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REPUBLIC OF MALI

**KNOWLEDGE, ATTITUDES, REPORTED PRACTICES
AND ANTHROPOMETRIC INDICATORS OF
CHILDREN'S NUTRITIONAL STATUS**

**Mid-term Assessment of the Nutrition Communication Project
as implemented by the Ministry of Health and CARE/Mali
through the Macina Child Health Project
Macina Circle
February 1 - 5, 1993**

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Nutrition Communication Project

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ABBREVIATIONS

A.I.D.	Agency for International Development (U.S.)
ANOVA	Analysis of Variance
ANCOVA	Analysis of Covariance
CDC	Centers for Disease Control and Prevention (U. S.)
CNIECS	Centre National d'Information, d'Education et de Communication pour la Santé
DHS	Demographic and Health Survey
EPI	Expanded Program on Immunization
FAO	Food and Agricultural Organization (UN)
GE	Greater than or equal to (in tables)
GOM	Government of Mali
GRAAP	Groupe de Recherche et d'Appui pour Autopromotion Paysanne et Populaire
KAP	Knowledge, Attitudes and Practices [survey]
LE	Less than or equal to (in tables)
MCHIP	Macina Child Health Project
MOH	Ministry of Public Health, Solidarity and the Aging
NCP	Nutrition Communication Project
NCHS	National Center for Health Statistics (U.S.)
NGO	Non-Governmental Organization
PVO	Private Voluntary Organization
SAP	System d'Alert Précoce (Early warning system-food availability)
SES	Socioeconomic Status
SPSS PC	Statistical Package for the Social Sciences, Personal Computer version
WHO	World Health Organization
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

This is a report of the Mid-Term Assessment of the Nutrition Communication Project (NCP) conducted in the Macina circle of Mali between February 1 and 5, 1993. The mid-term is part of the overall NCP evaluation effort, consisting of a baseline Knowledge, Attitude, Practice and Anthropometric assessment conducted in three NGO project sites (with over 650 children) in December, 1990 and the project's final evaluation, also conducted with three NGO projects (and 900 children) in December 1994.

The NCP Intervention

Between January 1991 and February 1993, 16 villages enrolled in the Macina Child Health Project (a collaborative effort of CARE and the Malian Ministry of Health), participated in a test of nutrition behavior change promotion conducted by the USAID-funded Nutrition Communication Project (NCP) and a consortium of government and non-governmental organizations.¹ In eight villages, referred to as "NCP Trials," CARE health workers (*monitrices*) performed their normal Child Survival program and followed a communication strategy (based on social marketing principles) developed by NCP. NCP used village-based stories and drama to introduce new nutrition concepts and model appropriate behavior. Five village storybooks (flipcharts) were designed for use by village health committees or health workers to tell stories that pose nutrition related problems and feature villagers solving the problems using local wisdom and resources. **CARE monitrices assisted with the development of these flipcharts and received two of the five before their project hiatus in June 1993.** NCP training strengthened the community agent's interpersonal counseling and small group animation skills. A step-by-step approach was taught to teach negotiation of small, incremental behavior changes with the network of persons concerned with improving maternal or child nutrition -- mothers, fathers, elders, community leaders.

To examine the impact of this approach, an additional eight villages in the Macina Child Health Project were enrolled as "comparisons," where the NCP strategy was not implemented, but *monitrices* conducted all CARE program activities, **including promotion of breastfeeding, drinking water hygiene, arm circumference screening for malnutrition (in 1991), enriched porridge and other cooking demonstrations, and limited "community problem diagnosis and consensus building,"** for nutrition using flannelographs.²

Three USAID-funded child survival projects participated in the baseline research: CARE (Macina), AFRICARE (Dioro) and World Vision (Koutiala). A total of 47 villages, represented by 835 women, 524 men and 657 children, were sampled. Save the Children (Kolondieba) joined NCP after the baseline, but will be asked to participate in the final evaluation, comparing these data against child survival program data collected in 1990.

¹GRAAP method and figures.

Why Have a Mid-Term Assessment?

The mid-term assessment was conducted because the entire NCP project, including the "final evaluation," was delayed by about one year (due to government changes in Mali and some fielding difficulties arising from the Gulf War). CARE/Macina was no longer willing to withhold NCP interventions from the villages serving as comparison sites because they believed the interventions were effective and wanted to use them throughout. To salvage something of the original research design, the Macina Child Health Project offered to participate in a limited monitoring exercise (**one week: half the staff, half the original sites**) to enable NCP to determine whether any differences in nutritional status, knowledge or attitudes had been achieved with respect to the trial and comparison villages between January 1991 - January 1993.

Sample and Methods

In February 1993, eight of the original 16 CARE villages were sampled, providing 59 "NCP Trial" children and 58 "comparisons." The baseline sample in the Macina site included 212 children, with no difference between trials and comparisons in terms of anthropometric results.

NCP used the same research protocol as the 1991 baseline. At both times, NCP weighed and measured children under the age of three, and assessed nutrition-related knowledge, attitudes and reported practices (KAP) using a 24-hour dietary recall, and posing a series of factual and hypothetical questions to parents. Please see the appropriate sections of this report for more information, as well as Appendix B for the questionnaire.

The mid-term sample of women, men and children is roughly half of the baseline for Macina, but only one-sixth of the entire baseline and final evaluation sample, which is contributed from three NGO programs.

Key Findings

Children's nutritional status is better in villages having NCP interventions than in comparison villages, and when compared to nutritional status at baseline.

There is a significant upward shift in children's weight-for-age scores in the NCP trial sites which is not seen in the comparison sites. The increase for height-for-age is smaller (about one-third of a standard deviation), and while important, it is not statistically significant (largely due to small "n"). Weight-for-height achieves a significant difference between the two sites.

Indicator	Children 0 - 3 Years of Age		
	Baseline Combined N=212	Mid-Term Comparisons N=58	Mid-Term Trials N=59
Percentage wasted using Weight/Height less than -2 SD	14.0%	15.5%	7.5%
Percentage generally malnourished using Weight/Age less than -2 SD	44.0%	37.9%	21.1%
Percentage stunted using Height/Age less than -2 SD	40.1%	39.3%	34.2%

For children living in NCP trial villages, the odds of having better nutritional status (being above the sample's median for weight/age) are 2.63 times the odds of children living in comparison villages. Similarly, children in NCP trial villages have well under half the likelihood (OR=.38) of having poor nutritional status as the children in comparison villages.

These positive changes in nutritional status appear to be associated with dietary practices and child feeding attitudes promoted by the intervention. The following were statistically significant ($p < .05$), comparing NCP trial villages to non-trial villages, which are often equal to the scores at baseline:

- Using an index to measure consumption of foods stressed by the intervention (peanuts, milk, millet, vitamin A-rich vegetables), women in trial villages tripled their score against the baseline survey. Women in comparison villages did not quite double their score
- 70% of mothers reported recently feeding millet porridge (compared to 50%); 42% fed milk and peanuts (compared to 18%).
- 40% of mothers reported introducing complementary foods such as fruit, fish and porridge, in a timely fashion (after 6 months, before 8 months) compared to 27.5%.
- 36% of mothers thought that the best way of getting a sick child to eat is to either give the food "little-by-little" or give a favorite food, compared to 16%.
- 36% of mothers knew that not eating enough food or good food is the cause of wasting malnutrition (marasmus, "sere" in Bambara), compared to 10%.
- 61% of mothers knew about food related cures (liver, carrots, dark green leafy vegetables) for night blindness, compared with 3.6%.

- 52% of mothers knew these same foods could prevent night blindness, compared with 16.7%.

Both the knowledge of recuperative feeding and the food-based treatment for night blindness were associated with children having relatively good nutritional status.

Improvements in the weight-for-age status of children in the NCP trial villages are most likely associated with earlier, and more consistent consumption of millet, and the addition of small quantities of milk and crushed peanuts to the diet, compared to comparison villages.

These behavior, knowledge and attitude variables are the only ones associated with a positive change in nutritional status. No confounding variable (education, food security, age of parents, number of wives, number of children, use of contraceptives, etc.) was associated with nutritional status, with one remarkable exception.

A proxy measure of wealth, an index of household possessions, demonstrates an inverse relationship between acquisition of wealth in the form of livestock, material goods and nutritional status.

- Using indexes of wealth and food security, while children in the "NCP trial" villages came from marginally wealthier households at both baseline and midpoint, all improvements in weight were achieved by NCP trial children in the lower 50th percentile of wealth. Children in the upper 50th percentile of wealth, in either trial or comparison villages, showed no change in weight-for-age from baseline measures.

This finding suggests that initial improvements in household wealth are not associated with improvements in nutritional status, and that improvements in nutritional status can be obtained with educational inputs alone among the poorest households. It is probably worth noting that PVO health educators worked with all segments of the population and did not particularly target the lowest income groups.

NCP approaches and materials helped the Macina Child Health Program and CARE to improve nutrition behavior, and this change is associated with improvements in children's weight (and to a lesser extent, height). The prevalence of acute malnutrition (**weight/height**) was reduced by 47%; general malnutrition (**weight/age**) decreased by 52% (44% baseline, 21% trials against 38% comparisons), and chronic malnutrition (**height/age**) decreased by 15% (against no change in the comparison group).

I. Overview

A. Project and Organizational Overview

The "Mali Nutrition Communication Project" is a collaborative effort of the Malian Ministry of Public Health, Social Action and Feminine Promotion and several private voluntary organizations. NCP's principal funding and technical assistance is provided by USAID/Mali and the USAID Office of Health and Nutrition, through the centrally funded "Nutrition Education and Social Marketing Field Support Project," known as the "Nutrition Communication Project," (NCP). The primary contractor for NCP is the Academy for Educational Development (AED), which together with its subcontractors, provides the majority of technical assistance to the Mali program. USAID/Mali has contributed 75% of the funding for NCP activities. In addition, UNICEF/Mali provides technical and financial support to the project, as has the Vitamin A Technical Assistance Project (VITAP), managed by Helen Keller International (HKI) and the Food and Agricultural Organization (FAO).

The principal partner for NCP in Mali is the National Center for Health Information, Education and Communication (CНИЕCS) with additional support provided by the Ministry of Education, the Ministry of Communication and the Nutrition Service of the Division of Family Health. In addition, Africare, CARE, Save the Children/US, Plan International, World Vision as well as "AED," Programme Intégré de Développement de Bafoulabé (PIDEB), Aide à l'Enfance Canada (AEC), Association d'Aide et d'Appui aux Groupement Ruraux et Urbains (AAG), and Centre d'Appui Nutritionnel et Economique aux Femmes (CANEF) (national NGOs) currently participate in NCP.

AED initiated project design work in Mali in June 1988. Field activities began in October 1990. Project support will end in March 1995.

It must be stressed that NCP is first a "field support project," with the goal of achieving impact in the programs (e.g. bilateral health projects: PVO Child Survival programs) to which it provides services. However, USAID felt strongly that a separate evaluation component be included to measure the impact of communication on nutrition behavior and nutritional status. For this reason, a baseline and end-of-project evaluation was planned to measure changes in "Knowledge, Attitudes and Practices" (KAP) and anthropometric measurements. A baseline survey was conducted in December 1990. As described below, the Macina Child Health project was not able to continue with NCP through its completion. A special "Mid-Term" evaluation was conducted in this site alone.

B. NCP in Macina (1989-1993)

From January 1990 through March 1993, the Macina Child Health Project (MCHP³) played a lead role in the design and implementation of the Mali Nutrition Communication Project. In March 1990, CARE/Macina hosted the NCP formative research team led by Dr. Kathy Dettwyler. The CARE/Macina village health agents, or *monitrices*, presented the results of this research to the Ministry of Health (MOH) program managers and child survival project staff from Dioro (Africare), Koutiala (World Vision) and Kolondieba (Save the Children) at the June "Strategy Development Workshop" (hosted by World Vision/Mali)⁴. The baseline Knowledge, Attitude, Practice (KAP) and Anthropometric survey was completed in Macina in December 1990 and the first round of NCP training, held at the Ségou regional health office began shortly thereafter.

The Macina Child Health Project underwent significant changes in management both from the side of CARE/Mali and the MOH. NCP project funding in Washington was also inconsistent. But most significantly, the Government of Mali underwent drastic political changes affecting even the implementation of rural health programs. As a result, NCP's total program of training and communications development was approximately nine months behind the schedule initially agreed to by the collaborating NGOs.

The "final" evaluation for the three-site study had originally been scheduled for December 1993, but NCP/Washington sought the cooperation of all concerned to postpone this by one year to allow for the full execution of NCP interventions (including radio broadcasts and use of counseling cards) for a period of at least one year. CARE/Macina informed the NCP consortium that they were no longer willing to withhold NCP interventions from the villages serving as comparison sites. (i.e. they believed the interventions were effective and felt obliged to use them throughout their project), and that they would implement NCP programs throughout the project in January 1993. To salvage something of the original research design, the Macina Child Health Project offered to participate in a limited monitoring exercise (**one week; half the staff, half the original sites**) to enable NCP to determine whether any differences in nutritional status, knowledge or attitudes had been achieved with respect to the trial and comparison villages between January 1991 - January 1993.

At the same time, USAID Mali requested NCP impact data for use in the preparation of Semi-

The Macina Child Health Project is implemented collaboratively by CARE/Mali and the Malian Ministry of Health, Solidarity, and the Aging with partial funding from USAID. The Ségou Regional Health Office provides administrative oversight to the program with the advice and support of the Médecin chef of Macina circle. All negotiations with the regional health office and the Médecin chef were performed by CARE Mali on behalf of NCP for work performed in Macina.

³See NCP Reports, March 5-22 1990 Field Research in Macina for Vitamin A Communications, and June 1990, Communications Strategy Development Workshop.

Annual Project Implementation Report (SAPIR). USAID/Mali instructed AED to use monies set aside to evaluate the impact of NCP to this end. What was termed a "mid-term" survey was conducted in February 1993. Unbeknownst to CARE/Mali or the NCP consortium at that time, the Macina Child Health Project was unable to continue its activities beyond September 30, 1993. CARE/Macina staff were disbanded, and thus not provided with the final stage materials prepared by NCP, nor trained in their use. Beginning in October, 1994, CARE/Macina re-started its activities with a virtually new staff of community health workers.

In essence, the NCP "mid-term" is the "final" report on NCP as implemented by the Macina Child Health Project. The CARE *monitrices* (as the visiting community nurses were called) had fewer final materials and one less NCP-initiated training in group communication techniques than the NGOs continuing with NCP through 1995. Materials available for use by the CARE *monitrices* included two village storybooks: *The Nutrition of Awa* and *Awa Finds the Solution*, and the *Village Compagnion* notebook. However, much of the innovation for other NCP materials began with their input (see list in next section- "Key Elements of the NCP Intervention in Mali"). Not to have Macina in the project through its completion was a loss felt by all.

