Republic of Mali

FINAL EVALUATION REPORT

Knowledge, Attitudes, Reported Practices
and
Anthropometric Indicators of Children's Nutritional Status

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NUTRITION COMMUNICATION PROJECT

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ABBREVIATIONS

AED	Academy for Educational Development
A.I.D.	Agency for International Development (U.S.)
ANOVA	Analysis of Variance
CDC	National Centers for Disease Control and Prevention (U. S.)
CNIECS	Centre national d'Information, d'Education et de la Communication pour la santé (National Center for Health Information, Education and Communication)
DHS	Demographic and Health Survey
DSFC	Division de la Santé de la Famille et de la Communauté (Division of Family and Community Health)
EPI	Expanded Program on Immunization
FAO	Food and Agricultural Organization
GOM	Government of Mali
ISH	Institut des Sciences humaines (Institute of Human Sciences)
KAP	Knowledge, Attitudes and Practices (survey)
MSSPA	Ministère de la Santé, de la Solidarité et des Personnes Agées (Ministry of Health, Solidarity and the Elderly)
NCP	Nutrition Communication Project
NCHS	National Center for Health Statistics (U.S.)
NGO	Non-governmental Organization
SPSS/PC	Statistical Package for the Social Sciences, Personal Computer version
TACS	Technical Advisor for Child Survival
WHO	World Health Organization
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

