

W.07.103 Poster

IMPACT EVALUATION OF AN INTERVENTION TO IMPROVE COMPLEMENTARY FEEDING IN RURAL CONGO

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Introduction: From 1993 to 1995, an intervention was implemented in rural Congo (Kukuya Plateau, 400 km North from Brazzaville) including (i) nutritional education to improve child feeding behaviours (especially to delay the age at introduction of gruels which was very low in this population) and (ii) teaching the mothers to prepare an energy-dense and protein-rich gruel with local ingredients. The intervention was delivered by field-workers recruited among mothers, through education sessions and cooking demonstrations.

Methods: The impact evaluation relied on a quasi-experimental design with baseline and final cross-sectional surveys carried out in both the Kukuya Plateau (in 1992 and 1995) and a control area (the neighbouring Plateau of Djambala, in 1993 and 1995). All surveys, with questionnaire about feeding practices and anthropometric measurements, were performed on representative samples of approximately 400 children 4–27 months old. The impact of the intervention was assessed through the adjusted effect on nutritional indicators of the year-of-survey * area interaction term, in regression models including also potential confounders.

Main results: After the intervention, the adjusted mean age at introduction of gruels was delayed from 2.7 months to 3.6 months in the Kukuya Plateau whereas it remained at 2.0 months in the control area ($p < 0.0001$). During the same time the adjusted mean height-for-age index of children equally decreased in both the intervention and the control area (respectively from -1.53 to -1.64 and from -1.50 to -1.62 z-scores, $p = 0.9$).

Conclusion: The intervention appears to have had a positive impact on some child feeding behaviours without any effect on the children's linear growth. It is thought that changes in complementary feeding practices may have been not spread and/or not lasting enough to induce positive anthropometric outcomes. Unfavourable other practices, insufficient health environment or harsh economic conditions may also have had a more important, negative effect on the children's growth.

Note: This study was funded by the French Ministry of Research, IRD, UNICEF and the French Cooperation.

A nutritional intervention was implemented in rural Congo (the Kukuya Plateau, 400 km north from Brazzaville) from 1993 to 1995. Its main objective was to improve complementary feeding practices through nutritional education and cooking demonstrations. The impact of the intervention on feeding practices and on the nutritional status of young children was assessed through a quasi-experimental study with baseline and final cross-sectional surveys in both the intervention and a control area.



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The nutritional intervention

The nutrition education messages mainly aimed at sustaining breastfeeding, delaying the age of introduction of complementary foods (which was very low in this population), and increasing the duration of consumption of gruels or other special transitional foods.

A new recipe to prepare an energy-dense gruel with sufficient protein and lipid content from local ingredients was taught to mothers. This recipe consisted in incorporating germinated (amylase-rich) maize flour and groundnut or pumpkin dough to the traditional cassava based gruel to increase the energy and macronutrient density.

The intervention was delivered by field workers recruited among mothers, trained and supervised by the research team. For two years (1993 to 1995) they held education sessions and cooking demonstrations for women of all ages, in the villages close to the one where they lived; they also performed individual face-to-face counselling to the mothers of young children.

Impact evaluation design

The Djambala Plateau (the closest to the Kukuya Plateau) was chosen as control area. The two areas were very similar in environmental, socio-economic and ethnic characteristics.

Baseline and final cross-sectional surveys were carried out in both intervention and control areas. The baseline survey was carried out in 1992 in the Kukuya Plateau (i.e. one year before the intervention) and in 1993 in the control area. It was hypothesised that no major change occurred between these two surveys. The final surveys were carried out in 1995 in both areas. All surveys took place during the same season (April-May).

The main criteria for impact assessment were changes in the ages of introduction and cessation of gruel consumption (among 4-to-11-month-old children) and changes in the prevalence of stunting and in the mean height-for-age z-score (among children 4-to-27-month-old children). Feeding practices were assessed by retrospective questionnaire. Anthropometric measurements were collected by standardised methods (WHO) and nutritional indices were calculated using the EPINUT module of EPI-INFO software. Information was also gathered on mothers' and households' characteristics.

In the Kukuya Plateau, children were randomly selected by cluster sampling. In the control area, prior to cluster sampling, the population was first stratified according to the residential status (villages/small towns) to ensure an identical rural/urban ratio in both the intervention and control samples.

Statistical analysis

The impact of the intervention was assessed through the adjusted effect, on each criterion, of the interaction term between the type of survey (baseline/final) and the type of area (intervention/control), in regression models including also the main effects of these two variables and all the potential confounders. Logistic regression models were fitted for qualitative criteria and linear regression models for quantitative ones.