C. Key Elements of the NCP Intervention in Mali (1989-1995)

The primary goal of NCP in Mali (which included other sites in addition to CARE-Macina), is to mount communication activities enabling rural populations to improve the nutritional status of women and young children. The task is daunting as one-fourth of Mali's children suffer from moderate to severe malnutrition, and this directly contributes to a rural under-five mortality rate close to 300/1000. In order for real gains in nutritional status to be achieved, more than knowledge change is required. Individuals and communities will need to make changes in attitudes and behaviors related to food and other resource distribution as well as infant feeding.

To achieve this behavioral change, NCP uses a social marketing approach to:

- ◆ Train child survival project staff in nutrition behavioral assessment, inter-personal communication and counseling, behavior change monitoring and evaluation.
- ◆ Amplify and support interpersonal nutrition messages through a range of media, including village level stories and plays, literacy and basic educational activities and mass media.

The NCP communication strategy (See Appendix A) was developed following a rapid ethnographic study in the region of Macina, in which CARE and regional MOH staff participated in village observations and interviews⁵. The strategy uses village-based stories

⁵See K. Dettwyler and C. Fishman, 1989, Communication for Vitamin A, NCP, Academy for Educational Development, Washington, D.C.

and drama to introduce new nutrition concepts and model appropriate behavior. NCP developed five village storybooks (flipcharts) that were designed for use by village health committees or health workers to tell stories that pose nutrition related problems and feature villagers solving the problems using local wisdom and resources. *The Nutrition of Awa* and *Awa Finds the Solution* emphasize the connection between vitamin A - rich foods, night blindness and health; *Why Sita is Strong and Vigorous* links good nutrition to better recovery from illness; and *Tenin's Baby is on the Road to Health!* and *Fati's Children Recover* emphasize appropriate child feeding practices. In addition, NCP developed and distributed counseling cards, sticker books, literacy books, *Healthy Communities Manuals* and *On The Road to Health: A Guide for Animators*. Other interventions introduced by NCP include a 20 episode radio drama series accompanied by spots, a nutrition communication component for formal and non-formal education programs and community-based theater.

NCP training strengthened the community agent's interpersonal counseling and small group animation skills. A step-by-step approach was taught to teach negotiation of small, incremental behavior changes with the network of persons concerned with improving maternal or child nutrition -- mothers, fathers, elders, community leaders. In addition, several items were produced to motivate and reinforce the community agents' confidence, while improving their nutrition counseling skills. These included an animator's idea bulletin, *On the Road to Health*, a professional follow-up note-book *The Village Companion*, motivational buttons for use with mothers who complied with recommendations, as well as stickers for rural agents' use. These materials were explained and distributed during the first training. A second round of training, emphasizing interpersonal counseling skills and concrete child feeding messages (see Appendix A) was conducted in January 1992.

During the period measured by the baseline and mid-term evaluations (January 1991- January 1993), the Macina Child Health project used the community-based interpersonal counseling approach and the group communications media (flipcharts, village role plays, games) developed by NCP. Proto-type literacy materials were also used on a small scale.

II. Mid-Term Assessment

A. Purpose

The basic question being asked by the Mid-Term Assessment of the NCP program in Macina is whether new nutrition counseling approaches and materials placed in the hands of community health workers make them more effective in achieving their Child Survival objective for nutrition. The latter is determined by following the A.I.D. guidelines¹ which asks child survival NGOs to measure "the proportion of children whose (anthropometric measurement) is below two standard deviations of the norm established by the National

¹ 1991 Child Survival questionnaire question 4-7a

Center for Health Statistics (the norm endorsed by the World Health Organization)."⁷ The Child Survival Project objective is to decrease the percentage of malnourished children, using weight-for-age as the primary indicator.

When NCP began working with the NGOs, the 1987 DHS Survey for Mali indicated that nationally, 25% of all children had moderate to severe malnutrition (or weight-for-age below - 2 standard deviations). As will be discussed below, malnutrition was far more widespread in Macina.

B. Evaluation Design

The Mid-Term is a subset of the overall NCP evaluation which tests the impact of the NCP intervention using a prospective "trial group" and matched "comparison group" approach. In December 1990, CARE/Mali, Africare/Dioro and World Vision/Koutiala⁸ were asked to select 16 villages randomly from their child survival project rosters according to the following criteria:

1. Equal length of time participating in the child survival program.
2. Presence of improved wells, roads, vaccination and gardening projects.
3. Presence of a maternity center or other health post nearby.
4. Similar ethnic, demographic and economic make-up (study villages were limited to 75% Bambara and 25% Bozo).

Half of the villages (8) would receive NCP interventions, and the remaining eight villages would not. However, all other child survival program activities (e.g. immunization, water and sanitation, oral rehydration therapy and limited **nutrition screening and education**) would take place. The purpose of the matching was to eliminate as many confounding variables as possible in a rural village situation, including the improvements made by the child survival intervention in its own right. The NGOs were asked to implement the NCP intervention according to their own schedule, but more or less uniformly. The evaluation was designed to

Readers are referred to the UNICEF *Information for Action Issue Paper: Growth Monitoring of Preschool Children* 1985, pp 16-17, for a clear discussion of Standard Deviation Units, Z-Scores and their equivalents in percentiles or percentage of the median on the WHO/NCHS growth chart.

⁷Save the Children Kolondieba wished to participate in the project, but was unable to take part in the baseline study for administrative reasons

⁸One arm circumference screening for malnutrition, enriched porridge and other cooking demonstrations, and limited "community problem diagnosis and consensus building" for nutrition using flannelographs-GRAAP method were done in all Macina Child Health Project villages.

combine the findings from the 3 sets of 8 (24) trial villages as one group in comparison to the 24 comparison villages as another group.

Research Questions

The Evaluation has been designed to test the following suppositions:

1. Children less than three years of age, living in villages with NCP interventions, will have better nutritional status (measured by anthropometric indices of weight-for-age, height-for-age and weight-for-height) following two years of NCP program implementation than:
 - a. children of the same age range residing in NCP trial villages prior to the start of the program and;
 - b. children of the same age range residing in comparison villages (matched for SES, environment and exposure to other child survival interventions) not receiving NCP interventions.
2. Pregnant women, and parents of children less than three years of age, living in villages with NCP interventions, will have better nutrition knowledge and behavior scores following two years of NCP program implementation than:
 - a. pregnant women and parents of children of the same age range residing in NCP trial villages prior to the start of the program and;
 - b. pregnant women and parents of children of the same age range residing in comparison villages, not receiving NCP interventions.

Corollary Hypotheses are:

3. At any time (baseline or at project end), mothers or fathers with better nutrition knowledge will have children with better nutritional status.
4. At any time (baseline or at project end), mothers with better nutrition practices will have children with better nutritional status. (Father's nutrition practices were not assessed.)

C. Survey Methods

The sampling frame, field methods and instruments used to conduct the Mid-Term Assessment were largely replicated from the NCP Baseline, with a few compromises and logistical improvements, as follows:

1. Sampling

a. Assignment of villages to the study

In Macina, in order to have enough villages that met the evaluation criteria above, CARE assigned villages that had been visited monthly by CARE health workers for 1- 6 months as "comparison" villages, and those visited by health workers for 6-12 months as NCP "trial" villages. CARE *monitrices* had performed virtually no nutrition education activities in any of the villages at that time. All other criteria were determined to be equal between the two sets of villages. The effect of the earlier enrollment for the "trial villages" proved inconsequential for variables assessed at the baseline, with two exceptions:

At the baseline, women in villages designated to be "NCP trials" reported a higher frequency of "trained birth attendant at mother's last delivery" and greater "exposure to a health message" than women in villages designated to be comparisons. These factors were not associated with any anthropometric, dietary intake or nutrition behavior variables at baseline.

The difference in these frequencies appears to be the only artifact of CARE assigning their slightly more engaged villages to NCP trial status and their newly-engaged villages to comparison status.

In addition, when NCP started to work with the Macina project, the Dry Area Gardening Project (DAZA) had been in effect throughout, promoting cultivation of carrots and other vegetables throughout the Macina Child Health Project region. All of the comparison villages and the majority of the trials were involved in this effort. The DAZA project ended about one year into the NCP trial period.

b. Sample size

At baseline, the sample needed for children was estimated based on the prevalence of moderate malnutrition reported in the DHS 1987 survey for Mali at 25%. In order to assess the impact of NCP interventions on this estimated rate of malnutrition with a 95% confidence interval (5% allowable error), the total sample of children for a simple random sample would be $4(25)(75)/25 = 300$ children¹. With the two group design, approximately 300 children

¹Standard equation for estimating sample size is $N = 4pq/L^2$, where p=the proportion with condition in the population, q = 1-p, L = error²

in each group were sought -- or 200 total children from each of the three NGO sites. Children were further grouped by age: newborn - 6 months; 7 months - 12 months old; 13 - 36 months old, and an equal number in each category were sought (over-sampling for under-ones). Sex was left random. Sampling requirements for mothers were not calculated independently. Pregnant women were also sampled, in the same proportion as mothers in the child categories above. Approximately half the same number of men were sought.

c. Recruitment of villagers

Within each village, CARE Child Survival project staff recruited villagers to participate in the survey several days in advance. Using village lists maintained by health posts or the Child Survival project, eligible families (with pregnant women or children under age three) were categorized into the following interview classifications: Pregnant woman, mother of infant less than 6 months old, mother of child 6 months to 1 year old, mother of child 1-3 years old, father of child. Eligible households were randomly enumerated and invited to participate in the study. In every village, virtually all pregnant women and mothers of children less than one year of age were interviewed. There was slightly more choice for mothers of older children, and either the enumeration technique, or, simply "rounding up anyone available," was used to select the remaining participants.

The baseline sample consisted of 835 women, 524 men and 657 children ranging in age from two weeks to 36 months old.

The Macina Mid-Term survey sampled men, women and children from four NCP program villages and four comparison villages in the Macina Child Health Project site in February 1993. These eight villages, selected (within trial/comparison categories) from the 16 villages included in the Baseline study, were chosen based on logistical proximity to each other. None were closer to the main road than the eight villages that did not participate. The projected sample size (slightly over 100 children) was considered minimally adequate to perform simple tests of significance between two groups. Table 1 below shows the completed samples at Baseline and Mid-Term.

Table I **Achieved samples - Macina**

	Comparison sites		NCP Trial sites	
	Baseline	Mid-Term	Baseline	Mid-Term
villages	8	4	8	4
adult females	156	77	123	75
adult males	58	46	47	39
children	119	58	93	59
total samples	333	181	263	173

2. Organization of Interview Teams

NCP local coordinator Robin Anthony, AED consultant Dandara Kanté and CNI ECS/NCP team member Safiatou Tamhoura, supervised field activities, assisted by the Macina Child Health Project Coordinator Denise Gordon Diarra. Two interviewing teams were trained including three health agents from the Macina Child Health Project (not working in evaluation villages), and two male interviewers, one recruited from the regional MOH health center in Macina and the other from the Ministry of Education.

Responsibilities were divided as follows:

- ◆ MCHIP field staff recruited participants in the village for the survey, handled village introductions and hospitality, checked children's birth and current age records and usually performed the anthropometric measurements.
- ◆ Interviewers asked all remaining questions to prevent biasing responses from interviewees who might hope to please the regular health worker.

Each team completed one village per day.

3. Data Collection Instruments and methods

a. Anthropometry

Children were weighed using the Macina local clinic's Salter suspension scales and measured using locally constructed length measuring boards, also belonging to the Child Health Project. Mid-Upper Arm Circumference (MUAC) was also collected using a red-yellow-green "Zerfas" insertion tape manufactured by TALC, London. The research team was trained to follow the anthropometric procedures described in United Nations, *How to Weigh and Measure Children*, 1986.¹¹

b. Knowledge, Attitudes and Practices

Adult participants were interviewed individually using the same research instrument as at baseline. A number of questions which proved to be useless at the baseline were eliminated, and pre-coded answer choices were provided for many of the questions to facilitate collecting data. The instrument is reproduced in Appendix B.

The instrument consisted of two parts:

(1) Verbal stimulus only

In this section, researchers asked participants a series of open-ended questions concerning family characteristics, food choices and food-related behavior. Dietary intake for adult pregnant and nursing women and for children over six months of age was assessed using a "24 hour recall" following the methodology of Gibson, R. *Principles of Nutrition Assessment*.¹² In addition, mothers were asked at what age various foods were given for the first time to their child, such as fruit juice, millet, meat, etc.

Women were asked either about their own experience during pregnancy or the first three months of breastfeeding, or they were asked questions concerning their youngest child. Men were asked to comment on their wife's pregnancy or about their youngest child, as well as about household food security and possessions. As some questions were of a personal nature, efforts were made to match the gender of the researcher with that of the respondent during this phase

(2) Illustrated stimulus

The section was used to allow respondents to project their opinions, values and demonstrate their knowledge in a non-direct manner. Six (out of 10 at the baseline) illustrations (Please

¹¹National Household Survey Capability Programme, DP/UN/INT-81-041/6E

¹²Gibson, R. 1990 Oxford University press, N.Y.:37-39. See also Christakis, G. 1972 *Nutrition assessment in health programs* APHA.11-18 and Appendix C. For discussion see Block, G. A review of validations of dietary assessment methods. *A.J. Epid.* 115:492-505 and National Research Council, *Diet and Health*, National Academy Press, 1989, Washington, D.C., Chp. 2, Methodological Considerations:23-40; Chp. 3, Dietary Intake and Nutritional Status:41-84.

see Appendix B) were used to explore reactions to hypothetical situations, or called for visual identification of physical conditions, such as marasmus or night blindness. The illustrations had been pre-tested independently of the baseline survey, and used for the baseline. During the baseline survey, respondents evidenced no discomfort participating in this section of the survey with interviewers of the opposite sex. Therefore, half of the research team "specialized" in the illustrated section, and interviewed either men or women sequentially.

All questions were written in French and then translated into Bambara. At the time of the survey, only the field supervisor, Ms. Kanté, could read written Bambara. Ms. Kanté oversaw training of the researchers in the correct Bambara for each question. Once the research team was comfortable with the survey, a single respondent could be interviewed in approximately 40 minutes. Field supervisors circulated to insure that questions were asked, and answers recorded, in a consistent manner.