Map of Mali showing Child Survival Project Locations

REPUBLIQUE DU MALI

Echelle 1: 10 000 000

ALGERIE

MAURITANIE

Tombouctou | *Niger*

Gao

SENEGAL

Kayes

Mopti

Niger

Koulikoro

Ségou

Bani

BAMAKO

N I G E

BURKINA-FASO

GUINEE

Sikasso

COTE-
D'IVOIRE
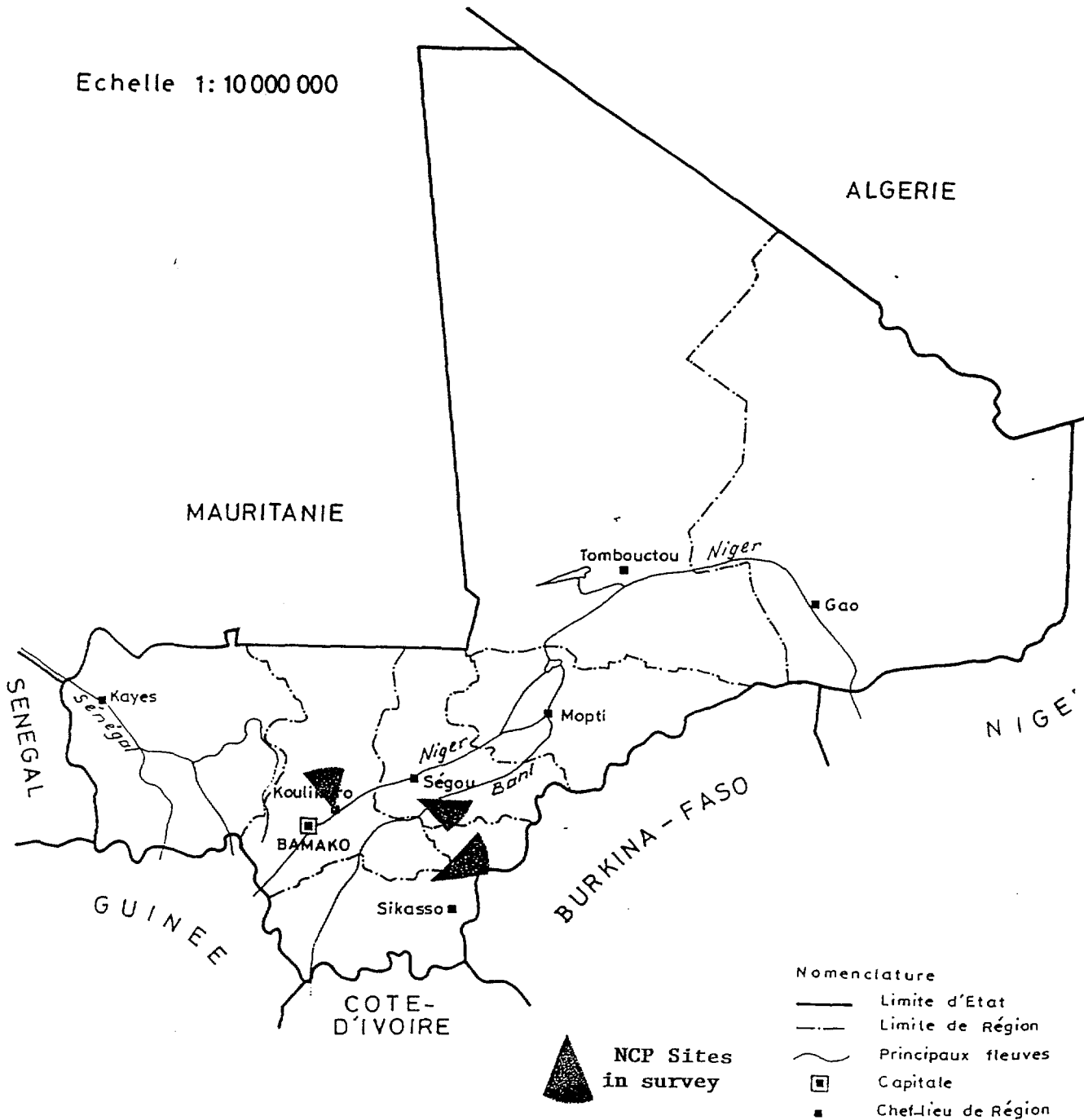
NCP Sites
in survey

Nomenclature

———— Limite d'Etat

—·— Limite de Région

～～ Principaux fleuves

◨ Capitale

▪ Chef-lieu de Région

I. EXECUTIVE SUMMARY

Background

Between October, 1990 and March, 1995, the United States Agency for International Development (USAID) assisted the Government of Mali and 10 non-governmental organizations (NGOs) in mounting a community-based nutrition education program, consisting of health worker and primary school teacher training, as well as broadcast of a radio drama and spots. This cluster of activities was known, and continues as, the "Mali Nutrition Communication Project." The name was derived from the USAID Office of Health and Nutrition's centrally-funded "Nutrition Communication Project" (NCP) managed by the Academy for Educational Development, between 1989 and 1995.

At the project's start, national data indicated that 25% of Mali's children suffered from malnutrition, which contributed to a rural under-5 mortality rate close to 300/1000. Women's diets were poor during pregnancy and nursing, and children's diets were missing critical vitamins and minerals (such as Vitamin A and iron), as well as the energy required to support adequate growth and development. A close examination of dietary practices indicated that mothers delayed feeding most solid foods until children were nearly 1 year old, and knew of few measures to help sick children regain their strength following bouts of diarrhea and illness. At the community level, men were fairly unaware of women's or children's dietary needs, and the "norm" for child feeding was that it did not require much attention.

The NCP communication strategy addressed these knowledge gaps, and attempted to create new community norms. Messages on food selection and feeding skills were largely directed to women, while men were sensitized to women's and children's nutritional needs, and encouraged to purchase specific foods for family consumption, such as green leafy vegetables and liver. NCP developed and provided flip charts, counseling cards, games, and role-play guides to support health worker-led communication activities, as well as motivational buttons, stickers and newsletters for the community agents. Towards the end of the project, regular broadcast of a radio drama began, accompanied by spot announcements of key nutrition and health messages.

The Evaluation

The evaluation component measured outcome indicators relevant to NCP's community-based programs: knowledge, attitudes, reported dietary/feeding practices, children's height and weight. Upon agreeing to participate in the evaluation component of NCP, each NGO selected 8 villages to participate intensively in NCP and child survival activities--these are referred to as NCP Trials-- and 8 villages, matched for socioeconomic and other factors, to act as "comparisons." In the comparison villages, the evaluation design called for all other Child Survival activities[2] to occur, but NCP approaches and materials to be withheld. This research protocol was applied, with varying degrees of fidelity, in 4 NGOs[3] between 1991 and 1995. The primary intervention examined by this evaluation

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[2]E.g. immunization, water hygiene, oral rehydration therapy, safe motherhood, family planning.

[3]Africare/Dioro, 1990-1995; CARE/Macina, 1990-1993; Save the Children/Kolondieba, 1991-1995; World Vision/Koutiala, 1990-1995.

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is the community media strategy, largely in place in most villages before the 4th training (October, 1993), although some villages were exposed to parts of the strategy as early as January, 1991.

The final survey, conducted between December, 1994 and January, 1995, provides the best picture of how well NCP performed in the NGO setting. Analysis of data from this survey contrasts outcome indicators from individuals who recalled NCP materials against those who did not; and compares village level indicators by length of time enrolled in NCP. Villages consistently participating in NCP for more than 1 year (*before the October 1993 training*) are called "High" exposure villages; villages participating for less than one year are called "Intermediate" exposure villages; villages not intentionally exposed to NCP, and where NCP was not systematically applied, are called "Low/No" exposure villages.

Results from the cross-sectional analysis of the final survey data provide strong evidence to suggest that NCP had a marked impact on the nutrition knowledge and behaviors of villagers consistently exposed to the intervention; and that parents who learned information from NCP had children with better height and weight measurements than those who did not. While attempts have been made to control for confounding factors, unless a different design had been applied from the beginning (e.g. measuring food intake; using a longitudinal design; collecting data more frequently, etc.), we can not be totally free of doubt that NCP is the sole reason for this improvement. However, the amount of doubt that remains must be balanced against what can be reasonably controlled when attempting to do fairly participatory research in one of the most difficult regions in the world to improve children's nutrition.

An additional pre-intervention, post-intervention analysis is made for data from the 2 NGOs that participated in both the baseline and final survey[4]. Because of deviations from the original research design (e.g. CARE dropped out; World Vision began applying NCP in all of its Child Survival villages by the 3rd year), and an error made in selecting villages for inclusion in the final survey (the majority of "trial" villages come from World Vision/Koutiala, the majority of "comparison" villages come from Africare/Dioro), the pre-post analysis results, while quite striking, are difficult to defend. However, they are consistent with both the retrospective results, as well as NCP's pre-post evaluation conducted for the CARE/Macina project in 1993. These pre-post data make a case for the *plausibility* that improvements in nutritional status are related to NCP alone and not other time- or regionally-affected factors (such as wealth, food availability, etc.).

