Nutrition education and technology transfer: a pilot intervention on the Kukuya plateau (Congo)

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1. JUSTIFICATION

In Congo, both types of protein-energy malnutrition (PEM), wasting and stunting, are prevalent. Among preschool children, the prevalence of wasting is 4%, whereas it is 21% for stunting (Cornu et al., 1990).

The national survey of the nutritional status of preschool children in Congo carried out in 1987, showed that the ecological region of the plateaux, to which the Kukuya plateau belongs (Lékana district), was highly affected by malnutrition. In 1987, the prevalence of wasting was 8.5% and that of stunting 27.5% among children aged 0–59 months.

In April 1992, the Laboratoire d'Etude sur la Nutrition et l'Alimentation (LENA)[1] of the DGRST-Orstom[2] Centre in Brazzaville conducted a new nutrition survey on the Kukuya plateau. The main objective was to identify the causes of wasting in children aged 0–59 months, determine the risk factors for PEM, and classify them by order of importance; a secondary objective was to provide basic data for designing an intervention to solve nutritional problems.

The results of the new survey confirmed the high prevalence of malnutrition previously observed, especially that of stunting (Kameli, 1992). Among the various risk factors identified, the data showed that the timing of introduction of complementary foods was inadequate, i.e. that it was not adapted to the nutritional needs and to the physiology of infants (Gami et al., 1995; Massamba et al., 1995).

[1] Laboratory of nutrition and food studies.

[2] DGRST: Department for scientific and technological research.
Orstom was renamed Institut de Recherche pour le Développement in 1999.

In addition, analyses of gruel samples prepared on the Kukuya plateau showed that it was not nutritionally adequate (Trèche et al., 1992; Cornu et al., 1993; Gami et al., 1995):

- The mean dry matter content, 15 g/100 g of gruel, corresponding to an energy density of approximately 60 kcal/100 ml, was insufficient given the low daily frequency of feeding gruel.
- The protein content was often less than 1 g/100 g of dry matter because gruel was usually made of cassava flour, sugar and water only.

The Kukuya plateau, 400 km from Brazzaville, was chosen for a nutritional intervention for a number of reasons:

- high rates of PEM and inadequate complementary feeding practices in the ecological area of the plateaux;
- human and cultural homogeneity of the Kukuya plateau, whose population density (16 000 inhabitants for the 450 km^2 of Lékana district, i.e. a density of 35 inhabitants/km^2) is much higher than the national average (Gami, 1992);
- homogeneity of agricultural production, which made it possible to propose technology that could be applied across the plateau.

2. DEVELOPMENT AND IMPLEMENTATION

2.1 Outline of the strategy

In 1991, the Ministry of Health developed two strategies to improve complementary feeding of young Congolese children (Tchibindat et al., 1993) through the Project for support of nutrition-related activities (PAAN), in collaboration with other partners including LENA and Agricongo[3].

The first strategy was mainly directed at urban areas, and was based on the production and promotion of flour for infants and young children prepared from local products (Tchibindat and Trèche, 1999).

The second, implemented as a pilot project on the Kukuya plateau, consisted of nutritional education and popularization of the household level processes shown below. This strategy had two main objectives:

- the dissemination of nutrition education messages to all women of child-bearing age in order to promote exclusive breast-feeding until 4 to 6 months, and an appropriate schedule for complementary feeding;
- the popularization of food processes to allow mothers to prepare a protein-rich and energy-dense gruel from permanently available local foods.

2.2 Training of village extension workers

To implement this project, we decided to enrol female extension workers selected in the target population, and trained by the research team responsible for the project. Each extension worker was responsible for one of the 12 zones of the plateau.

[3] Research institute for support of agricultural development in tropical areas.

There were eight training objectives, each one being the subject of a special module. The basic message to be conveyed to the extension worker was given in the "Aide mémoire de l'animatrice", the extension worker's handbook (Pezennec et al.,1993). Training comprised theoretical and practical stages. After acquiring basic nutritional knowledge, the extension workers should (objectives 1 to 5):

- have elementary knowledge of nutritional needs
- know how food can meet nutritional needs
- know how to meet the nutritional needs of children aged 0–2 years
- be aware of the main symptoms of malnutrition
- know how to prepare a protein-rich and energy dense gruel.

The team's approach to teaching was to build on the extension workers' previous knowledge, encourage them to participate actively and ask questions. In the second stage, training focused on organizational principles to enable workers to (objectives 6 to 8):

- be able to convey to mothers the nutritional message and teach them how to prepare the improved gruel;
- know how to organize and plan nutrition education sessions and cooking demonstrations in the zone for which they will be responsible;
- be able to evaluate their work and, in particular, identify obstacles to the dissemination of the nutritional message.

For financial reasons, it was not possible to train all the extension workers at the same time. They were divided into two groups of six. The extension workers from the zones most affected by malnutrition were trained first (January 1993), whereas those from the other six zones were trained three months later. The extension workers' work plan was divided in two phases:

- First phase: dissemination of the nutritional message and technique for preparing the enriched gruel to all women of child-bearing age in the zone. During this 3-month phase, the extension workers were asked to reach all the target population in their particular zone and were employed full time (six days per week).
- Follow-up phase: visit women in their villages (the work programme was adapted to each extension worker) in order to reinforce the action initiated during the first phase. During this phase (21 months), the extension workers worked a third of the time (around two days per week).