Variables and indices created from the questionnaire, including those collected to measure the impact of confounding factors, are discussed in relevant sections of the findings, below.

4 Data entry and statistical analysis

Completed questionnaires were forwarded to NCP/Washington for processing. Dr. Aissata Thiam, who created the data set for the baseline in Mali, performed this same function for the mid-term in Washington. She coded and entered data into standard ASCII data files using Paradox Database software. *EPI Info*, a Center for Disease Control (CDC) software program, was used to enter the data, transform raw data into anthropometric indices and perform preliminary analyses. Data cleaning involved correcting obvious data entry errors and creating a household identification number that allowed women, men, and children from the same household to be linked together. Records with missing values and the missing code "999" for the particular variable being tested, were excluded from analysis. Consequently, total sample size for each question or variable varies according to the numbers of valid answers for the question or indicator. Sample size is indicated for each analysis. Data were then analyzed using SPSS PC statistical software.

Data analysis focused primarily upon differences between the baseline and mid-term samples and between the trial and comparison sites. Regression was used to test the relationship between the nutritional status indicators (Z-scores) and continuous measure of diet quality (dietary index, explained below) as well as some confounding continuous variables (household wealth index, numbers of wives and children). Chi-square, odds ratios, and ANOVA tests were used to examine categorical variables, differences between trial and comparison children, and differences within groups over time. Significant findings and the level of significance (p-values) are reported in the results section of this report.

III. RESULTS

A. Demography

Variables used in this section: Mother's age/Father's age; Father's occupation; Education; Length of time residing in village; Number of adults and children in care of household; Number of wives (men); Wife's rank in polygynous household (women); Number of living children.

Table II below summarizes the more important demographic characteristics for NCP trial and comparison villages at baseline and mid-term.

As was true at the baseline, 99% of the men describe themselves as "farmers;" no one has any formal education and only 25% of the women and 1% of the men can estimate their own age. The average number of children per woman remains unchanged from the first survey to the next. While the proportion of boys and girls in the sample changes between baseline and mid-term, this difference is not significant, nor are any outcome measures significantly associated with "child's sex" at either time.

The most significant change between the baseline and mid-term is the addition of second or third wives to the household, which has occurred against an overall improvement in food security throughout the region. Only 3.3% of the women resided in the village for less than all of the NCP project's two years.

Table II Sociodemographic Characteristics: Comparison of samples

	Comparison site		NCP Trial site	
	Baseline	Mid-Term	Baseline	Mid-Term
mean age of children (months)	10.53	12.33	10.13	11.47
sex of children				
% boys	49	48	48	59
% girls	51	52	52	41
mean number children (of adult women)	2.99	3.37	3.39	3.41
number wives in household ¹				
% w 1 wife	45	47	51	45
% w 2 wives	55	47	49	46
% w 3+ wives	0	6	0	8
subject female's rank				
% Wife 1	76	68	81	75
% Wife 2	23	27	17	23
% Wife 3+	1	3	2	2

¹ p < .05 (chi-square) for both comparison and trial villages

B. Cognizance of Intervention¹³

Variables used in this section (27) Have you ever heard a message on nutrition?: (28) How was this message transmitted? (29) What was the primary message?

Virtually everyone had heard what they thought was a "nutrition message" at some point in time, although the survey revealed that a number of these were actually messages about ORT, immunization or malaria.

At the baseline, only 4.8% (of 105) of the men who said they heard a "nutrition" message, claimed to have heard a message about **diet during pregnancy** or **infant feeding**. This number increased to 32.9% (out of 85) at the mid-term, about equally divided among NCP trial and comparison villages.

¹³ One of the disadvantages of using the same tool at the mid-term as at the baseline, is that the NCP intervention was not finalized at the time of the baseline survey, and the indicators used to assess its penetration are quite weak. Based on our experience with the tool at both the baseline and mid-term, this section of the assessment will be changed for the final evaluation.

Among women, vastly more at the baseline had heard a health or nutrition message in villages selected to be NCP trials than in control villages (107 compared to 12). This was due to the manner in which CARE/Macina designated villages into trial and comparison status, as described in the methods section above. However, of these 107 women, **only 38.7% had heard a message about either maternal or infant feeding.** At the mid-term, 67.7% (N=62) of the women in NCP trial villages, compared to 59.2% (N=49) of the comparison villages remembered hearing a message on this subject. Virtually all respondents claimed to have heard a message "through a health worker."

CARE/Macina had initiated nutrition communication activities in comparison villages approximately two months before the mid-term evaluation, and it seems likely that comparison villagers were exposed to some NCP messages at least once during this period.

These fairly crude data on exposure are not significant, nor particularly meaningful, given the complexity of the NCP intervention. (Please see Appendix A) The data on specific infant feeding behaviors and practices tell much more about what information was retained, and actually made an impact, on maternal diet and infant feeding behavior, as discussed below.

C. Nutritional Status

Variables used in this section:

Measurements

- a Child's age¹⁴ - calculated by *Epi Info* from:
 - Date of birth (from health post or village records)
 - Date of interview
- b Child's weight measured in kilograms to the nearest 0.1 kg
- c Child's height or length (children less than 2 years old are measured supine) measured in centimeters to the nearest 0.1 cm
- d Child's sex (male or female)
- e Mid Upper Arm Circumference (MUAC). Both the circumference in centimeters and the color of the tape (red, yellow or green) were recorded. These data were chiefly used during data cleaning as an independent check of weight and height for age measurements.

¹⁴At the baseline, an attempt was made to count children's teeth as a verification of their age. As sufficient written records were available to document children's age, and the technique was extremely difficult to carry out, it was dropped.

Standardized Scores

For the purpose of analysis, the individual child's measurements are compared to international reference data for children of the same age and sex, established by the U.S. National Center for Health Statistics (NCHS) and endorsed by the World Health Organization (WHO).¹⁵ The standard scores calculated by *ANTHRO* (part of the *Epi Info* package) included weight-for-age (WAZ), a measure of overall nutritional status; weight-for-height (WHZ), a measure of acute malnutrition; and height-for-age (HAZ), a measure of chronic malnutrition. A score of "0" indicates that a child's measurements match the reference mean. Positive numbers indicate that the child is taller or heavier than the mean; negative numbers indicate the child is shorter or lighter. In a normal distribution of scores, 99% of the variation within a population will be found between -3 and 3 standard deviations from the mean (0). The *ANTHRO* program automatically "flags" records which are missing data or fall outside of an accepted range (LE¹⁶ -5 or GE 5 standard deviations), indicating a high likelihood of measurement/data entry error. Flagged records are excluded from the analysis.

Note about error measuring height in one village

A systematic error was made in measuring the height of nearly all the children in one NCP trial village, resulting in recorded heights at levels below those of normal newborns. Unfortunately, this error was not detected until data analysis began. Inspection of the weight and MUAC scores indicated that these were normal to higher weight children, with normal MUACs (indicating a good fat to long bone ratio-i.e. not excessively skinny or fat), which confirms the belief that the height measurement was incorrectly reported or entered into the data set. The height data for the entire village were automatically eliminated from the analyses by the "flagging" procedure described above. For this reason, the "n" for height data in the NCP trial villages is quite small (38), although still sufficient for the grouped analysis performed. The vast majority of analyses conducted in this report use "weight" data.

¹⁵ Readers are referred to the UNICEF Information for Action Issue Paper: Growth Monitoring of Preschool Children, 1985, pp 16-17, for a discussion of standard deviations, Z scores and their equivalents in percentiles of the median on the WHO NCHS growth chart.

¹⁶ LE=Less than or equal to. GE=Greater than or equal to.

Table III below shows the mean Z-scores and standard deviations for NCP trial and comparison children's weight-for-age, height-for-age and weight-for-height at both the baseline and the mid-term, as well as the significance of the difference between the mean scores at each time.

Table III: Mean Standardized Scores for Anthropometric Indicators

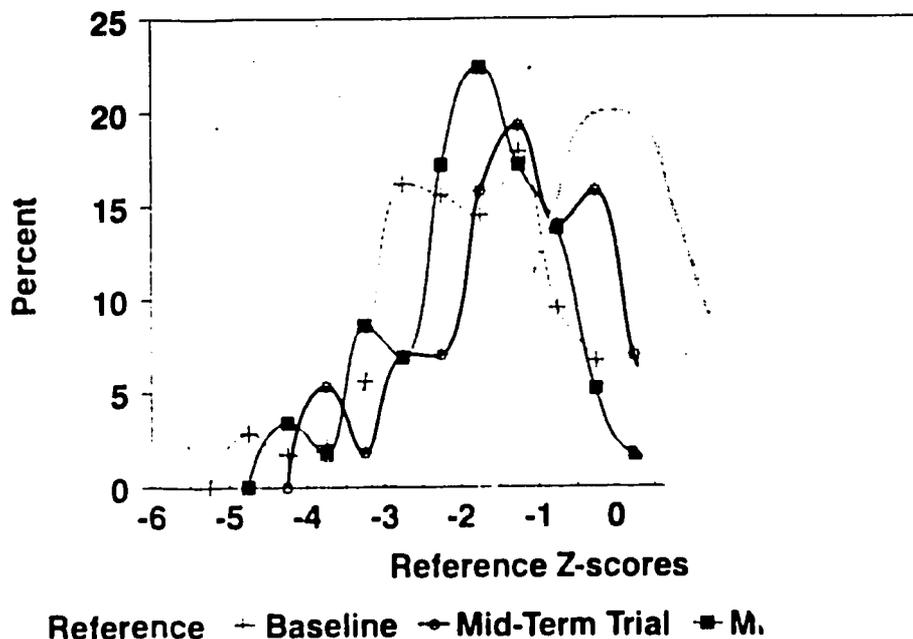
Baseline							
	NCP Mean	SD	N	Comparison Mean	SD	N	Sig
WAZ	-1.72	1.20	90	-1.87	1.34	100	NS
HAZ	-0.90	1.44	87	-1.06	1.43	98	NS
WHZ	-1.37	1.11	87	-1.37	1.22	98	NS

Mid-Term							
	NCP Mean	SD	N	Comparison Mean	SD	N	Sig
WAZ	-1.16	1.16	57	-1.79	1.07	58	.005
HAZ	-1.11	1.62	38	-1.47	1.51	56	marg.
WHZ	-0.23	1.38	38	-0.86	1.14	56	.05

There is a significant upward shift in children's weight-for-age scores in the NCP trial sites which is not seen in the comparison sites. The incremental difference for height-for age is smaller (about one-third of a standard deviation), and while important, not statistically significant (largely due to small "n"). Weight-for-height achieves a significant difference between the two sites. Figure 1 below graphs the distribution of weight-for-age at baseline (NCP and Comparison sites combined), and at mid-term (NCP and Comparison sites separately)

Figure 1 Weight- for- Age Distribution of NCP Baseline and Mid-Term Samples Compared to Reference Population

Compared to the NCHS/WHO/CDC Reference



Percentage of Malnourished Children using Child Survival Project Cut Points

Figure 2 below displays the percentage of children whose weight-for-age classifies them as "normal," or suffering from "mild," "moderate" or "severe" malnutrition at the baseline and at the mid-term. For weight/age, a "normal" Z-score is ≥ -1 standard deviations from the mean. Children with "mild" malnutrition have z-scores < -1 SD, and ≥ -2 SDs. "Moderate" malnutrition is < -2 SDs and ≥ -3 SDs. "Severe" malnutrition is < -3 SDs below the mean. Child survival projects report the proportion of children below -2 SDs, combining "moderate" and "severe" malnutrition.

BEST AVAILABLE DOCUMENT

Figure 2 Changes in Percentage of Normal Children, and Those Suffering from Malnutrition Based on Weight-for-Age

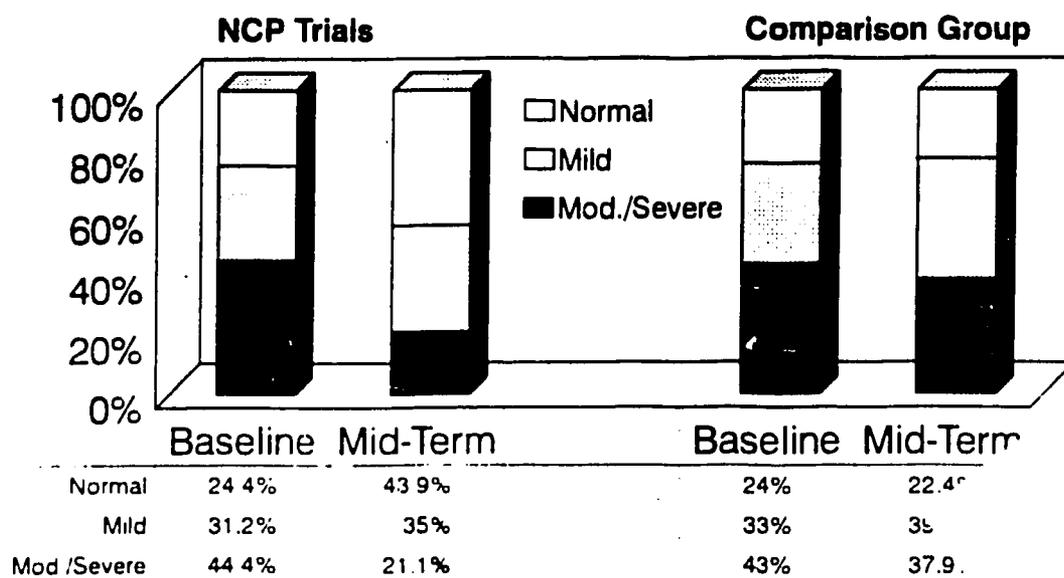


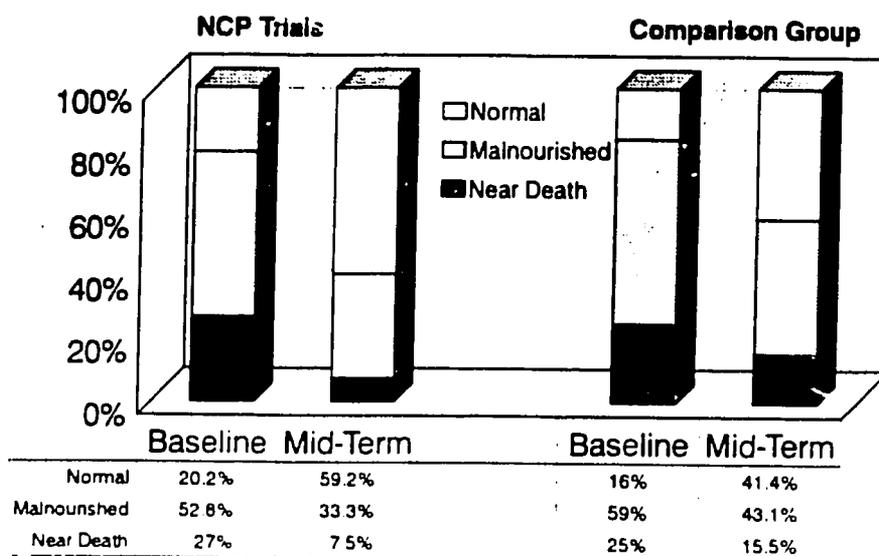
Figure 3 below shows the change in children's weight-for-height. The cut-points selected here reflect the more critical nature of what is termed "acute" malnutrition. Children near -2 SD have a very poor chance of survival. Even children less than -.5 SD are at a much greater risk of dying than normal children. The first study to demonstrate this phenomenon clearly was the Iringa Project of Tanzania.¹⁷

These indicators are selected based on comparative data from the "Iringa Project" in Tanzania that demonstrate that the mean weight or height of children who lived to age three were more likely to be above -2 SDs than for children who died, and *mean weight-for-height was more likely to be above -.5 than for children who died*.