Key Results

1. Reach

Where NCP was meant to be seen (Trial/High-Intermediate villages), approximately **50% of the women and 30% of the men** sampled in the 1994 survey *remembered* at least one intervention of five tested. **Among women, 10% could recall two different counseling media, and an additional 6% saw these interventions as well as remembered the radio program.**

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[4]Africare/Dioro, World Vision/Koutiala. CARE/Macina also took part in the baseline survey. For administrative reasons, CARE had to close the Macina Child Survival Project in 1993. A rapid assessment was made at that time, comparing results in 1993 to those collected at the baseline.

Where NCP was not intentionally deployed (Comparison villages), 18% of the women and 6% of the men reported seeing an NCP flip chart or counseling card. As the Child Survival coordinators could attest, NCP materials were well-liked and spread around the region --as did the people. This weakens, but does not entirely nullify, the validity of "exposure categories" used to assess NCP's impact.

2. Purchasing Behavior

NCP was a *better predictor* of whether a man gave money to his wife to purchase food, or brought recommended foods home for his family to eat, than being in the upper 50th percentile of wealth as measured in the survey. For example, men who learned that *"liver can prevent or cure night blindness"* purchased liver, on average 3 times during the 2 month period preceding the survey in contrast to a one time purchase by those who had not learned this concept. Other NCP messages concerning women's and children's need for liver, or the man's role in providing for this need, were also associated with increases in purchasing (1.7 times and 1.5 times, respectively). This combined analysis was significant (p=.000).

While NCP radio spots had only been on the air for a short period, 63% of those who heard the spots purchased meat for their families in the 2 weeks prior to the survey, compared to 47% who had not heard the spots. (Chi sq. P=.003).

3. Maternal Diet

Where NCP was systematically applied, against where it was not, women were more likely to have porridge, leaf sauce, tomatoes, bananas and green beans (item by item, all chi sq. analyses p< .01) in their 24 hour dietary recall, which was used to assess dietary intake. And among pregnant and breastfeeding women, 26% percent of those in NCP villages reported consuming liver in the past 24 hours compared to 9% in non-NCP villages (N=245, p=.005). Women in comparison villages did report greater consumption of milk and peanuts than women in NCP villages. Other maternal dietary practices were not assessed.

4. Child feeding and care skills

Women who remembered the first NCP counseling card assessed (No. 10) were more likely to learn to be patient and use small portions when feeding sick children (36% said they did, n=172) compared to those who did not see cards (2% said they did, n=540). 60% of 147 women who recalled the second NCP counseling card (No. 5) knew that a small bowl could be used to check on a child's portion size. Of the 546 women who had not seen the card, 59% had learned about using a bowl from a community agent, a health worker, a village volunteer or the radio, indicating the spread of NCP messages from their original media. *Women who actually saw the card were more likely to use a bowl for this purpose, suggesting that the visually-supported counseling was more effective.*

On a pre-post basis, giving children colostrum (first breast milk) more than doubled in Trial villages (from 25% to 58%) compared to a 12 point change (30% to 42%) in Comparison

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villages. The number of mothers in Trial villages not giving infants water until after 4 months doubled over the baseline level (from 10% to 21%) compared to a 6 point change (11% to 17%) in Comparison villages. Mothers in Trial villages were far more likely to introduce porridge, fruit, green leafy vegetables, cow's milk and meat or liver into their child's diets -- in a timely fashion--than mothers in Comparison villages[5].

5 Growth

There is a positive relationship between the length of time a village participated in NCP and children's growth measurements, as shown in Table 1 below:

Descriptive Statistics for Anthropometric Indicators of Nutritional Status for Children in Cross-Sectional Sample, 1994

Indicator	NCP Exposure Classification						
	High (> 1 Year) N=388		Intermediate (< 1 Year) N=226		Low/No N=229		Significance
Mean Weight/Age Z-Score	-1.33	SD	-1.78	SD	-1.66	SD	p=.0001
		1.18		1.14		1.14	
Mean Height/Age Z-Score	-1.51	1.26	-1.74	1.23	-1.92	1.46	p =.001
Mean Weight/Height Z-Score	-0.69	1.06	-0.91	1.14	-0.78	1.09	p=.06 (NS)

Multivariate analyses (logistic regression and ANOVA) indicate that variations in household income, or availability of other child survival inputs, played less of a role in predicting nutritional outcome than NCP program variables. Specifically:

- Children over 6 months of age were **twice** as likely to have a satisfactory general nutritional status (weight/age) if the child's mother *remembered 2 or more NCP counseling contacts or materials (p=.008)*. **Recalling NCP media was the only significant factor** in an analysis that also included having been vaccinated, filtering water, and having a positive wealth measure.

- Similarly, children over 6 months of age were **3.4 times less likely** to be stunted (satisfactory height/age) if the child's mother *remembered 2 or more NCP counseling contacts or materials.*

- Women who had **learned recuperative feeding skills** had children whose overall nutritional status was the best in the entire survey, followed by those who learned about special foods, or generally encouraging sick children to eat. Remembering the NCP message to feed sick children patiently and/or with small portions was associated with more than half a standard deviation

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[5]   Porridge (Trial 53%, Comparison 42%); Fruit (Trial 27%, Comparison 11%) , Cow's milk (Trial 22%, Comparison 14%), Greens (Trial 21%, Comparison 7%), Meat/Liver (Trial 35%, Comparison 14%).

difference (.6 SD change, p=.005[6]). *These children were likely to have a normal nutritional status (compared to international reference data) in contrast to other children who were malnourished.*

- Neither the presence of child survival activities alone, nor socioeconomic factors alone (particularly wealth indices), or a combination of these factors without NCP, were associated with improved nutritional status. This was tested in a multitude of ways.