The 12 extension workers received a monthly salary, the equipment needed for demonstrations (cooking utensils, maize and stationery) and a bicycle for their visits, all of which were financed by the PAAN project.

2.3 Supervision

There were two levels of supervision: supervision by a local supervisor living on the plateau, and by members of the project team.

Local supervision

In each of the two training groups, one extension worker was chosen to coordinate the work of the others, ensure liaison with the project team, and act as local supervisor.

The local supervisor was responsible for making sure that the nutritional message and home processing techniques were correctly disseminated. For this purpose, she brought the other extension workers together twice a month and visited each one in her zone, at least once a month.

Supervision by the project team

The project team supervised the work of the extension workers and local supervisors. Control visits were made towards the middle and the end of the first phase of the work plan; they took place approximately every four months in the second phase (PAAN, 1994).

During these visits, meetings with all the extension workers were organized, where they were able to describe the problems encountered, and find solutions through group discussion. The "session" and supervision records were checked and extension workers submitted questions on any unclear issue. Answers were given to any questions raised by the target women.

The team also visited extension workers in their zone during nutrition education sessions. Finally, target women were interviewed after the sessions and during visits to the villages.

3. TRANSFER OF TECHNOLOGY

The objective was to transfer technology to households for the preparation of protein-enriched gruel (10 g of protein per 100 g of dry matter) with a concentration of 30 g of dry matter per 100 g of gruel, providing approximately 120 kcal per 100 ml, and with a viscosity level between 1 and 1.5 Pa.s. (Trèche et al., 1991; Trèche, 1994 & 1999; Louyat de Dibantsa, 1994).

3.1 Ingredients

The various ingredients used to prepare the energy-dense gruel were cassava (*kifuwo*), groundnut or pumpkin paste, sugar, germinated maize flour and water (Figure 1).

3.2 Methods for the preparation of the three main ingredients

Preparation of "Kifuwo"

The technology used to obtain *kifuwo* is the same as the one used in the first stages of *chikwangue* preparation, the basic food staple of Congo (Trèche and Massamba, 1995):

- Retting cassava tubers for 2 to 4 days, if it is done in water, or 2 to 3 days if done underground (Gami and Trèche, 1995).
- Removing the outer skin and fibre by decantation and draining.
- Rolling the paste on a wooden board.
- Forming the paste into a large ball wrapped in leaves.
- Cooking the ball in a large pot lined with straw or creepers for ½ to ¾ hour.
- Kneading the paste after cooling on a wooden board: the centre, partly cooked, is the *kifuwo*, which is used to prepare gruel.

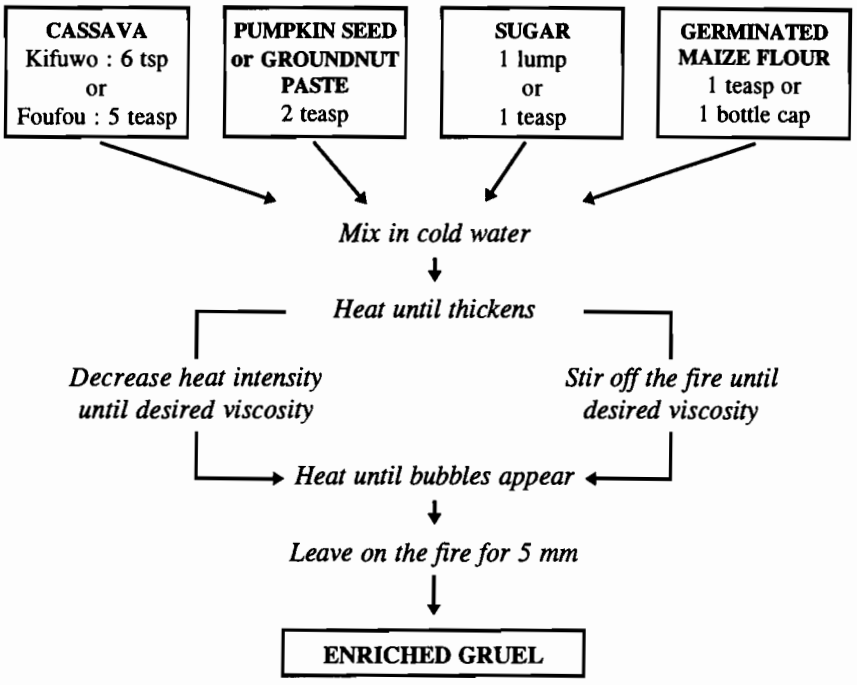

Figure 1
Method for the preparation of enriched gruel

Preparation of germinated maize flour

The method for preparing germinated maize flour is shown in Figure 2:

- Sorting and washing maize grains to remove those that cannot germinate.
- Soaking grains in a large amount of water for 48 hours and spreading them out on a clean moist cloth.
- Germinating at room temperature, away from the sun, until a 3-cm sprout is obtained (72 to 96 hours is required).
- Drying grains in the sun or inside the hut near the fire for three or four days.
- Removing the roots and sprouts after drying the grains.
- Crushing the grains with a mortar and then sieving if necessary.
- Storing flour in a closely sealed container away from humidity and pests.