Indicator	Dead	Alive
Z Weight-for-Age	-2.27 +/- 1.21	-1.67 +/- 1.01
Z Height-for-Age	-2.48 +/- 1.32	-2.04 +/- 1.10
Z Weight-for-Height	-0.97 +/- 1.26	-0.49 +/- 0.97

Source: YAMBI, Olivia. 1988. Nutritional Status and the Risk of Death: A prospective study of children six to thirty months old in Iringa region, Tanzania. PhD Thesis, Cornell University.

Figure 3 Changes in Percentage of Normal Children, and those Suffering from Malnutrition based on Weight-for-Height



In the NCP trial villages, there was a 20 percentage point reduction in the percent of children in the moderate/severe category, and a 39% increase in the percent of children with normal nutritional status. Using the WHO terminology¹⁸ to describe the prevalence of the malnutrition problem after the NCP intervention, in the comparison villages, malnutrition remains "critical," whereas in the NCP trial villages, it is merely "poor." This is a three-grade improvement, but it is not time to relax anywhere in the region just yet.

Nutritional Status: Conclusions

These data demonstrate that children less than 3 years of age, living in villages with NCP interventions, have significantly better nutritional status (measured by anthropometric indices of weight-for-age, height-for-age and weight-for-height) following two years of NCP program implementation than:

- a. children of the same age range residing in NCP trial villages prior to the start of the program, and:
- b. children of the same age range residing in matched comparison villages not receiving NCP interventions

¹⁸ 5% Acceptable, 5-9% Poor, 10-14% Serious, 15+% Critical. Report on the Consultation on Rapid Nutrition Assessment in Emergencies Alexandria, January, 1992. WHO-EM/NUT/114-E/L.

The data for nutritional status therefore support a positive conclusion to the first research question. Research questions two through four explore the factors responsible for the change in nutritional status.

D. Changes in Nutrition Practices

1. Women's food consumption

Variables used in this analysis: 48 food/meal variables (i.e. millet at breakfast, millet at lunch, millet at dinner, millet at snack=4 yes/no variables) reduced to one 24-hour recall "food consumption index," as follows:

A food consumption index for adult women was created from the 24-hour recall data. Following the emphasis of the NCP intervention, the index assigned Vitamin A-rich foods a point value of 3, protein-rich foods a value of 2, and carbohydrate-rich foods a value of 1. The 24-hour recall only collected how many times a particular food was consumed (i.e. its presence or absence in meals or other eating occasions), and did not quantify portions or servings. Hence, it is a fairly crude measure of dietary intake, essentially serving to indicate whether 12 key foods (food groups) specifically mentioned in NCP communications appear with any regularity in the diet. The food consumption index was calculated by multiplying the point value for each of these 12 foods by the number of times that food was consumed in the past 24 hours. In this manner, 48 separate variables were reduced to one index.

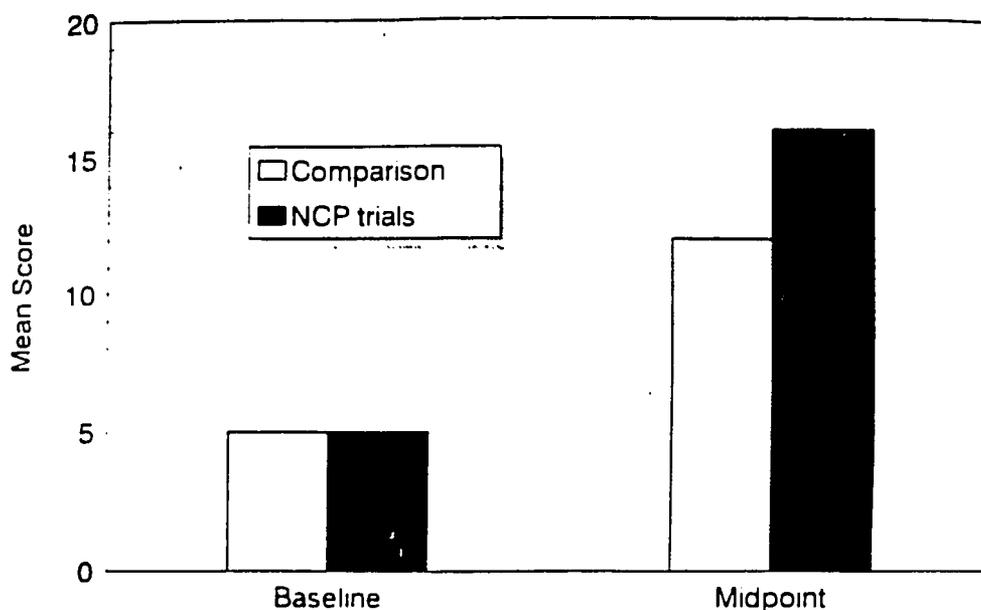
Table IV Point values assigned to foods in women's 24 hour recall.

Points	1 point	2 points	3 points
Items	millet rice porridge sauce other	fish meat peanuts eggs	milk vegetables leaves

Figure 4 presents the mean food index scores for NCP trial and comparison women at the baseline and mid-term. ANOVA calculations indicate that while the two groups had statistically indistinguishable food index scores at baseline, women in the *NCP trial villages consumed more of the foods recommended by the NCP intervention* than women in the comparison villages. Women in comparison villages also consumed more foods, in general, than they had at baseline. As mentioned before, the region experienced an overall improvement of agricultural conditions. However, the difference between the amount of NCP

recommended foods consumed by the NCP trial and comparison villages is significant ($p \leq .05$).

Figure 4 Women's Food Index Score



Figure

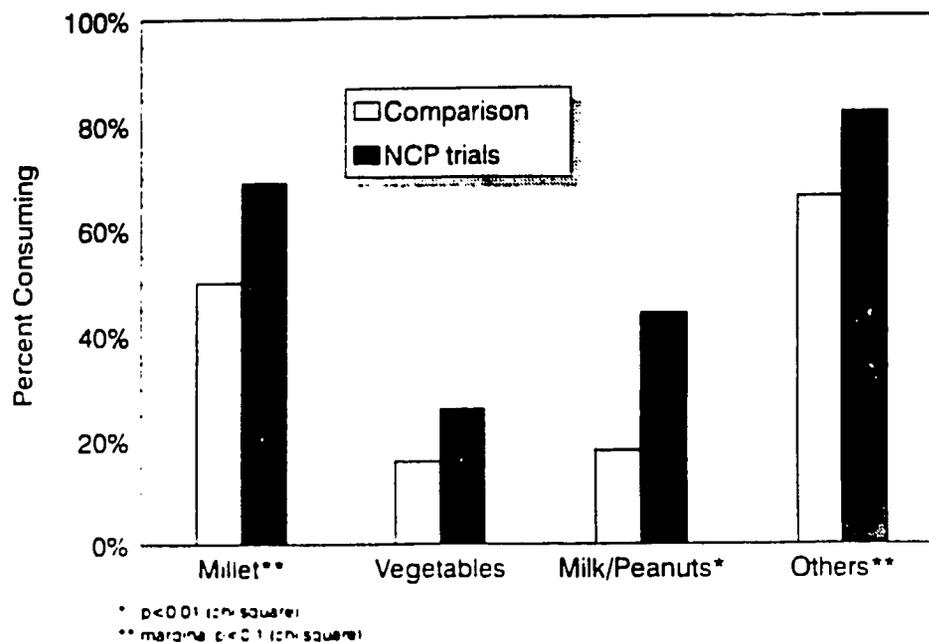
In addition to benefiting the woman directly, improvements in maternal diet, as found to a greater extent in NCP trial villages, would also enhance the youngest children's nutritional status by increasing weight and micronutrient stores at birth. However, records of birthweight and prenatal micronutrient status indicators were not available for analysis.

2. *Infant Feeding Behavior*

Variables used in this analysis: Food meal variables from Mother's "24 hour dietary recall" for children six months through three years old, indexed (as above).

NCP recommended a gradual introduction of complementary foods (in addition to breast milk), beginning no later than six months of age. Recommended foods include millet porridge, (vitamin A-rich) vegetables, milk and ground/crushed peanuts. Figure 5 below shows differences in consumption reported for children in NCP trial and comparison villages for these key foods.

Figure 5 Foods Consumed in Past 24 Hours
Children 6 months and older



The percentage of children consuming milk and peanuts within the past 24 hours is significantly higher in NCP trial sites. The percentage eating millet and other foods is marginally higher ($p < .10$). These differences are quite important, as the primary infant feeding mode at baseline was to withhold all solid foods (foods other than breast milk or water) until the child was "able to eat by himself," that is to say, eight to ten months old.

As will be discussed below, improvements in the weight-for-age status of children in the NCP trial villages are most likely associated with earlier, and more consistent consumption of millet, and the addition of small quantities of milk and crushed peanuts to the diet, compared to comparison villages.

E. Beliefs, Attitudes and Reported Infant Feeding Behaviors

In addition to the 24-hour recall data, a number of variables were used to determine how women fed their children before and after the intervention. Table V below, presents the infant feeding behavior indicators, the "effective" behavior that was promoted by NCP, alternative choices, and the percentage of the women who practiced an "effective" behavior at baseline and at mid-term. Significance levels are indicated by shading (marginal) or reported. These variables are used to test Research Question 2, and as independent variables to test research questions 3 and 4. Numbers refer to the Woman's Mid-Term Questionnaire (See Appendix B). Following the table, several of the variables are discussed in depth.

Table V Summary of Infant Feeding Behavior Change Variables at Baseline and Mid-Term

Q	Variable	Possible choices (Bolded and underlined answers were promoted by NCP and used to categorize by "effective" or "ineffective" responses in analyses).	Frequency "Effective" Baseline Women		Frequency Effective Mid-Term Women	
			Trial	Non-Trial	Trial	Non-Trial
11	First substance given to child	<u>Breast milk</u> , sugar water, infusion, fruit juice, boiled water, plain water, butter, other	12%	29%	27.3% (NS diff)	
12-18	Age at weaning	Age in months (<u>GE 24 months</u>)	53.1% (NS diff)		81.6% (NS diff)	
19a	Age water introduced	Age in weeks or months (<u>GE 4 months</u>)	10% (NS diff)	34.2%	58.3% see below.	
19b	Age porridge introduced	<u>(4-7 months)</u>	40.9% (NS diff)	63%	55%	
19c	Age fruit introduced	<u>(6-8 months)</u>	16.8% (NS diff)	40%	27%	
19d	Age millet paste (toh) introduced	<u>(6-8 months)</u>	15.1% (NS diff)	36%	24.6%	
19e	Age fish introduced	<u>(6-10 months)</u>	24.8% (NS diff)	40%	28.5%	
19f	Age meat introduced	<u>(6-10 months)</u>	24.8% (NS diff)	45.3%	35.1%	
20	Drinking water treatment	Nothing, <u>filter</u> , boil, <u>chlorinate</u> , other	93%	48%	98.6%	86.3%
23	Number of times child ate yesterday	0 - 6 "meals/snacks" (GE 3)	20.4% (NS diff)		44.4% (NS diff)	
26 a-f	Child supervision during 2+ meals	Alone, <u>Mother</u> , Older sib, <u>Father</u> , <u>Other Adult</u> , Other Child(ren)	18.9% (NS diff)		37.3% (NS diff)	
D2d	Mode of getting sick child to eat	Don't know, (Encourage), <u>Give little-by-little</u> , <u>Give favorite foods</u> , give medicine, other.	21.5% (Encourage = 25.4%) (NS diff)	35.6% (Enc = 16%)	15.7% (Enc = 30%)	
D3a	(Hypothetical) Why should the man buy carrots for the child in the market place? (Women and Men together)	Don't know, the other choice (macaroni) is dirty, <u>carrots are good for health/good foods/like medicine</u> , <u>carrots have vitamins</u> , other	1% (NS diff)	86.7%	68%	
D4a	(Picture of child with marasmus). Do you notice anything special about this child?	Nothing, don't know, other, <u>marasmus "eye"</u> , <u>too skinny</u> , stomach distended, mother became pregnant too soon.	24.6% (NS diff)		35% (NS diff)	
D4b	(For those who recognized picture of malnourished child)- What causes this problem?	Don't know, God, <u>doesn't eat enough</u> , <u>doesn't eat enough good food</u> , drink dirty water, nursing from mother who is pregnant, eats too much, eats the wrong kinds, other.	9.7% (NS diff)	35.7%	10% (000)	
D5c	How do you cure night blindness?	Don't know, go to the health post for medicine, put leaf juice in eyes, wash face with herbal remedy, <u>give liver to eat</u> , <u>have a special capsule</u> , <u>eat carrots or dark green leafy vegetables</u> (dglv)	99% (Don't know or wrong (1% go to health post))	60.9% 18.8% capsule	3.6% 80% capsule (000)	
D5f	How do you prevent night blindness?	Don't know, vaccinate, use an emulsi, eat well, <u>eat liver/greens/dglv</u> , other	99% (Don't know or wrong)	52.2%	16.7% (000)	

Shaded areas have p. values approaching significance, between .07 to .10, however, too many cells and too small samples

1. Exclusive Breastfeeding

The most important action a healthy woman can take to protect her infant's health is to feed the child her breast milk, and her breast milk alone, for the first 4-6 months. Besides being the superior form of nutrition, this strengthens the child's immune system.¹⁹

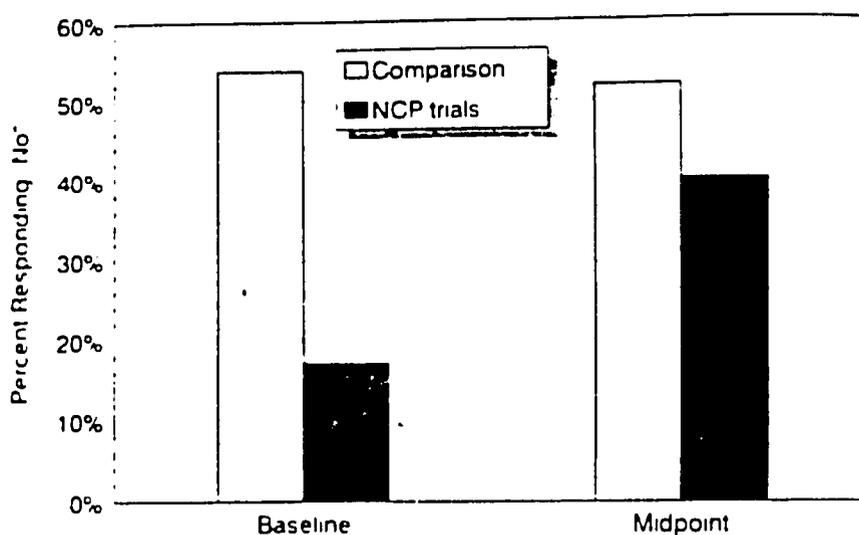
While this fact is now well known scientifically, the medical profession promoted early introduction of supplementary foods, particularly in developing countries, well into this decade. In addition, it was part of primary health training in Mali to recommend giving newborns boiled sugar water or boiled water during the first two weeks of life while the mother "waited for her real milk to appear" (i.e. colostrum was not fed to infants).