- Sickness 2 weeks prior to/during the survey was the only variable associated with wasting (low weight/age).

6. Pre-Post Analysis of Growth

Malnutrition, as measured by weight-for-age, was reduced by 10 percentage points (from 38% to 28%) in Trial villages, while it remained virtually unchanged (from 42% to 43%) in Comparison villages, as shown in figure 1 below:

Figure 1

Percent of Children with Low Weight-for-Age

	TRIALS			COMPARISONS	
	N=201	N=233		N=182	N=122
< -2 SD	38%	28%		42%	43%
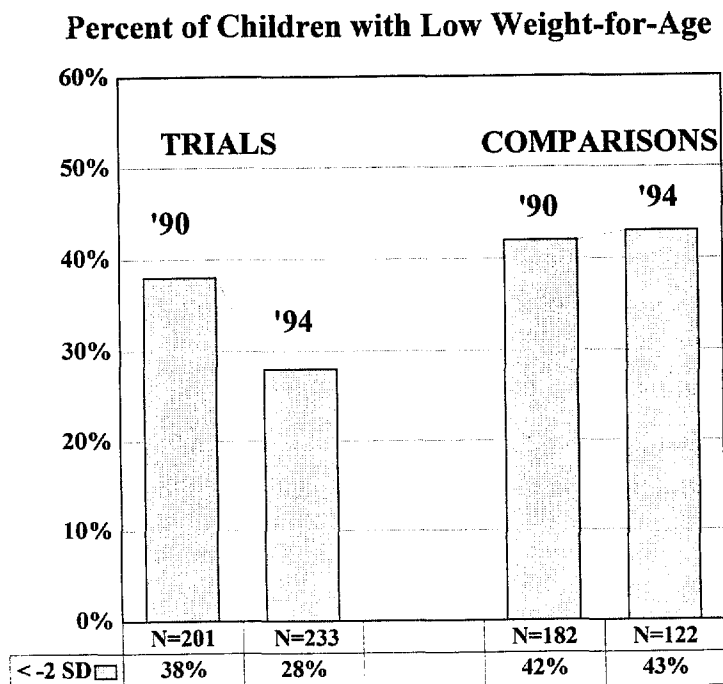
Chronic malnutrition, or stunting, was reduced by 15 percentage points (46% to 31%) in the Trial villages, and increased slightly (50% to 52.5 %) in Comparison villages.

Using MANOVA techniques to compare Trial and Comparison groups by Time, holding their household wealth category ("richer" or "poorer") constant, showed that NCP's impact was slightly greater, and achieved statistical significance, in the "richer" category, but not among poorer participants. The sample sizes by cell become quite small for this analysis, particularly for the Comparison group. However, wealth alone is not responsible for the change over time, as suggested

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[6] In analysis combining this with other messages, the significance level was .01.

by contrasting the mean Z-score of children in the "richer" comparison group (-2.0) to children in the "poorer" trial group (-1.5). It does suggest that families with marginally better incomes, (which characterizes the region of Koutiala), if given nutrition education, make more effective use of this input than poorer families are able to do. In the cross-sectional analysis described above, the survey's wealth indicator is not significantly associated with growth when NCP program inputs are entered in the analysis.

Conclusions

The combined analysis suggests that NCP was associated with improvements in nutrition knowledge, practices and children's growth. These improvements:

- were achieved in combination with other child survival interventions, although these interventions alone *,were not responsible for the change;*

- were not associated with indicators of more household income, although *communities with more wealth appeared to have applied some information more readily;*

- were achieved on a community-wide basis; boding well for sustainability of the behavior change;

- were obtained through the additional costs of staff training, flip charts, and counseling cards (and possibly radio). Compared to supplemental feeding, these costs are minimal.

The Child Survival literature indicates that nutritional status is responsible for up to 56% of a child's likelihood of living or dying in the first 5 years[7]. On this basis, the reduction in child malnutrition alone, achieved through NCP activities, is estimated to have prevented the deaths of approximately 850 children per year by the end of the project[8]. The long term impact of NCP on the approximately 750,000 persons taking part in the community-based component, or on those listening to the radio broadcasts (which potentially reach any Bambara speaker in the country of 9 million people), remains to be seen. While funding for USAID's project ended in March, 1995, in Mali, NCP continues under the direction of its lead government agency, the National Center for Health Information, Education and Communication (CNIECS), the Group pivot for Child Survival (an NGO coordinating group, partially supported by USAID), and the network of NGOs, and additional support from UNICEF.

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[7]Pelletier, D.L., Frongillo, E., J-P. Habicht, 1993. Epidemiologic evidence for a potentiating effect of malnutrition on child mortality. AJPH 83:1130-33.

[8]J.Ross, PROFILES analyst, p.c.

II. INTRODUCTION

Between June, 1989 and March, 1995, the "Nutrition Communication Project" (NCP)[9], managed by the Academy for Educational Development (AED) for the U.S. Agency for International Development (USAID), implemented a rural communication program for Child Survival projects run collaboratively by the Government of Mali and its non-governmental (NGO) partners. In addition, NCP worked at the central level to integrate nutrition into primary health care, develop a primary school curriculum and conduct teacher training, and broadcast a radio soap opera nationally as a vehicle for nutrition information. The population of Mali is approximately 9 million people, and all might eventually benefit from these interventions. NCP activities for Child Survival projects covered approximately 760,000 people.

