals or snacks to alleviate short-term hunger, enabling children to learn. School based feeding programmes have proven effective in encouraging enrolment, increasing attention spans, and improving attendance at school (International Food Policy Research Institute 2005).

Research Methodology

The sample of the study was selected from five schools which were benefiting from the NGO feeding programme. The schools included three secondary schools and two primary schools. For the purpose of this study only the two primary schools were used for this research project. Data was gathered on four occasions, equally distributed throughout the two trial period. Personal interviews were conducted with the learners in order to complete the sensory assessment sheet. The rules were explained to the learners before completion of the

assessment sheet on each occasion. The assessment sheets were completed on behalf of the younger learners by the field workers, based on their responses. Opportunity sampling technique was applied to obtain the population size of the study. Over the four occasions of data gathering seven hundred and sixty (760) assessments were competed by five hundred and thirty eight (538) respondents from Primary School 1 and two hundred and twenty two (222) respondents from Primary School 2. Over the four occasions 272 males and 266 females participated from PS 1 and 122 males and 100 females from PS 2).

Sustainability of the CSB product was assessed at two primary schools in a very poor informal settlement through standardising of preparation procedures and testing for sensory acceptance over time.

Product regulatory compliance (Stage 1): porridge preparation method was observed, including the preparation and cooking method as well as the ration of ingredients used on different occasions. The quality of water (measured) and the amount of raw CSB (weighed) were reported as well as the serving method. Seven samples of servings for each grade were randomly collected to estimate average portion sizes.

Stage 2: The recommended guidelines provided by the school feeding policy of South Africa (Steyn & Labadarios 2002:335) and the NGO were compared for both boys and girls to determine the requirements to be met accordingly. The amount and ratio of the ingredients (water and CSB mix) was adjusted to meet the regulatory guidelines prescribing the nutrient requirements of the school children and to provide the amount of servings to be prepared. After the adjustments were made the amount of portion served, gender and grade of the respondents were reported over two month trial period for sensory acceptance.

The volunteers were trained to use the correct procedures when preparing the CSB porridge. On three fellow-up occasions the CSB preparation procedures were monitored to ensure compliance with the guidelines.

Product Acceptability testing

After the implementation of the recommendations for compliance, sensory testing was conducted for product acceptability. A three tiered hedonic scale and open ended question format was applied. Assessment sheet was tested to forty (40) randomly selected learners from both schools. Assessment sheet was then adjusted to ensure maximum comprehension. Data was collected by trained and experience fieldworkers who knew and understand the indigenous languages of the community.

Findings of the study

The findings of the study were presented in two stages:

Stage 1: regulatory compliance of the CSB porridge; the objective of this phase was to verify the product preparation specifications and serving sizes to meet the recommended guidelines for school feeding as indicated by the NGO and the Department of Health.

The situation on **t**he deliveries of the CSB product in both schools revealed that it depended on the quantity still available at the schools when conducting the weekly inventory (first in, first out). The NGO delivered the CSB dry mix every two weeks. Additional CSB stock for one week was allowed for flexibility. On average, 8 bags of 25kg dry CSB product were supplied to Primary School 1 and 12 bags to Primary School 2 due to the difference in the number of learners participating in the school feeding programme.

Bags of dry CSB were stored in dry storage facilities. Due to insufficient storage space, Primary School 1 stored the bags of CSB on the floor in a general storeroom which was also used for other school equipment, while Primary School 2 used a steel cupboard in the kitchen.

Different methods of porridge preparation were use by the schools. Porridge samples were collected and analysed. A total of 84 samples (7samples of each grade × 3 occasions × 4 groups) were collected at each of the schools. The findings indicated that an average serving size of 234 ± 36g was served to grade 1; 408 ± 43.1g to grade 2 and 3; 447 ± 62g to grade 4

and 5; and 571 ± 48g to grade 6 and 7 at Primary School 1. At Primary School 2 an average serving size of 287 ±59 g was served to grade 1 to 3, 471.4 ±45g to grade 4 and 5 whereas grade 6 and 7 received an average of 599 ±53g.

The ratio of the ingredient were standardised to comply with the regulatory guidelines. To standardise the preparation method, optimise the utilisation of the existing 100 litre capacity cooking pot available at each of the schools, and to ensure comparability for the sensory evaluation between the schools (in Phase 2), the highest ratio of CSB dry mix to water used was chosen for product preparation (100g dry CSB mix + 473ml water per serving at Primary School 2).

Although this ratio of ingredients resulted in a more stiff porridge for the learners at Primary School 1, learners at Primary School 2 had already adjusted to this practice. To keep the texture similar for both schools and prepare the maximum amount of porridge, a ratio of 81litreof water plus 17kg dry CSB mix was calculated to prepare 100litre of porridge to produce 205 servings of ± 488ml per day. Accordingly, 92.5litre of porridge was prepared at Primary School 1, utilising 78 litre of water and 14.5kg dry CSB mix to provide 164 servings of ±490ml each. For each of these servings, the equivalent of 83g of dry CSB mix was ensured.

In order for the CSB to comply with recommended guidelines, the NGO recommends that the equivalent of 100g dry CSB mix should be provided per child for each school day in an attempt to meet 70 % of the recommended daily allowance as stipulated by Unicef (The NGO, 2006:1). This was not possible due to preparation limitations at the schools. Only the equivalent of 83g dry CSB mix could be provided per child per serving of porridge consumed from the ±490ml porridge eaten.