Because of the importance of breastfeeding to child survival, messages about exclusive breastfeeding were a part of the overall child survival effort, and not directed to NCP trial villages exclusively.

None-the-less, there are some interesting results in the survey concerning the relative difference between the two sets of villages:

Figure 6 below displays the percentage of women who believe it is inappropriate to give 2-week old infants anything but breast milk.

Figure 6 Should 2-week-old infant consume anything but breast milk?



Figure

¹⁹See NCP, "Questions and Answers About Infant Feeding: A Panel of Experts Takes a New Look. USAID, 1993.

As can be seen, significantly more women in comparison villages than in trial villages gave the "right" answer to this question at baseline. This fact is perplexing, unless the one significant difference between the trial sites and the comparison sites at baseline is taken into consideration. More NCP trial women had "trained midwives" attending their last births than comparison villages. These government-trained midwives promoted the idea that sugar water was a good infant feeding choice in the first two weeks. Whereas women in comparison villages did not have as many mid-wives at their birth, and thus did not receive these messages as frequently.

During the course of the intervention, the Macina health workers were able to maintain the idea of exclusive breastfeeding among 50% of the women in comparison villages, and replace the idea of giving sugar water with exclusive breastfeeding among 23% of the women surveyed in NCP trial villages, for a total of 40% accepting the new idea.

In addition, among women living in NCP trial villages, the number of women who gave their children colostrum more than doubled (from 12% to 27.3%). While this percentage was statistically no different than the comparison villages at both the baseline and the mid-term, it does indicate that the problem of non-exclusive breastfeeding was even more serious in NCP trial villages when the intervention began, and that real progress was made in this area.

Another indicator provides more-or-less the same story. At the time of the NCP baseline, only 10% of the population in either trial or comparison sites, claimed to wait until the fourth month before introducing water. At the NCP mid-term, the percentage in comparison sites was 58.3%, and in NCP trial sites, 34.2%, which is a significant difference ($p=.02$). This particular indicator demonstrates that "de-promoting" an idea perhaps takes longer than promoting an entirely new idea. In NCP trial villages, the mid-wives had promoted giving sugar water during a baby's first two weeks. It perhaps takes longer to unlearn these practices. However, the Macina health agents were well on their way to reversing the old practice.

The percentage of women who weaned their infants at 24 months or more also increased from a starting point of 53.1% at baseline to 81.6% at the mid-term. These results were also indistinguishable from the comparison villages.

2. Water Treatment

The risk of contracting an illness due to premature introduction of water is, of course, linked to the degree to which the water is free of bacterial or other contamination. In addition to having a high bacterial load, the Macina region is located in the Guinea worm belt. The Macina Child Health agents have therefore promoted treatment of water through boiling, filtering through tightly woven cloth (sufficient for eliminating Guinea worm), and/or addition of chlorine bleach (*Eau de Javel*).

At the baseline survey, already 93% of the NCP trial villages and 48% of the comparison villages performed at least one of these water treatments. At the mid-term, the trial village rate had been increased to 98.6% and the comparison village rate raised to 86.3%. These are both substantial increases over the baseline rates -- particularly given that reaching the last 5-10% of a population for any health intervention is normally considered to take the same amount of effort as reaching the first 80%.

This entire set of outcomes demonstrates that the Macina Child Health Project agents (the CARE monitrices) were quite effective with their child survival program in all villages. They were more effective promoting water treatment in NCP trial villages, perhaps due to six months more of exposure to the water treatment message, or perhaps due to its reinforcement in NCP approaches and materials.

3. Introduction of Complementary Foods

Women were asked to recall at what age they first gave their youngest child (the child in the study) a particular food. Table VI below shows the responses of women living in NCP trial and comparison villages in terms of the percent responding in a manner consistent with NCP promotional strategies.

Table VI **Reported Introduction of Complementary Foods**

(1)	Food	NCP Message	Baseline	Mid-Term NCP Trials	Mid-Term Comparison
196	Age porridge introduced	(4-7 mos.)	40.9% (NS diff)	63%	55%
197	Age fruit introduced	(6-8 mos.)	16.8% (NS diff)	40%	27%
198	Age millet paste (tohi) introduced	(6-8 mos.)	15.1% (NS diff)	36%	24.6%
199	Age fish introduced	(6-10 mos.)	24.8% (NS diff)	40%	28.5%
199	Age meat introduced	(6-10 mos.)	24.8% (NS diff)	41.3%	35.1%

The difference between the proportion of respondents in NCP villages giving the correct answer against the comparison villages falls just short of statistical significance (p varies between .06 and .08). However, there is a clear trend, and we can be reasonably certain that this is not due to chance. **The differences between the baseline values and the mid-term are significant ($p \leq .05$) in the NCP trial villages for all the variables above, whereas they are not for the comparison villages (millet paste achieves a marginal significance in the**

comparison villages). The impact of reported timely introduction of complementary foods on nutritional status is examined below with other nutrition KAP factors.

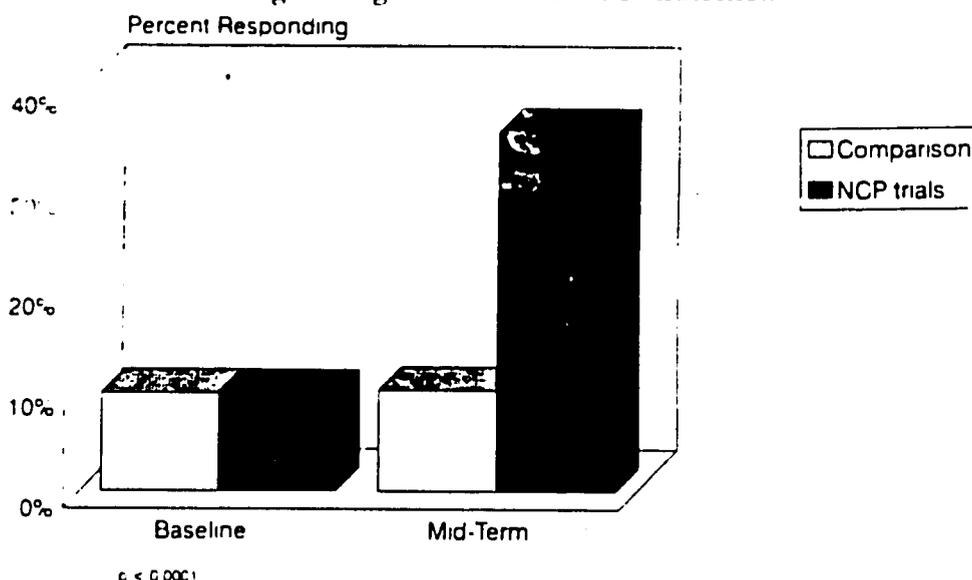
4. Recognition of child malnutrition, its treatment and prevention

Teaching parents to recognize symptoms of child malnutrition has been an important strategy of child survival programs throughout Africa, as many traditional societies attribute the visible signs of marasmus or kwashiorkor to evil spirits, bad air, or other sickness. Teaching adults that a certain cluster of symptoms is related to poor dietary practices, and that the symptoms, or illness, **can be prevented through better diet** is one goal of the NCP project.

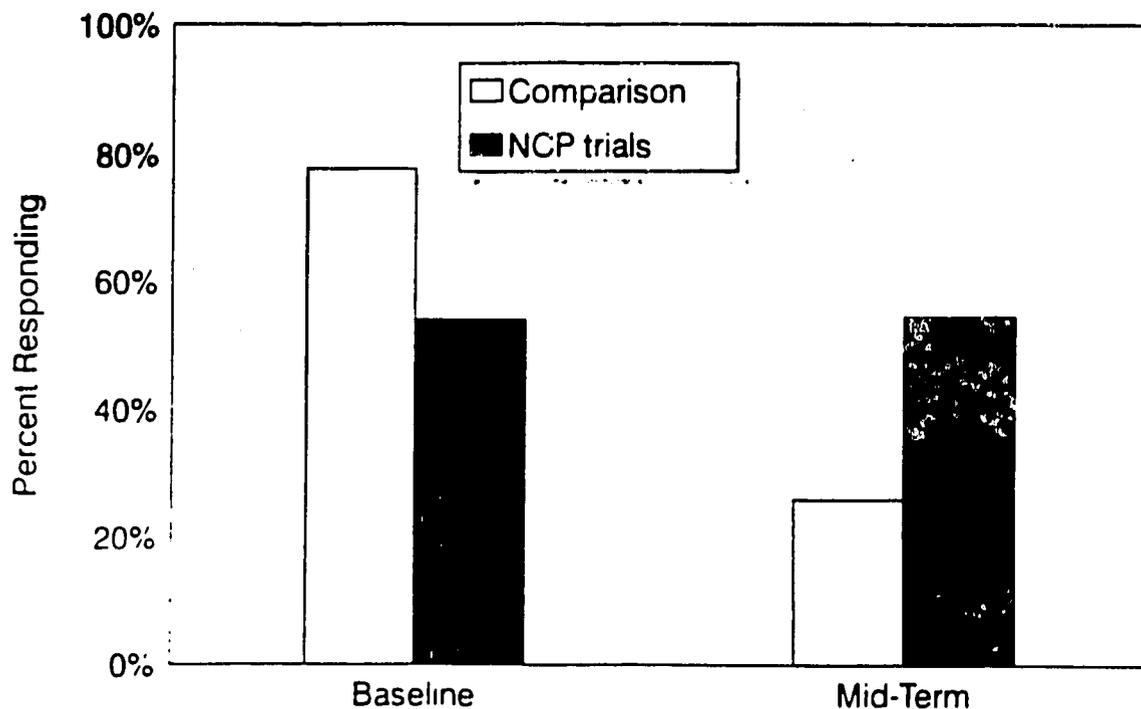
At both the baseline and mid-term, adults were shown a (pretested) drawing of a small boy suffering from marasmus - severe wasting malnutrition. The adults were asked whether they "noticed anything special" about the child. Eliminating those who responded "puffy/distended stomach," or did not answer the question from the analysis, the percentage in each sample that remarked the child was "too skinny" or suffering from "sere" (the local term for marasmus) was nearly 25% at the baseline in both trial and comparison villages, and 35% in both trial and comparison villages at the mid-term. Hence there was an increase across the board in adult's ability to recognize a drawing of extreme malnutrition. It should be noted that the Child Survival Project had implemented some nutrition education activities in all villages, including teaching adults to be *aware* of child malnutrition.

Those who named at least one symptom of malnutrition were asked if they knew what caused the problem, and how it could be prevented. At the baseline, only 9.7% of the respondents knew that either "not eating enough, or not eating enough good food" was the cause of the problem. At the mid-term, 35.7% of the NCP trial villagers knew this was the cause against an unchanged 10% in the comparison villages, and that "giving the child more and better foods to eat prevents this illness." This finding was extremely significant ($p < 0.001$), and is graphed below in figure 7.

Figure 7 Percent Believing Eating Well Prevents Malnutrition



"Father in picture should buy carrots"



5. *Prevention of Vitamin A Deficiency*

A central objective of the NCP intervention is to teach villagers to appreciate the value of vitamin A-rich foods available in their environment, and to choose more of these foods for household consumption, as well as for pregnant women's and children's snacks. When NCP started to work with the Macina project, the Dry Area Gardening Project (DAZA) had been in effect throughout, promoting cultivation of carrots and other vegetables throughout the Macina Child Health Project region. Some of the villages selected for the NCP trial, as well as the non-trial comparisons, were involved in this effort. With this as the starting point, NCP attempted to reinforce DAZA's efforts in NCP trial villages. The DAZA project ended about one year into the NCP trial period.