While USAID funding for NCP stopped in March, 1995, NCP continues to be implemented by the Government of Mali's Center for Health Information, Education and Communications (CNIECS), the Ministry of Education, and the NGO "Pivot Group" for Child Survival, with support from UNICEF/Mali.

A. Key Elements of the NCP Intervention in Mali[10]

The primary goal of NCP in Mali was to mount communication activities enabling rural populations to improve the nutritional status of women and young children. At the project's start, national data indicated that 25% of children suffered from moderate to severe malnutrition, and this contributed to a rural under-5 mortality rate close to 300/1000[11]. National surveys indicated that women and children consumed inadequate levels of certain micronutrients and protein[12]. Pregnant and nursing women, as well as children being weaned from breastmilk (18 months-3 years), also consumed too few calories for their nutritional needs. To address these problems, the Government of Mali sought a communication strategy to motivate the population to direct critical dietary resources to women and children, and to modify child feeding practices (breastfeeding, complementary feeding) linked to child survival. With funding from USAID/Mali, the Office of Nutrition and the Africa Bureau, NCP approached this challenge with a series of community-based and mass media interventions developed using a "social marketing" framework.

Social marketing is used in communication to focus on individuals, their social contexts and the decisions they make relevant to a behavioral domain, such as child feeding. Formative research on specific behaviors, (in this case, eating, food purchasing, child-feeding as well as media habits), is used to develop a strategy to communicate nutrition messages, direct parents towards health services or products, or affect community norms and attitudes.

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[9]The formal name of the project is: The Nutrition Education and Social Marketing Field Support Project.

[10]See Nutrition Communication Project Final Report, Mali, 1995, for a detailed description of the program.

[11]Mali DHS, 1987.

[12]See Parlato & Fishman, 1988 Assessment and Project Planning Trip Report, NCP, for compilation of nutrition data available at project start. Sundberg, S. *An Overview of the Food Consumption and Nutrition Situation in Mali*, Final Report to USAID/Bamako, March, 1988, was consulted extensively. See also recent update by Government of Mali, Country Situation Report, International Conference on Nutrition, Rome, 1992.

The NCP communication strategy was developed following a rapid ethnographic study of the target population directed by an anthropologist well-known for her work in Mali.[13] The strategy used village-based stories and drama to introduce new nutrition concepts and model appropriate behavior.[14] Five village story books (flip charts) were designed for use by village health committees or health workers: (1) *The Nutrition of Awa* and (2) *Awa Finds the Solution* emphasize the connection between vitamin A- rich foods, night blindness and health; (3) *Why Sita is Vigorous and in Good Health* emphasizes appropriate child feeding practices, such as using a small feeding bowl, supervising older children's meals and feeding sick children patiently and persistently; (4 & 5) *Two Families on the Road to Health* (Part 1 and Part 2) stress pre-natal health and nutrition as well as immediate follow-up care of both the mother and infant.

NCP trained community agents in interpersonal counseling and small group animation. A step-by-step approach was taught to negotiate small behavior changes with mothers, fathers, and community leaders. *Communities in Good Health*, a manual featuring realistic dialogues and drawings to illustrate behavioral negotiation, was distributed at the training. In addition, several items were produced to motivate and reinforce the community agents' confidence, while improving their nutrition counseling skills. These included an 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.

In addition to community-based interventions, Mali NCP also launched a weekly radio program, as well as a series of spot announcements. These had been on the air approximately 3 weeks at the time of the first wave of the final evaluation, and 6 weeks by its conclusion[15]. As the Child Survival Project staff took part in research and strategy formation steps, this is also considered part of their "training." Table 1 below summarizes the critical research, strategy formation and training events that affected these project sites.

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

[14]These stories, featuring role models performing the desired behaviors, incorporate many of the principles of Bandura's "Social Cognitive Theory," one cornerstone of public health communications this decade. A second cornerstone theory, "Stages of Change," was applied in NCP's step-by-step counseling approach. The Academy for Educational Development pioneered use of an "Applied Behavior Change (ABC)" framework, founded on these two theories, in developing health communications (see, e.g. Smith W.A. and Elder J. *Applied Behavior Change: A Framework for Behavior Change Interventions and Research*, NAE, USAID, 1992). The Nutrition Communication Project was influenced by this approach, although it was not designed, as were other AED projects, to explicitly use behavioral psychological theories.

[15]A prototype version was broadcast for about 10 weeks in 1993. No one mentioned hearing this broadcast when asked about radio.