The SA guidelines for school feeding (DoH) indicates that the food option or combination of options selected should provide a balance of nutrients and not less than 20% of the RDA for energy for the 11 to 14 year old target group.

Phase 2: Sustainability of CSB porridge acceptance for long term utilisation

Most of the respondents from Primary School 1 consumed CSB porridge five times a week (71 to 85%) as indicated, whereas only 1 to 11% of the respondents consumed porridge once a week. Between 41 and 75% of the respondents at Primary School 2 consumed porridge five times a week, with only 3to6%for which consumption was reported once a week. The reason for the spread in results has not been investigated, but the lower intake coincided with the inclusion of yellow maize in the production of the dry CSB mix. This change in production was not discussed with the researcher beforehand, and therefore had an unforeseen influence on the findings.

Nearly half of the respondents (47 ±3.7%) at Primary School 1 went for second servings, while 52 ±2.6% did so at Primary School 2. The percentage of respondents opting for second servings at both schools increased over time. The reason for this increase is not clear. At both schools the highest incidence for second servings was twice a week.

The Sensory perceptions of CSB porridge consumed over time indicated that the texture of the porridge was perceived by most of the respondents at Primary School 1 to be good, with an increase indicated over time from 74 to 82%. Most of the respondents at Primary School 2 perceived the CSB porridge texture as good, with a general tendency of increase over time (71 to 83%).

The respondents at Primary School 1 accepted the taste of the porridge, as most of them perceived the taste to be increasingly good over the four occasions of assessment (75 to 80.4%). From the four assessments conducted at Primary School 2, it is clear that most of the respondents perceived the taste of the CSB porridge as good (88 to 82.5%). Despite the slight downward trend of the perceptions, (expectedly) due to the temporary inclusion of yellow maize in the CSB formulation, the lowest point indicated for taste acceptance is still higher than the indicators for Primary School 1. An overall positive perception over time is therefore reported.

Respondents were assessed on the need of the porridge at schools most of them indicated that definitely want the porridge to be available at school over time, as clearly indicated by the positive response from 96 to 99% of the participants at Primary School 1, and 94.9 to 100% from the participants of Primary School 2 respectively.

The respondents from both the schools regarded the fact that the CSB porridge provided them with energy (31% and 27% respectively) as the most important benefit. At Primary School 1 the provisioning of nutrients were indicated as the second highest benefit, while the satisfaction of hunger was indicated in this position for Primary School 2. Overall only 1% of the respondents indicated no benefit from consuming the porridge.

DISCUSSION

In spite of the constraints of reality within which each serving of CSB porridge provided the equivalent of only 83g of CSB dry mix instead of the recommended 100g, it can be concluded that within the household setting of limited average daily intake for children aged between 7 to 14years and with support through the provisioning of the CSB porridge as a school feeding product, it was possible to comply to the regulatory guidelines as stipulated by the NGO and the DoH (South African Health Review, 2002:5).The CSB product therefore made a substantial contribution to the nutritional intake of the learners.

If the fact is kept in mind that approximately 25% of the learners in both the primary schools consumed second servings of CSB porridge (Table 6),mostly twice (34%) but up to five times a week (21%), it can be assumed that all major shortfalls for the nutrients addressed in the study might have been alleviated.

If the assumption is made that the children that were very hungry went back most often for a second serving of CSB porridge, it can be inferred that the additional nutritional intake benefitted the most needy children the most.

It can therefore be further inferred (as no measuring was conducted) that the consumption of the CSB porridge on a regular basis most probably enhanced both cognitive and physical performance of the learners, which support more alertness in school and a better ability to learn and to perform sports or other physical activities (International Food Information Council, 2005:6).

Acceptance of CSB porridge for long term utilisation

The tendency observed for increased texture acceptance over time supports probable sustainable product use over time. The results indicates that a sustained positive perception for the taste of CSB porridge over time, supporting product utilisation over the long term.

The large number of respondents had a positive response as both the primary schools (96 to 99% and 94 to 100% respectively), is indicative of the support for the availability of CSB porridge at both primary schools (Figure 5). Further evidence that learners perceived the benefits of energy and nutrient provisioning and hunger satisfaction from the product, support the sustainable acceptance of the product.

Conclusions

Product preparation specifications and serving sizes were verified to best meet the recommended guidelines. The findings of this study support the availability of CSB porridge at primary schools as a school feeding product to facilitate nutrient intake by primary school children between 7to14 years of age.

Recommendations

From the preceding it became clear that:

- Bigger servings should be provided to the children in order to better meet the Unicef guidelines, specifically for calcium.

- More research projects in the school feeding programme should be undertaken in order to identify products which will sustain long-term use and comply with the SA regulatory guidelines for the school feeding programme.
- The NGO programme for school feeding can be expanded to include other primary schools in South Africa within similar contexts.
- Training and workshops with special monitoring on hygiene, preparation (preparation + ratios of ingredients for a specific yield) and serving should be provided to the volunteers on a regular basis.
- Industry could be approached for assistance in providing equipment and utensils such as bigger pots, weighing scales and measuring jugs.
- Further research on the impact of school feeding products on the cognitive performance of school learners is recommended.

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