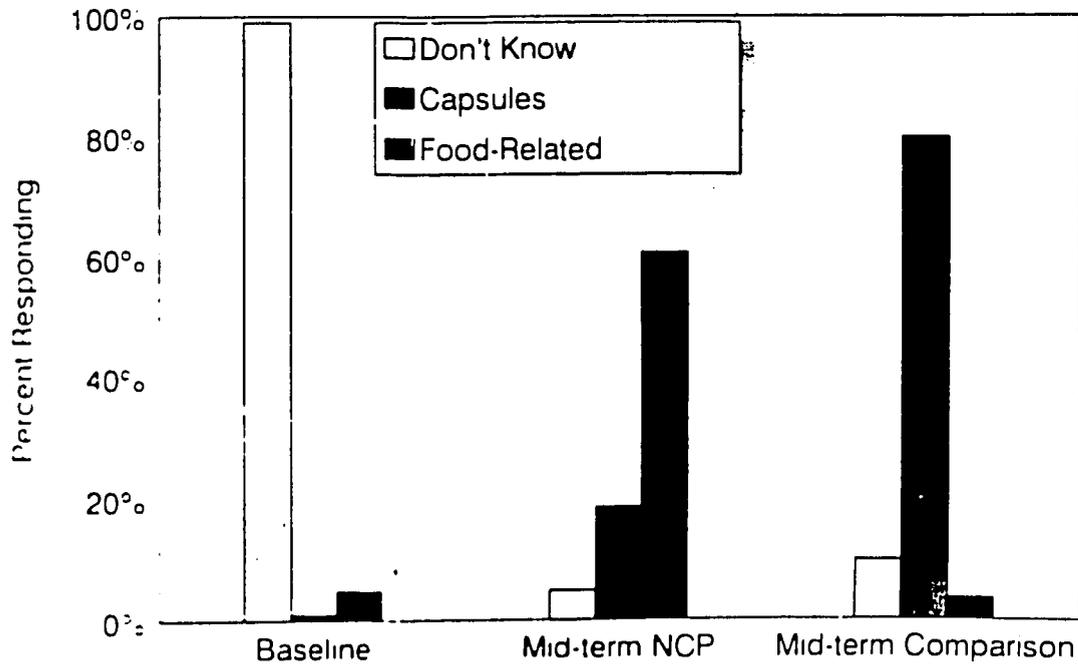
An important educational focus of NCP is that carrots, dark green leafy vegetables and certain animal-source foods can prevent and cure night blindness, a symptom long recognized by rural Malians. At the baseline and mid-term... an illustration and a series of hypothetical questions were used to assess the ability of respondents to differentiate foods by their nutritional value, and to state their intention to purchase a vitamin A-rich food under a specific circumstance. Respondents were shown an illustration of a man and his son at the market in front of a table where both macaroni and carrots are sold. The respondents are informed that the child in the illustration has asked for macaroni, and asked which the father in the picture should choose for the child -- macaroni or carrots, and why.

The percentage of adults choosing the carrots remained the same between the baseline and mid-term at the NCP trial site, while it decreased from a previously higher point in the comparison villages. In the trial sites, it is likely that the NCP program picked-up where DAZA left off in promoting the idea of buying carrots thus maintaining fathers interest in the idea. In the comparison sites, without this repeated stimulus, the idea fell off rapidly.

6. *Linkage of carrot consumption to preventing Night Blindness*

In addition, while adults in both sites know something about the nutritional value of carrots, more NCP trial participants than comparison villagers chose carrots because they are "good for health" or "contain vitamins" (See Table V). Using a different illustration, parents were asked what causes "night blindness," and how it can be either prevented or cured. Keeping in mind that UNICEF was distributing vitamin A capsules in the region, there is a fascinating difference in how this question was answered by women in the NCP trial villages compared to the non-trial villages. The data appear in Table V, and are graphed below.

Figure 9 Knowledge of Treatment for Night Blindness



While the Macina Child Health project, UNICEF and others had promoted obtaining vitamin A capsules from health posts somewhat effectively in the area, **women in the NCP trial villages were significantly more prepared (than comparison villagers) to do something about the problem themselves with foods they had available to them.** This finding was extremely significant ($p < .000$), and as will be shown below, this indicator of "preparedness" is one of the few to be significantly associated with improved nutritional status.

Conclusions - Changes in KAP

To conclude this section, while the phenomena are somewhat harder to measure, and the strength of the relationships is somewhat weaker than for nutritional status, a positive outcome has been found for research question 2:

Pregnant women, and parents of children less than three years of age, living in villages with NCP interventions, have better nutrition knowledge and behavior scores following two years of NCP program implementation than:

- a. pregnant women and parents of children of the same age range residing in NCP trial villages prior to the start of the program, and;
- b. pregnant women and parents of children of the same age range residing in comparison villages, not receiving NCP interventions.

Are there any linkages between these improvements in nutrition knowledge, attitude and behavior with improvements in children's nutritional status: or are these changes due to chance and confounding variables? This is explored in the next section.

F. Associations of KAP and Nutritional Status

Variables used in this section Children's mean and median weight-for-age Z-scores, infant feeding variables described above

Association of mean weight-for-age Z score and other variables

At the baseline, when an even larger sample was analyzed, no scaled or continuously quantified variable was found to be associated, either positively or negatively, with mean children's Z-scores for either weight or height. The same condition pertains at the mid-term. This is due largely to small sample size and the clumping of children towards the small end of the reference distribution.

Categorical variables: Good v. Bad Nutritional Status

As was done for the baseline analysis, an additional categorical variable was created that regrouped the sampled children according to their distribution around an anthropometric index. The mathematical median divides the entire sample in half. As Child Survival projects primarily collect and report weight-for-age, this variable was selected for this analysis. Children who were **at or above** the group's median Z-score for weight/age were classified as having *relatively* "good" nutritional status as compared to those **below** the sample median, who were classified as having *relatively* "bad" nutritional status. In addition to the continuous Z-score variables, this categorical variable (Good/Bad weight-age) was also examined as in relation to other variables (see figure 1 for distribution of scores around median). This method enables us to examine the potential influence of a number of program and confounding variables in a statistically more powerful manner than using the mean Z score alone. Using this indicator, the likelihood of having either "good" or "bad" nutritional status is significantly associated with residence in either an NCP trial or comparison village:

Table VII Children's Nutritional Status as "Bad" or Good" by Site

	Bad	Good	Row
NCP Trial	22	35	57 49.6
Comparison	36	22	58 50.4
Column	58 50.4	57 49.6	115 100.0

Chi square. Pearson's R = 6.33. Significance= 0.01

Odds ratios

For children living in NCP trial villages, the odds of having better nutritional status, (being above the sample's median for weight-age) are 2.63 times the odds of children living in comparison villages. Similarly, children in NCP trial villages have well under half the likelihood (OR=.38) of having poor nutritional status as the children in comparison villages.

Do the feeding behavior and knowledge variables account for this effect, or are confounding factors responsible?

Feeding Behaviors and Nutritional Status

The feeding behavior variables were similarly grouped into those responses constituting the "right answer" and those constituting the "wrong answer." These categorical variables are the ones reported in Table V and used in the analyses above to examine whether persons in NCP trial villages were more likely to give the "right answer" than those in comparison villages. Using the grouped anthropometric data above, the present analysis looks at whether children who were in the "good" category were more likely to have parents who gave the "right" response, and vice versa; and, again, whether these children were more likely to be in NCP trial or comparison villages at the time of the mid-term.

While the improvements in NCP trial villages in infant feeding knowledge and attitude change are certainly important. Only two variables emerge as significantly associated with a child being in the category of having better nutritional status. These are:

Method of feeding a sick child	Mothers who say the way to encourage a sick child to eat is to either "give foods little-by-little" or "give foods the child likes to eat" are significantly more likely ($p < .005$) to have a child with relatively good nutritional status.
Knowledge of how to cure night blindness	Mothers who say that night blindness can be cured by "feeding the child liver, feeding the child carrots or green leafy vegetables or by getting a special capsule" are significantly more likely ($p < .05$) to have a child with relatively good nutritional status.

At the significance level accepted for the study (p less than or equal to .05), no other knowledge or reported behavior variables were associated with likelihood of having better nutritional status. As indicated previously, mothers were significantly more likely to give these positive answers in NCP trial villages than in comparisons.

G. Non Program (Confounding) variables

The behavior, knowledge and attitude variables are the only ones associated with a positive change in nutritional status. No confounding variable (education, food security, age of parents, number of wives, number of children, use of contraceptives, etc.) was associated with nutritional status, with one remarkable exception. A proxy measure of wealth, an index of household possessions, demonstrates an inverse relationship between acquisition of wealth in the form of livestock, material goods and nutritional status. This finding suggests that initial improvements in household wealth are not associated with improvements in nutritional status,

and that improvements in nutritional status can be obtained with educational inputs alone, among the poorest households.

1. Food Security

Men were interviewed concerning how long their stores of grain lasted during the year. At the baseline there was no significant difference in food security in trial and comparison villages during the baseline survey. Forty-three percent of the Macina sample reported grain duration under 12 months, which dropped to 31% at the mid-term. While farming conditions in the region improved generally between the baseline and the mid-term survey, differences between mean reported grain duration between NCP trial and comparison villages are not statistically significant at either the baseline or the mid-point²⁰.

Table VIII Food Security: Mean Reported Months of Grain Duration

NCP Trial Site		Comparison Site	
Baseline	Mid-term	Baseline	Mid-term
10.95	11.02	11.67	14.37
N=46	N=39	N=58	N=47

2. Household Possession/Wealth Index

Men were asked whether they possessed specific items known to exist in the community, that seemed to be distributed according to relative "wealth." The list was based on one developed by Dr. Michael Chapko, a sociologist at the University of Wisconsin, as part of his evaluation work for Africare in Niger (1989). The list had been tested in this context, pre-tested in Mali, and used during the Mali baseline survey. A "point value" of 1-3 was assigned to each item based on its local cost. Because not all villages from the baseline were included in the Mid-term assessment, a number of variables that were more randomly distributed at baseline now appear unevenly distributed in the sample at Mid-term. There appears to be a significant difference in acquisition of household possessions between NCP trial and comparison villages, with more men in NCP trial villages possessing "donkeys," "carts," "working radios" and the like. The distribution of possessions in the sample is shown in Table IX below. (Numbers in parentheses indicate point value assigned to item.)

²⁰ Although mean grain duration in the comparison sites is 14.4 months compared to mean duration of 11.67 months in the NCP trial sites, the F (significance) value is .81. Therefore, this difference is likely due to chance, and should be disregarded

Table IX Household possessions in NCP Trial and Comparison villages Baseline and Mid-Term

Household Item and "point value"	NCP Trial Villages			Comparison Villages			Trial/Non-Trial
	Base	Mid	Time Signif.	Base	Mid	Time Signif.	Signif @ Mid
Donkey (2)	55%	62%	NS	9%	26%	.05	.001
Cart (2)	70%	69%	NS	52%	46%	NS	.05
Motor bike (3)	16%	18%	NS	2%	4%	NS	.05
Working Watch (1)	32%	56%	.05	16%	24%	NS	.05
Working Radio (1)	47%	64%	NS	31%	24%	NS	.001
Bicycle (2)	43%	49%	NS	17%	15%	NS	.001
Goat (1)	72%	62%	NS	55%	57%	NS	NS
Sheep (1)	72%	68%	NS	29%	57%	.005	NS
Cow (2)	83%	77%	NS	81%	76%	NS	NS
Horse (3)	11%	15%	NS	3%	17%	.05	NS

The first analysis performed used the summary variable, "Household wealth index." The household wealth index ranged from 0 points (no items) to 25 points (all items). Using the mid-term sample only, the mean household wealth score was significantly higher ($p=.05$) in the NCP trial sites at both the baseline and the mid-term²¹, than the comparison sites, although these scores remain stable over time. The mean score for the NCP trial villages was 8.06 at baseline and 8.74 at the mid-term; for the comparison sites the mean score was 4.67 at baseline and 5.55 at the mid-term. This is the same information as that presented above (possession of donkeys, carts, radios, etc.) converted to one numeric variable for further analysis. Did this difference in "relative wealth" account for differences in nutritional status?

3. Impact of Wealth on Nutritional Status

A series of multivariate analyses was conducted to test the association of possessing these items, which, together with grain duration, is used as a proxy for wealth, on nutritional status. Those possessions that were most significantly different between trial and comparison villages

²¹ At the baseline, the larger sample of Trial and Comparison sites did not show this difference.

were grouped together into three categorical variables for further analysis. Keeping in mind the extreme poverty of the area, these were:

- "Rich" There were no cars at either the baseline or the mid-term. Men who possessed either a bicycle, or a horse or a motor bike were classified as "relatively rich" compared to the others.
- "Modern" Men who possessed either a radio or a watch were distinguished from the others for analysis.
- "Rich/Mod" Men who possessed both an item listed in the "rich" category and an item from "modern" were distinguished from the others for analysis.

First, mean weight-for-age Z scores were compared against these categories, with the following results:

Table X Mean weight-for-age Z score

Wealth Category	Yes	No	Significance
Rich (bike, motorbike, or horse)	-1.55 N=29	-1.48 N=92	NS (.82)
Modern (radio or watch)	-1.77 N=34	-1.43 N=87	NS (.26)
Rich & Modern (1 or more of each above)	-1.67 N=17	-1.47 N=104	NS (.62)

While the children whose fathers possess these items appear marginally worse off, these differences are *not* significant. When the categorical variable of good/bad nutritional status was analyzed against these categories, there were similarly no significant differences.

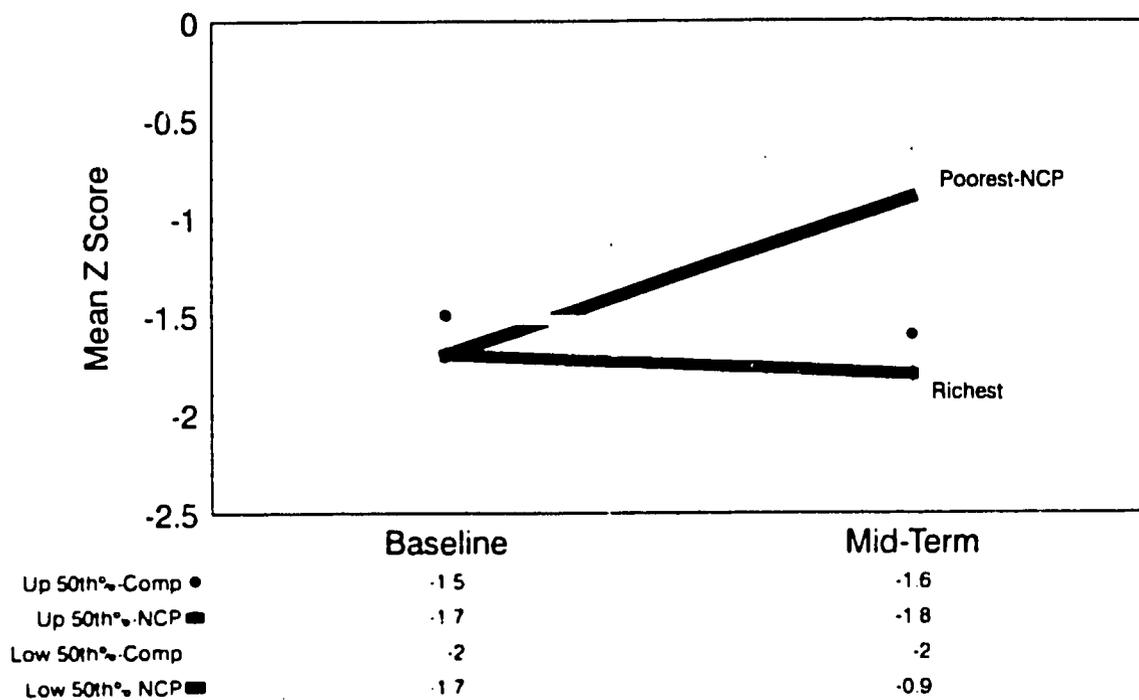
A regression of children's mean weight-for-age Z-scores was analyzed against the continuous wealth index variable and against months of grain duration. **There variables did not correlate in any way.**

Splitting households into those from the upper 50th percentile of the wealth index and those from the lower 50th percentile produced an unexpected finding. **All positive changes in nutritional status occurred among children whose fathers were in the lower 50th percentile for wealth as measured by the household index.**

Figure 10 below presents the weight-for-age scores for children from lower and upper wealth brackets, by site, at the baseline and mid-term. The WAZ scores of the NCP trial children in the lower wealth bracket are dramatically improved between the baseline and mid-term. Children from the higher wealth category showed no improvement over baseline status.