B. Schedule

Table 1: Chronology of Key Events in NCP Intervention

Date	Activity/Support Materials	NGOs active in Evaluation component
June, 1990	Strategy Formation Workshop-Formative Research report	Africare/ Dioro, CARE/Macina, Save the Children/Kolondieba, World Vision/Koutiala
December, 1990	Baseline Knowledge, Attitude, Practice (KAP) and Anthropometric Survey	Africare, CARE, World Vision
December, 1990	Training I: Five Step Counseling Approach, Flip Charts 1 & 2	Africare, CARE, Save the Children, World Vision
September, 1991	Dissemination of KAP findings, Strategy re-formulation	Africare, CARE, Save the Children, World Vision
May, 1992	Training II: "Communities in Good Health," (Five Step Counseling Approach), Flip Chart 3	Africare, CARE, Save the Children, World Vision, local NGOS
October, 1992	Training III: Theater and Community Mobilization, Flip Charts 4 & 5	Africare, CARE, Save the Children, World Vision, local NGOs
October, 1993	Training IV: Community Assessment, Counseling Cards, other Mobilization techniques	Africare, Save the Children, World Vision, local NGOs
October, 1994	Training V: Village Theater Groups	All active NGOS (UNICEF-sponsored)
December, 1994 - January, 1995	Final KAP and Anthropometric Survey	Africare, Save the Children, World Vision

NCP operated as a continuous quality improvement project. While some aspects were in place by January, 1991, the message strategy was not complete until April, 1992. The community-based media strategy was 90% complete following the October, 1993 training. NGOs were trained in structured village theater (as distinct from skits and role plays introduced in the first training) in October, 1994, and radio broadcast began on a consistent basis in November, 1994.

The primary intervention examined by this evaluation is the community media strategy, *fully in place in most villages after the 4th training (October, 1993)*, although some villages were exposed to parts of the strategy as early as January, 1991. Given the gradual introduction of interventions, the October 1993 training (Training IV) is used to demarcate the level of participation in NCP at the time of the 1994 assessment. Villages that joined only in time for training V (October 1994) had less than 6 months of exposure to NCP at the time of the final assessment. The significance of this categorization is explained below.

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III. EVALUATION METHODS AND MATERIALS

A. Evaluation Design

1. Study Protocol

a. Original Design

Beginning in October, 1990, the Child Survival projects of Africare/Dioro, CARE/Macina, and World Vision/Koutiala agreed to participate in a longitudinal evaluation of NCP. Agreed-to activities consisted of (1) a pre-intervention (Baseline) survey of villagers' nutrition knowledge, attitudes and practices (KAP) coupled with measurements of children's nutritional status; (2) staff participation in NCP training; (3) use of NCP approaches and materials according to a study protocol that required the NGO to **withhold the intervention from 8 of their project villages**[16]; (4) participation in NCP supervisory visits; and (5) a post-intervention (Impact) survey. Save the Children/Kolondieba signed a letter of agreement shortly after this time, but was not able to participate in the baseline survey for administrative reasons.

The project's evaluation protocol was designed to allow NCP to use a quasi-experimental design, in which some villages are exposed to the intervention ("trials"), while others matched for environmental and socioeconomic conditions are purposefully not exposed to the intervention to serve as a "comparison" group. Measurements from the pre-intervention and the post-intervention surveys are compared to see whether the presence of the intervention is associated with any change in the outcome variables of interest: knowledge, attitudes, behaviors (practices) and children's growth measurements. The comparison villages are needed to help rule out non-project factors that might confound knowledge, attitudes, practices and children's growth.

b. Events Necessitating Change in Evaluation Design

Since the NCP evaluation depends upon NGO programs, and took place over 5 years, circumstances, as well as project-based decisions, forced changes in the original research design. These include the following:

1. NCP in Mali was extended (from 1993 to 1995), in part due to fielding delays caused by the Gulf War as well as political turbulence in Mali. The final evaluation was rescheduled for December, 1994. CARE/Macina was not able to participate in the NCP program after January, 1993, and an evaluation was made in this site alone in February of that year[17]. This left only two of the original sites (Africare/Dioro and World Vision/Koutiala) with pre-intervention data.

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[16]As explained below, each project selected 8 villages to serve as comparison sites for a prospective trial of NCP impact.

[17]Please see Fishman, C. et al, Mid-Term Assessment report, February, 1995.

2. Within Africare/Dioro and World Vision/Koutiala, some villages originally designated as "comparison sites" were exposed to the NCP intervention beginning in 1993. Other villages enrolled as "trials" in 1990 withdrew from the NGO's Child Survival project, and hence, were no longer exposed to NCP. The validity of the trial-comparison/pre-post design was threatened by these project "drop-outs" and "drop-ins".

3. NCP introduced a number of program innovations developed after the 1990 baseline. The knowledge and attitude questions from the baseline instrument were not adequate to measure impact in these areas.

4. Both Africare and World Vision had expanded their projects (e.g. from 40 to 80 villages in the case of Africare), and felt that their work with NCP over the past two years in the new villages should be reflected in the final evaluation.

c. Final Evaluation Plan

As a result of these factors, NCP planned to use two analytical designs in evaluating project impact:

1. The original quasi-experimental design: Pre-Post Intervention/Trial- Comparison

For the Pre-Post Comparison, any village randomized to be a "trial" in 1990 would maintain this classification in 1994 *even if activities were discontinued prior to the end of the project*. Similarly, villages randomized as "comparisons" in 1990 would maintain this designation even if they were exposed to the intervention. The entire baseline sample of trial and comparison villages in Dioro and Koutiala would be used to compare to results in 1994, acknowledging that some of the villages are lost to follow-up (due to village drop-out/drop-in). This is necessitated by the original design which pools data from trial villages v. comparison villages -- in contrast to a village-by-village design (which may also be used to answer different questions about the program).