Potential confounders included in the models were: residential status, household size, economic level (terciles of a synthetic index), age, level of schooling and professional activity of the head of household and of the mother, marital status, height and BMI of the mother, sex and age of the child, level of participation of the child in routine health activities (synthetic index).

Only children with an exact birth date and no missing values were included in the analysis (i.e. 356 and 427 4-to-27-month-old children, in the baseline and the final survey, respectively, in the Kukuya Plateau, and 434 and 422 children in the Djambala Plateau). All the analyses were performed using the SAS System (version 6.12).

Results 1: Feeding practices

Breastfeeding indicators (such as BF rate, exclusive BF rate and BF duration) remained unchanged in both the intervention and the control area.

The adjusted mean age of introduction of gruel was delayed from 2.8 to 3.6 months after the intervention in the Kukuya Plateau, whereas it remained at the same level (2.1 months) in the control area ($p < 0.0001$ for the survey*area interaction term; table 1).

The adjusted mean age of cessation of gruel consumption was also delayed in the intervention area (from 4.3 to 5.8 months) and remained almost unchanged in the control area ($p < 0.0001$ for the survey*area interaction term); the mean duration of gruel consumption increased in the intervention area (though not significantly more than in the control area).

Among 165 mothers whose children were given any gruel at the time of the final survey in the intervention area, 72% reported that they tried at least once the new recipe, and 25% that they regularly prepared it (these mothers could show to surveyors the germinated maize flour, which was a specific ingredient for the gruel preparation).

In the intervention area, the more the mothers participated in the intervention activities, the more their knowledge about complementary feeding improved and the more all the above changes in feeding practices were pronounced.

Table 1. Changes in the ages of consumption of gruel (children 4-11 months)

Gruel consumption	n	Baseline survey		Final survey		test of survey*area interaction term
		Intervention area	Control area	Intervention area	Control area	
Introduction ¹	508	2.77	2.05	3.60	2.05	$p < 0.0001$
Cessation ²	389	4.27	3.60	5.79	3.81	$p < 0.0001$
Duration ²	385	1.62	1.67	2.27	1.86	$p = 0.054$

¹ Adjusted mean age, in months (adjustment variables: see statistical analysis paragraph)

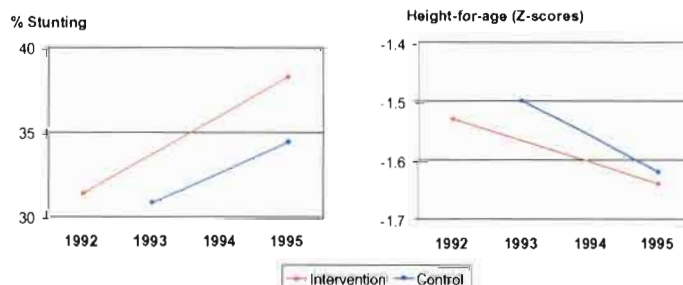
² Adjusted mean, in months (adjustment variables: see statistical analysis paragraph)

Results 2: Anthropometric indices

The prevalence of stunting increased in both the intervention and the control area (in the same proportion: adjusted p-value = 0.80 for the survey*area interaction term); similarly, the mean height-for-age z-score decreased in both areas (adjusted p-value = 0.40). See figure 1.

In both areas there was no change over time in the other anthropometric indices among children (prevalence of wasting, mean weight-for-height z-score, birth weight) nor in the mothers' BMI.

Figure 1. Changes in the prevalence of stunting and in the mean height-for-age z-score (1512 children 4-27 months old)



Conclusion

The intervention appears to have had a positive impact on some complementary feeding practices, but no effect on the children's nutritional status.

It is thought that in order to induce positive anthropometric outcomes, changes in child feeding behaviours should have been more pronounced and/or more spread and/or should have lasted longer.

In addition, probably due to poor health environment and/or harsh economic conditions, a significant deterioration in the growth of children was noted.



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Acknowledgments: The study was funded by the French Ministry of Research, IRD, UNICEF and the French Cooperation. The authors gratefully acknowledge the invaluable statistical advice of Pierre Traissac (IRD, UR 106).

Martin-Prével Yves, Tchibindat F., Adoua-Oyila G., Mantey K., Trèche Serge. (2001).

Impact evaluation of an intervention to improve complementary feeding in rural Congo : poster.

Annals of Nutrition and Metabolism, 45 (Suppl. au No 1), 570.

International Congress of Nutrition, 17., Vienne (AUT), 2001/08/27-31.