Figure 10 Changes in Weight-for-Age by Wealth Bracket and Site

Children from HIGHER and LOWER wealth categories



The data suggest that the entire area experienced an improvement in socioeconomic status during the two year period covered by the study, as evidenced by purchases of livestock, by acquisition of additional wives, and purchase of household items. More men in NCP trial villages converted these gains into household items than in comparison villages. An equal number in either NCP trial or comparison villages expanded their families, by adding wives or children

Improvements in nutritional status appear to be unrelated to improved wealth, and occur significantly only in those villages that received specific nutrition counseling. Furthermore, within these villages, improvements in nutritional status occurred among children at the lower 50th percentile for wealth. This somewhat remarkable finding will be examined in the final evaluation in a larger sample before more is said about its possible implication.

In addition to the data on wealth and food security, no other variables (e.g. age of parents, use of contraceptives (fewer than 3% of the sample claimed to use a modern contraceptive), number of wives, birth interval or number of children appeared to be associated in any significant way with the outcome variables.

H. Final Conclusions

There is sufficient evidence to suggest that at the mid-term:

Mothers with better nutrition knowledge have children with better nutritional status.

Mothers with better nutrition practices have children with better nutritional status.

And,

There were more mothers with better nutrition knowledge and practices, and children with better nutritional status, living in NCP trial villages---than in:

Comparison villages at the time of the mid-term survey

and,

in NCP trial villages prior to the intervention.

While the evaluation was limited in time and scope, this careful analysis indicates that CARE Mali and the Macina Child Health Project succeeded in improving nutritional status significantly in the villages where NCP approaches and materials were used, that comparison villages are not similarly affected, and that confounding factors do not account for these differences. The CARE *monitrices* must be praised for their efforts in improving the lives of women and children in Macina -- and for pioneering what seems to be a truly effective community based nutrition communication effort in Africa.

Appendix A

The NCP Intervention in Macina, 1990-1993

NCP Rural Communications Strategy

NCP's strategy is based on ethnographic research conducted by a team of MOH communications and nutrition staff as well as CARE health workers led by an NCP consulting anthropologist in 1989.²² With NCP's assistance, a larger group, including additional PVO and MOH staff, interpreted the research and prepared a multi-audience communication strategy in June 1990. The formative research and the strategy development workshop have been reported previously.

NCP "Intervention" 1991-1993

I. Overall Strategic Framework

- **Work in Villages with Established Commitment to Health or Social Improvement:** Nutrition messages are promoted in areas where other health or social interventions such as immunization, oral rehydration therapy, or water and sanitation projects exist. Such improvements helped to establish motivation and self determination, two necessary elements for committing to nutrition behavior change.
- **Develop Different Approaches for Men and Women according to Higher and Lower levels of Socioeconomic Autonomy:** There were women in nearly every village with at least some control over resources - garden products, small commerce, milk sales, village technologies, etc. These women could be influenced to directly acquire appropriate foods for themselves and for their children, with encouragement and direction to what these foods were. NCP decided that in order to help women make independent dietary decisions, they must be made aware of their purchasing or bartering power. However, since in most families men control resources, they too must be encouraged to increase their financial contribution to maternal and child nutrition and must be persuaded to purchase more nutritious foods directly for their family.

Determine a Culturally Appropriate Avenue for Nutrition Behavior Change: Since the research revealed that rural Malian families perceive children's nutritional needs and rights to eat as far inferior to those of adults, the team determined that the intervention must increase the community's awareness of children's dietary needs, while leaving the more socially defined concept of children's rights alone.

²²See Dettwyler, K. and Fishman, C. 1989 Communication for Vitamin A, Report of Qualitative Research.

- **Use Adult Night Blindness as a Bio-Feedback Hook for Establishing the usually subtle link between Diet and Health:** Night blindness (which results from a dietary deficiency of vitamin A) was a wide- spread and well recognized condition thought to occur "naturally" in pregnancy. Given that the target audience was aware of night blindness as a "symptom" and knew that it could be "cured," NCP chose to use night blindness to help the target audience make the connection between dietary intake (eating enough red-orange or green leafy vegetables, liver, etc.) and good health (the condition improves when the right foods are consumed).
- **Find Appropriate Motivational Appeals for Men and Women:** The researchers learned that economic and social incentives for investing in women's and children's nutrition may work for both men and women. Men may be persuaded to purchase more nutritious foods if they cost less than the more "socially-esteemed" foods. Women seem to enjoy the independence that comes with purchasing or bartering for food themselves, and admire other women who demonstrate self-sufficiency. The NCP team realized, however, that different approaches were necessary - men could be motivated by parental pride, for example, while women were more motivated by their children's health. Both of these motivational appeals were included in the strategy.

The NCP/MOH/PVO consortium used this information to determine our selection of additional PVO partners, the way that we work with our partners, themes and messages, choice of media, and counseling strategies.

II. Behavioral Themes

During the period under investigation (1991-1993) NCP emphasized the following nutritional themes during training workshops for its counseling program. All messages were subsequently summarized in the *Healthy Communities Manual, Volume I* and distributed to NGO partners in December 1993.

A. **Three Actions to Protect the Health of the Whole Family**

Families should:

1. Make green leaf sauces frequently²
2. Add bright orange or yellow vegetables to the sauce, such as pumpkin or yellow squash.
3. Women and children should eat cooked liver once a week. Each person needs a piece

²Quantified portions were suggested during training and in materials developed subsequent to 1992.

about the size of the end of their biggest finger. This is the best "medicine" a father can buy for his family to prevent tired blood and blindness.

B. Three Actions to Improve Women's Nutrition during Pregnancy and while Breastfeeding

A Pregnant or Breastfeeding women should:

1. Improve the quality of her diet. Eat normal servings of *tô* and sauce, but in addition:
 - Drink a calabash of milk every day, if possible.
 - Eat peanuts whenever she feels hungry.
 - Try to eat one fresh fruit of what's in season. This could be a fresh mango, half a papaya or other available fruit.
2. Discontinue strenuous tasks, such as carrying wood or water. Find someone else who can do this for her at least three months before she expects the baby to be born.
3. Eat a brochette with three small pieces of liver once every two weeks. Ask her husband to buy this for her or buy it herself.

C. Ten Actions to Improve Infant and Child Nutrition

1. Mothers should feed the infant only breast milk during the first 4-6 months.
2. By the sixth month, feed the baby porridge made with millet & cowpea flour to which pounded peanuts, oil and sugar are added.
3. When the baby is about eight months old, begin feeding food prepared for the rest of the family. Mash the vegetables, fish or meat well in the sauce and feed this to him. Use a little piece of *tô* as a "spoon" to feed the baby. Let him lick the sauce off of the *tô* first. Then let him eat the *tô* if he is still hungry.
4. Always feed the baby from a clean, separate bowl.
5. Feed the baby (after 6 months) at least four times a day, at meals and in-between.
6. Supervise young children when they eat. Watch to see if the children finish their portions and give them more if they are still hungry. When giving *tô* or rice, make sure to also give a small calabash half full of vegetables, fish or meat sauce.

7. **Breast-feed the child for at least two years.**
8. **Use patience and continue trying to feed a sick child. Instead of making a sick or recovering child eat normal food, try to tempt him to eat by giving him a mashed banana or any available ripe, sweet fruit.**
9. **Children who have diarrhea must be given plenty to drink. If they are breastfeeding, breast-feed the child more. Give oral rehydration solution to children who have diarrhea for more than one day. See a health worker if the diarrhea continues.**
10. **A child who can not see well once the sun starts to go down needs to eat more red and orange fruits and vegetables, or dark green leafy sauce. If possible give him 3 small pieces of liver at least once a week until he can see well at night.**

In the support materials (*The Nutrition of Awa and Awa Finds the Solution*), CARE Monitrices received the following messages:

Mothers

- As soon as you know you are pregnant, go to the health center for a pre-natal consultation.
- Rest during your pregnancy. During the last trimester, avoid hard work such as carrying water or wood. Find someone to help you.
- If you are pregnant or breastfeeding, be sure to maintain a varied diet to remain in good health. Eat fruits, peanuts and fish and drink a calabasse of milk if possible at least four times a day.
- Night blindness is an illness which can become worse. If you or your children do not see well at night, eat more foods such as liver, eggs, dairy products, green leafy vegetables and fruits.

Fathers

- Keep a quarter of your harvest and the fruits and vegetables from your garden for your family's consumption. These foods are good for their health. This will also decrease your medical expenses.
- Buy 25 francs of liver for your wife and children each week. Liver will protect your family against illnesses.
- Buy fruits, vegetables and fish regularly to add to the sauces that your wife prepares for meals.

- Buy your children snacks, such as grilled liver, mangoes and carrots. They are healthy for your children.

Parents

- If your child is sick, take him to the health center right away. Follow the health agent's advice.
- Consult regularly about your family's health.

III. NCP's Approach to Interpersonal Counseling

NCP developed a Five Step Approach for nutrition-related assessment and counseling, as follows:

1. The agent *evaluates* the problem by talking and *listening* to the mother, as well as using her observational skills, to gain an understanding of the situation.
2. The agent reflects on her own training and works with the mother to *establish priorities*:
 - a) what problem demands immediate attention?
 - b) what can be discussed during follow-up visits with the same mother?
 - c) what can be discussed in a larger setting with the entire community, or its health committee?
3. The agent suggests a *short-term solution for the immediate problem* only, and discusses its feasibility with the mother. The agent demonstrates the behavior involved (e.g. mashing bananas, feeding a child with a spoon or finger).
4. The agent asks the *mother to state what she will do about the problem* over the next week. The agent praises the mother for trying to do the new behavior and says she will come back soon to see how she and the child are doing.
5. The agent *makes notes* concerning follow-up and community sensitization: When should the agent check back with the mother; Is this a problem that could be brought to the attention of the village health committee; is this a topic for group demonstration, health chat or role play activity?

Appendix B
Mid-Term Questionnaire

BEST AVAILABLE DOCUMENT

QUESTIONNAIRE POUR LES FEMMES

Site _____ Village _____ Quest. No. _____

Enquêteur _____ (Voir liste ci-joint)

1. Etat _____
- 1 = enceinte
 - 2 = avec enfant moins de 6 mois
 - 3 = avec enfant 6 - 12 mois
 - 4 = avec enfant 12 - 36 mois

2. Depuis combien de temps habitez-vous d'une manière continue à (nom du village)? _____
- Toujours = 77
 - Longtemps = 88
 - Ne sait pas = 99

3. Combien êtes-vous à manger ensemble à chaque repas?

Nombre d'adultes qui mangent _____ Nombre d'enfants qui mangent _____

4. Combien de femmes a votre mari? _____
Quel est votre rang? _____

5. Quel âge avez-vous? _____ (nsp = 99)

6. A quel âge avez-vous eu votre premier enfant? _____ (nsp = 99)

7. Combien d'enfants avez-vous? _____

8. Utilisez-vous une méthode pour faire la planification des naissances? _____

9. Si oui, laquelle? _____
- 1 = pilule 2 = stérilet
 - 3 = préservatif 4 = injections
 - 5 = méthodes traditionnelles

10. Qui vous a aidé lors de la naissance de votre plus jeune enfant? _____
- 1 = accoucheuse traditionnelle
 - 2 = hôpital/sage femme/matronne/infirmière
 - 3 = mère/sœur/tante
 - 4 = seule 5 = autres

11. Quelle a été la 1ère substance que vous avez offert à votre enfant? _____
- 1 = lait maternel 2 = l'eau sucré
 - 3 = infusion 4 = jus de fruit
 - 5 = l'eau chaude/bouillie 6 = l'eau
 - 7 = beurre 8 = autres

12. Est-ce qu'il continué a téter? _____ Oui, continuez avec 13
Non, sautez à 16
13. Si oui, à quel âge envisagez-vous de le sevrer? _____, si non sautez à la question 16
14. Qui décide du changement d'alimentation de l'enfant? _____
1 = moi-même 2 = l'accoucheuse
3 = mon mari 4 = sa grand-mère/
tante 5 = l'enfant 6 = autres
15. Pour quelle raison envisagez-vous le sevrage?
1 = limite d'âge 2 = grossesse
3 = l'enfant ne mange pas bien
4 = mère malade 5 = insuffisance
du lait maternel 6 = autres
16. Si non, à quel âge l'avez-vous sevré? _____
17. Qui a décidé du changement d'alimentation de l'enfant? _____
1 = moi-même 2 = l'accoucheuse
3 = mon mari 4 = sa grand-mère/tante
5 = l'enfant 6 = autres
18. Pour quelle raison l'avez-vous sevré?
1 = limite d'âge 2 = grossesse
3 = l'enfant ne mange pas bien
4 = mère malade 5 = insuffisance
du lait maternel 6 = autres
19. A partir de quand avez-vous donné d'autres aliments à votre enfant?
(âge en mois. Naissance = 00, nsp = 99)
- | | | | |
|--------------|-------|---------|-------|
| Eau | _____ | Riz | _____ |
| Bouillie | _____ | Mil | _____ |
| Jus de fruit | _____ | Poisson | _____ |
| Fruit | _____ | Viande | _____ |
20. Traitez-vous l'eau de boisson et de quelle manière? _____
1 = non, rien
2 = filtrer/faire passer de tissu
3 = bouillie 4 = javel 5 = autres
21. Combien de fois avez-vous mangé hier? _____
22. Quel était le repas principal? _____
1 = petit déjeuner/matin
2 = déjeuner/midi 3 = diner/soir 4 = toh 5 = riz 6 = autres

POUR TOUTES LES FEMMES ET LES ENFANTS DE PLUS DE 6 MOIS

23 et 24. Premièrement, décrivez ce que vous avez mangé toute la journée.