The capacity of germinated maize flour to make gruel thinner can change depending on the variety, the duration of storage, and the method of germination; it is therefore necessary to increase or decrease the amount of germinated flour according to its characteristics and the desired consistency of the gruel.

Preparation of groundnut and pumpkin-seed paste

The techniques used traditionally to prepare groundnut or pumpkin paste are shown in Figure 3.

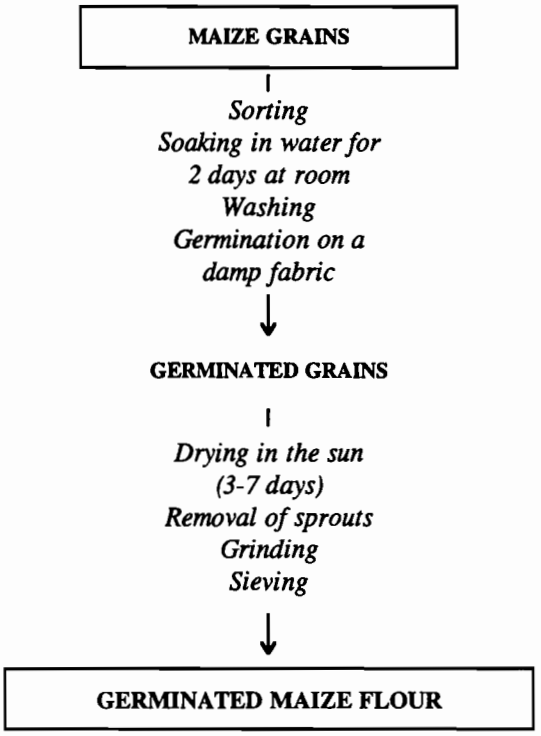

Figure 2
Method for preparation of germinated maize flour (Louyat de Dibantsa, 1994)

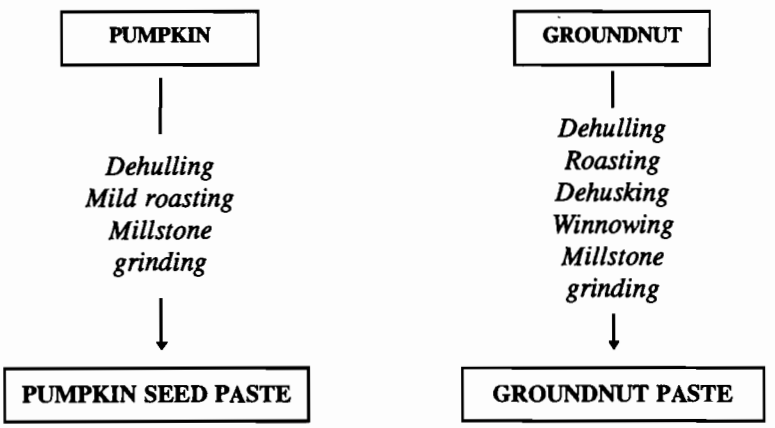

Figure 3
Traditional technology for processing pumpkin seeds and groundnuts (Louyat de Dibantsa, 1994)

3.3 Method for cooking enriched gruel

The technique for cooking gruel has been adapted to customary practices of mothers on the Kukuya plateau:

- Mixing all the ingredients.
- Cooking the gruel gently or in a water-bath until bubbles appear on the surface.
- Leaving to cook for an additional 5 minutes.

4. EVALUATION

The operation started in January 1993. In November 1994, supervisory missions showed that the project was proceeding normally.

Evaluation of the intervention, whose design is given in detail elsewhere (Martin-Prével et al., 1999), comprised a process evaluation and an assessment of nutritional impact. The first evaluation in late 1993 showed that the nutritional message was correctly memorized and that the technology was assimilated (Louyat de Dibantsa, 1994).

5. CONCLUSION

One of the most important etiological factors of malnutrition on the Kukuya plateau is, undoubtedly, traditional complementary feeding practices which are inappropriate. The knowledge and attitude of mothers play an essential role in feeding practices.

The pilot intervention consisting of nutrition education and transfer of food technology was well received by the population of the Kukuya plateau. However, as with any innovation, there was some sociocultural inertia, even though the participation of extension workers originating from the plateau helped overcome some of the resistance encountered.

Behaviour change for improving the timing of complementary feeding encountered more difficulties than the adoption of the new gruel.

The sociocultural factors determining feeding practices must be taken into account to a greater extent in the future, to ensure the sustainability of technological innovation and nutrition education in this type of intervention.

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COMPLEMENTARY FEEDING OF YOUNG CHILDREN IN AFRICA AND THE MIDDLE EAST

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