2. A new cross-sectional design to assess the relationship of outcome variables to village level "involvement" to NCP measured retrospectively from 1994. Both villages participating in the baseline as well as those joining later are included in this analysis, as explained below:

Retrospective Village Level Involvement

Participation in NCP was determined at the village level by records kept by NGO partners, checked against the NCP Field Coordinator's records. The terms "High," "Intermediate" and "Low/No" are used to distinguish the length of time a village collectively participated in NCP, as follows:

High   High Involvement villages participated in NCP for a minimum of 1 full year, and were actively engaged at the time of the final evaluation.

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Intermediate   Intermediate villages participated in NCP for more than 6 months but less than 1 year, *or* , participated in NCP for more than 1 year, but had not been active in the project (nor possibly the Child Survival Project) for the past two years.

Low/No   NCP was not systematically applied in these villages, although individuals might have seen a material outside of the village, or materials might have been sent to a health center in the village just prior to the survey.

For the sake of having sufficient numbers to analyze in the intermediate category, villages that once participated in NCP but discontinued are combined with those beginning less than 1 year ago. Villages falling in this category are difficult to analyze due to the imprecision of their actual exposure. High involvement villages have the strongest/clearest exposure to NCP, and Low/No villages have no deliberate exposure to NCP.

2. Sampling

a. Sample size

(1)   1990

At baseline, the sample for children was calculated based on the 25% prevalence of moderate and severe malnutrition (children having less than -2 standard deviations of weight/age) reported in the DHS 1987 survey for Mali. 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 was calculated[18] as 300 children. With the 2 group (trial-comparison) design, approximately 300 children in each group were sought -- or 600 total children. As there were 3 NGOs, 200 were selected from each of the 3 NGO sites. The evaluation was designed to combine individual data from 24 (3 sets of 8) trial villages as one group in comparison to the 24 comparison villages as another group. For some analyses, data would be grouped by child's age: newborn-6 months; 7 months-12 months; 13-36 months. Because of the emphasis in the project on "weaning", children 7-24 months were over-sampled. An equal number of boys and girls were desired, although children were selected randomly for gender. Parents were sampled in relation to their children's status. The completed baseline sample included 835 women, 524 men and 657 children, who represented, respectively, 1% of the women of procreational age; 1% of the men, and 3% of the children under 3 in each Child Survival Project's catchment area.

(2) 1994

In order to allow for multi-variate analyses of the cross-sectional data, a larger sample was desired. The 1990 sampling plan for children was approximately doubled for the two

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[18]   Standard equation for estimating sample size is $N = 4pq/L^2$, where p=the proportion with condition in the population, $q = 1-p$, $L = error^2$. The sample was $4 (25)(75)/25 = 300$.

sites remaining from the baseline survey (Dioro and Koutiala), and a comparable sample was drawn for Kolondieba. Approximately 1400 children were sought, breaking down as 30 children/village x 48 villages. A total of 851 children were actually sampled in the final evaluation, which included virtually all children who fell within the age range in each village. A subset of mothers and fathers, selected randomly from the list of children, was interviewed. The 1994 sample used for the pre-post analyses is much smaller, as only those villages with both baseline and final data are included.

b. Village Selection

(1) Assignment of villages to the study - 1990

As part of the baseline protocol in December, 1990, Africare/Dioro, Care/Macina and World Vision/Koutiala[19] were each 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 (w/in 10 kilometers).

4. Similar ethnic, demographic and economic make-up (study villages were limited to 75% Bambara and 25% Bozo or other ethnic groups).

Half of the villages (8) would receive NCP interventions, and the remaining 8 villages would not during the course of the research period. However, all other child survival program activities (e.g. immunization, water and sanitation, oral rehydration therapy and limited *breastfeeding promotion and nutritional screening*) would take place. The purpose of the matching was to eliminate as many confounding variables as possible in the 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.

(2) Selection of villages - 1994

Village sampling instructions were forwarded to NCP's resident coordinator well ahead of the scheduled survey *(See Appendix B)*. For the pre-post analysis, NCP attempted to include 6 original "trial" and 6 original "comparison" villages each from Dioro and Koutiala, for a total of 24 villages from which there were pre-post data. For the cross sectional survey, NCP requested that 2 villages each from World Vision's and Africare's new Child Survival projects be included, as well as 2 new comparison villages from the

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[19]   Save the Children/Kolondieba wished to participate in the project, but was unable to take part in the baseline study for administrative reasons.

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Child Survival expansion projects. Kolondieba was asked to select villages according to the original criteria for baseline selection.

The survey field supervisors had difficulty meeting these requirements. In Koutiala, it was virtually impossible to find a village - among 70 - that had not been exposed, however minimally, to NCP. The field team decided it was pointless to include the original comparison villages in the sample from Koutiala.

In addition, because participant recruitment was not complete by the time the field team arrived in each village (*see Field Survey Methods below*), and a greater number of participants were interviewed per village, only one village could be completed in a day. As the budget allocated for the survey did not allow for extending the time in the field necessary to visit all 16 villages, the total number was reduced to 10 per site, for a total of 30 instead of 48. The total number of individuals included in the survey remained close to the baseline, as more children were recruited on a per village basis. The combination of the budgetary restrictions and decisions made by the field team in the course of implementing the impact survey resulted in the following sample of villages:

- In Koutiala, the 8 original trial villages were included.

- Two new "comparison" villages were selected from the expansion project using the original criteria above.