Maintenant, parlons de votre enfant. Qu'a t-il mangé toute la journée?

Votre enfant, combien de fois a-t-il mangé, aujourd'hui? _____

	Mil	Riz	Sauce	Poisson	Viande	Pâte d'arachides	Légumes	Feuilles	Lait/Lait caillé	Oeufs	Bouillie simple	Autres
REPAS 1 Mère	1											
Enfant												
REPAS 2 Mère												
Enfant												
REPAS 3 Mère												
Enfant												
REPAS 4 Mère												
Enfant												

(SEULEMENT POUR LES ENFANTS PLUS DE 6 MOIS)

26. Avec qui l'enfant a-t-il mangé à chaque repas?

	<i>seule</i> seule = 1	mère = 2	<i>ou</i> aîné = 3	père = 4	autres adultes = 5	autres enfants = 6
Au repas 1						
Au repas 2						
Au repas 3						
Au repas 4						
Au repas 5						

27. Avez-vous jamais écouté un message sur l'alimentation? _____

1 = oui 2 = non
0 = plusieurs

28. Comment ce message était-il transmis

1 = agent de santé 2 = radio
3 = télé 4 = affiche
5 = responsable UNFM
6 = voisin 7 = autres

29. Quel était le message principal? _____

0 = pas de réponse 99 = nsp

01 = bouillie enrichie 02 = SSS/Keneyaji 03 = Sachet Keneyaji
04 = 3 groupes d'aliments 05 = Nivaquine 06 = vaccination
07 = allaitement 08 = comment manger pendant la grossesse
09 = autres (à remplir)

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QUESTIONNAIRE POUR LES HOMMES

Site Macina Village Quest. No.

Enquêteur

1. Nom de l'enfant (dans l'étude) Age

2. Nom du père Age

Nom de la mère Age

3. Mari de la femme: 1 = enceinte
 2 = avec enfant moins de 6 mois
 3 = avec enfant 6 - 12 mois
 4 = avec enfant 12 - 36 mois

4. Depuis combien de temps habitez-vous d'une manière continue à (nom du village)?

Ans 01 - XX Toujours = 77 Longtemps = 88 Ne sait pas = 99

5. Combien êtes-vous à manger ensemble à chaque repas?

Nombre d'adultes qui mangent Nombre d'enfants qui mangent

6. Combien de femmes avez-vous?

7. Combien d'enfants avez-vous?

8. Utilisez-vous une méthode pour faire planification des naissances?

Si oui, laquelle? : 1 = pilule 2 = stérilet 3 = préservatif 4 = injections

9. Qui décide du changement d'alimentation de l'enfant?
1 = moi-même 2 = l'accoucheuse
3 = mon mari 4 = sa grand-mère/tante
5 = l'enfant 6 = autres

10. Pour quelle raison envisagez-vous le sevrage?
1 = limite d'âge 2 = grossesse
3 = l'enfant ne mange pas bien
4 = mère malade 5 = insuffisance du lait maternel 6 = autres

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11. A partir de quand est-ce qu'on a donné d'autres aliments à votre enfant?
(âge en mois. Naissance = 00, nsp = 99)

Eau _____
Bouillie _____
Jus de fruit _____
Fruit _____

Riz _____
Mil _____
Poisson _____
Viande _____

12. Traitez-vous l'eau de boisson
et de quelle manière? _____

1 = non, rien
2 = filtrer/faire passer de tissu
3 = bouillie 4 = javel 5 = autres
5 = méthodes traditionnelles

13. Possédez-vous les objets suivants:

- | | | |
|-----------------------------|----------------------------|------------------|
| 1. O/N Boutique | 2. O/N Ane | 3. O/N Charrette |
| 4. O/N Moto | 5. O/N Voiture | 6. O/N Table |
| 7. O/N Montre
qui marche | 8. O/N Radio
qui marche | 9. O/N Moulin |
| 10. O/N Vélo | 11. O/N Chèvres | 12. O/N Moutons |
| 13. O/N Vaches | 14. O/N Cheval | |

14. Quelle est votre activité principale?

- | | | |
|-----------------|------------|---------------------------|
| 1 cultivateur | 2 éleveur | 3 commerçant |
| 4 manoeuvre | 5 forgeron | 6 fonctionnaire |
| 7 marabout | 8 chômeur | 9 pêcheur |
| 10 détaillant | 11 exode | 12 hygiéniste/ secouriste |
| 13 autres _____ | | |

15. Combien de mois est-ce que votre grain vous a duré? _____

16. Avez-vous jamais écouté un message
sur l'alimentation? _____

1 = oui 2 = non
3 = plusieurs

17. Ce message était-il transmis
par quel moyen? _____

1 = agent de santé 2 = radio 3 = télé
4 = affiche 5 = responsable UNFM 6 = voisin 7 = autre

18. Quel était le message principal? _____

00 = pas de réponse 99 = nsp

01 = bouillie enrichie 02 = SSS/Keneyaji 03 = Sachet Keneyaji

04 = 3 groupes d'aliments 05 = Nivaquine 06 = vaccination

07 = allaitement 08 = comment manger pendant la grossesse

09 = autres (à remplir)

QUESTIONNAIRES HOMMES ET FEMMES SUR LES IMAGES

1. Cette maman est en train d'allaiter son bébé au sein.

A. Jusqu'à quel âge un bébé doit-il téter le sein? _____ mois

B. En plus du lait maternel, est-ce qu'un nouveau né (moins de 2 sems.) doit manger ou boire autre chose? (1) oui (2) non

C. Si oui, à préciser: (1) l'eau simple (2) l'eau bouillie
(3) jus de citron/fruit (4) lait frais (5) beurre/beurre de karité (6) infusions (7) médicaments traditionnels (8) médicaments modernes (9) autres _____

2. Cette maman est en train de forcer son enfant à manger.

A. Pourquoi agit-elle ainsi? (1) ne sait pas (2) l'enfant est malade (3) elle n'a pas du lait/pas assez du lait (4) elle veut sevrer l'enfant (5) l'enfant refuse/n'aime pas des aliments

B. Pensez-vous que se soit une bonne chose que d'agir de cette façon? (1) ne sait pas (2) s'il nécessité (3) oui (4) non

Pourquoi: (1) si l'enfant n'a pas de l'appétit il ne faut pas le forcer (2) il faut alimenter l'enfant quand il veut (3) si elle ne fait pas ainsi, l'enfant maigrira (4) ça lui donne de la force

C. Si l'enfant est malade, doit-on l'obliger à manger (1) oui (2) non

D. Y a-t-il une meilleure façon? (1) ne sait pas (2) non (3) on doit l'encourager (4) donner petit à petit (5) donner les aliment qu'il aime bien (6) donner des médicaments pour lui donner de l'appétit (7) autres _____

3. Nous sommes au marché. La femme de gauche vend des carottes et des légumes verts tandis que celle de droite vend des macaroni. L'homme d'en face voudrait payer quelque chose pour son enfant. L'enfant réclame des macaroni.

A. D'après vous que doit-il payer pour son enfant? (1) macaroni (2) carottes/légumes.

Pourquoi macaroni: (1) ne sait pas (2) il doit payer ce que l'enfant réclame/veut (3) le macaroni rassasie (4) macaroni est moins cher
32.69 MP ff
13.27 ff

Pourquoi carottes: (1) ne sait pas (2) le macaroni est exposé/sale - plat ouvert/ les carottes sont bien protégés/facile à nettoyer (3) les carottes sont bons pour la santé/bons aliments/médicaments (4) les carottes ont des vitamines (5) autres _____
-6% *2370 Midpoint ff*
12.59

B. Quelle est la différence entre les macaroni/carottes dans le sens de l'apport au corps.

Lequel est plus important? (1) ne sait pas (2) aucune différence (3) chacun jeu son rôle (4) macaroni est plus important/bien (4) carotte est plus important/bien

4. A. Remarquez-vous quelque chose de spécial chez cet enfant?

(1) ne voit rien de spécial (2) ne sait pas (3) autres (4) marasme (sere) (5) maigre (6) ventre ballonné/gonflé (7) maman a tombé en état prématuré/mauvais sevrage S'IL DIT 1, 2 OU 3 SAUTEZ A 5)

B. Quelle est la cause de cette maladie? (1) ne sait pas (2) Dieu (3) ne mange pas assez (5) ne mange pas assez des aliments riches (6) eau sale (7) tête une femme enceinte (8) l'enfant mange beaucoup (9) la consommation de certains aliments (10) autres

C. Peut-on guérir cette maladie? (1) ne sait pas (2) oui (3) non. Comment (1) aller au dispensaire/médicament moderne (2) médicament trad. (3) alimentation équilibrée (4) meilleurs aliments/plus riches (5) ne pas manger de sel (6) autres

D. Comment nourrissez-vous un tel enfant? (1) n.s.p. (2) aliments riches (à préciser: (3) bouillie (4) poisson/viande/oeufs (5) lait (6) arachides (7) fruits (8) riz/toh/couscous (9) infusions/médecine (10) autres

E. Y a-t-il des aliments qui lui sont interdits? (1) n.s.p. (2) non (3) bouillie (4) poisson/viande/oeufs (5) lait (6) arachides (7) fruits (8) riz/toh/couscous (9) soubala (10) autres

F. Peut-on éviter cette maladie? (1) n.s.p (2) oui (3) non Si oui comment: (1)n.s.p. (2) médicament mod (3) médicament trad. (4) manager bien (5) autres

5. A. Remarquez-vous quelque chose de spécial chez cet enfant?

(1) ne rien voir (2) ne sait pas (3) malade (4) cécité nocturne/surofynyè (5) autres maladie
DITES QUE C'EST LA CECITE NOCTURNE, Connaissez-vous cette maladie?
(1) oui (CONTINUEZ AVEC 5) (2) NON (SAUTEZ A 6)

B. Quelle est la cause de cette maladie? (1) n.s.p. (2) Dieu (3) la saleté (4) la rougeole (5) ne mange pas assez de viande (6) ne mange pas de légumes/fruits (7) soleil (8) pas de médicaments (9) autres

C. Peut-on guérir cette maladie? (1) n.s.p. (2) oui (3) non
Comment? (1) aller au dispensaire/médicament moderne (2) jus de feuilles dans les yeux (3)laver la figure avec infusion (4) donner du foie (5) donner des capsules/médicaments (6) manger des carottes/légumes verts (7) autres

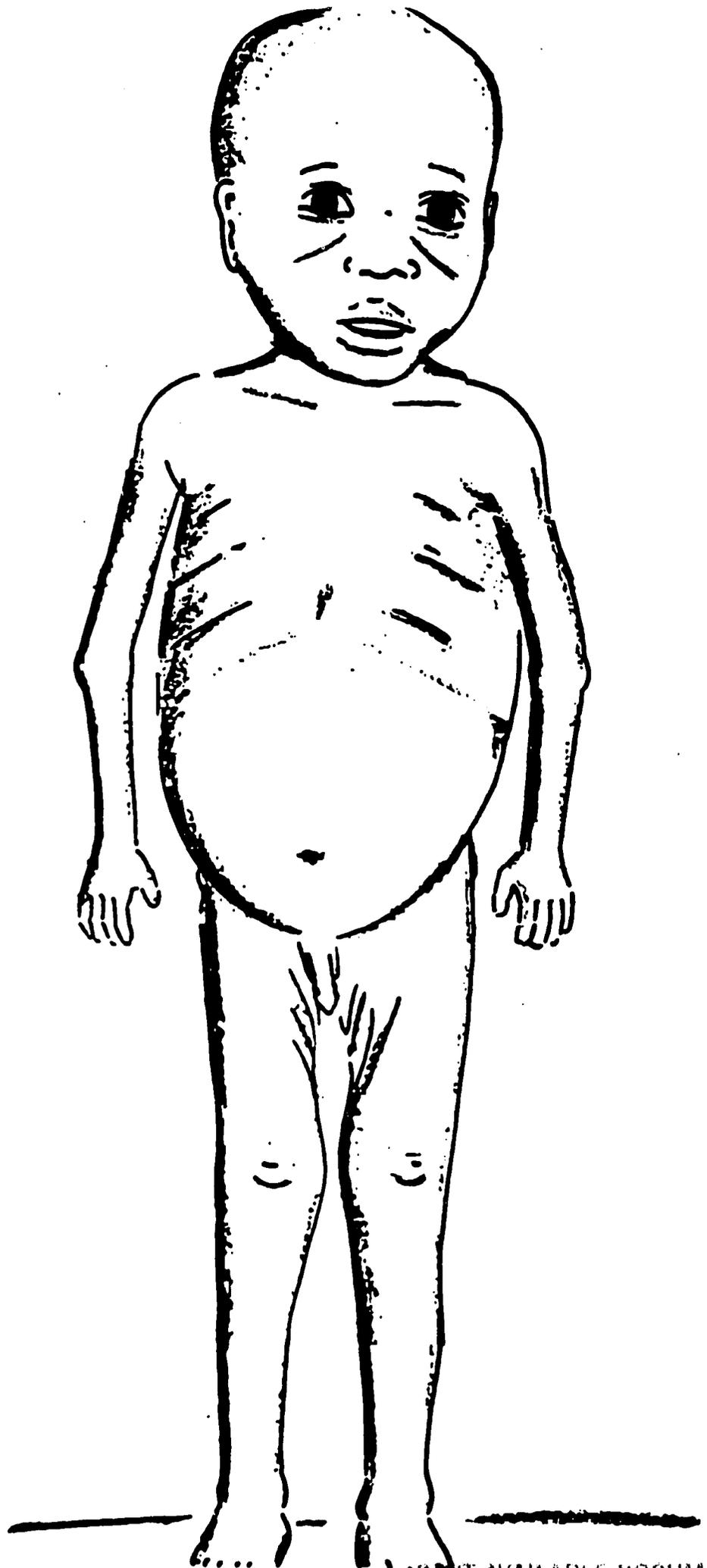
D. Comment nourrissez-vous un tel enfant? (1) n.s.p. (2) aliments riches (à préciser: (3)





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FICHE DE L'ENFANT

Province _____
(1)

Village _____ Questionnaire # _____
(2,3) (4,5)

1. Nom de l'enfant _____
2. Nom de père _____
3. Nom de mère _____
4. Jour de la naissance J _____ J _____ M _____ M _____ A _____ A _____
5. Age en mois _____, _____
6. Nombre de dents _____
7. Poids _____, _____ (kilos)
8. Taille _____, _____ (cm)
9. Circonference brachial _____ (cm) R J V

Appendix C - Tables and analyses - Available upon request (over 100 pages).

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