- Having over-selected "trials" in Koutiala, the field team decided to over-select "comparison" villages in Dioro[20], and only two original trials were included together with four original comparisons. In addition, two participating and one comparison village were selected from Africare's expansion site.

- Save-the-Children in Kolondieba was asked to select villages according to high and low involvement categories matching villages according to the original health service and economic criteria given in 1990 (see above).

Tables 2 and 3 below show the final disposition of villages for the two analytical designs. Appendix C, Tables C-1 to C-3 shows all villages included in the 1990 and 1994 surveys by name and level of exposure. This makes clear which villages from 1990 are effectively "lost to follow-up" in 1994 for the Pre-Post analysis, and how each village is classified for the retrospective, cross-sectional analysis performed on 1994 data only.

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[20]This was a serious mistake, the ramifications of which are explained below.

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Table 2   Reclassification of villages by 1990 and 1994 designation

1990 Status	1994 Status	Label	Pre-Post Design	Cross Sectional Design
Trial	Active >/= 1 year	X_1	Trial $X_1 + X_2$	$X_1 + x_4 = $ Hi
	PreviouslyActive > 1 year, now Inactive > 1 year (NCP Drop-outs)	X_2		$X_{2+}X_5$ Intermediate
Comparison	Active < 6 months/ Never Active	Y_3	Comparison Y_3	$Y_3 + y_6$ Low/No
	Active > 6 months (NCP Drop-ins)	not in study		
Not in	Active >/= 1 year	x_4		
Not in	Active > 6 months, < 1 year	x_5		
Not in	Active < 6 months/ Never Active	y_6		

Table 3   Contribution of Sites to Pre-Post and Cross-Sectional Analysis Schemes

SITE	1990	1994	Pre-Post Analysis	Cross-Sectional Analysis
Dioro	XXX(X) → XXX(X) → YYY(YYYY) →	X 1, X 2, YYYY 3, xxx 5, y 6	X 1, X 2, YYYY	X 1 HI, X 2 / xxx INT., YYYY / y LO/NO
Koutiala	XXXXX →, XX(X) →, YYYYYYYY	XXXXX 1, X 2, XX 4, yy 6	XXXXX 1, X 2	XXXXX 1 / xx HI, X 2 INT., yy LO/NO
Kolondieba		xxxxxx 4, xxx 5, y 6		xxxxxx HI, xxx INT., y LO/NO

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c. Impact of Sampling on Evaluation Design

Village sampling decisions made once the survey was in the field, and the resulting number of villages contributed from each region, sharply constrain NCP's ability to use the original Pre-Post design. Where the 1990 and 1994 survey instruments are comparable, limited comparative analyses of anthropometric variables, women's reported feeding behaviors and wealth classifications are performed.

B. Field Survey Methods

1. Recruitment of survey participants

At the baseline, Child Survival project staff recruited villagers to participate in the survey several days in advance. Due to changes in project management and location, current project staff had not been informed of this need ahead of the 1994 field team's arrival on location. As a result, the field team (which included the former Coordinator for the World Vision Child Survival project) asked village-level traditional birth attendants and volunteer health workers to recruit villagers for the survey on the morning that the team arrived in each village. Individuals were picked "as randomly as possible" from lists maintained by health posts or according to village birth records. In the case of non-project villages, the village Chief was asked to provide the list of names and identify volunteers to assist with recruitment. Eligible families (with pregnant women or children under age three) were categorized into the following interview classifications: Pregnant woman, mother of infant through 6 months, mother of child 7 to 36 months, father of child. In every village, virtually all pregnant women and mothers of children less than two years of age were interviewed. There was slightly more choice for mothers of older children, and either a "random" enumeration technique *(see Appendix B)*, or, simply "rounding up anyone available," was used to select the remaining participants. The Team leader stressed that recruitment was time and labor-intensive, and as "random as possible" under the circumstances. However, the end result is an exhaustive sample of pregnant and breastfeeding women as well as children under age 2, and a convenience, (rather than a strictly random), sample of older children and men.

2. Organization of Evaluation and Preparation of Interview Teams

Prior to the arrival of the field team leader, Dr. Anne Golaz, NCP Local Coordinator Enkaterina Sissoko and NCP resident consultant, Dandara Kante, recruited field interviewers[21] and made most logistical arrangements. Dr. Golaz and Ms. Kante reviewed the questionnaires and its written Bambara translation, instructed the interviewers in its use, and trained the interviewers in anthropometric measurement. The team practiced both interviewing and measuring for one day in Bamako. Two field teams were created. These were as follows:

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[21]Please refer to page i. for personnel titles.

Team 1   Team 2
Dandara Kante, Supervisor   Katy Dolo, Supervisor
Ouessa Sanogo, Measurer   Fanta Ba, Measurer
Saba Soumbounou, Team Leader   Fatimata Tony, Team Leader
Nana Toure, Women's questions   Alima Simaga, Women's questions
Boubacar Diarra, Men's questions   Noumouke Diarra, Men's questions

Responsibilities were divided as follows:

The Supervisor and Team leader worked with local staff to recruit participants in the village for the survey, handled village introductions and hospitality, checked children's records, where available. The "Measurer" performed all anthropometric measurements. As indicated above, two of the team members specialized in either the woman's or the man's questionnaire, by their own gender. The Team leader specialized in questions asked to women, after recruitment and other duties were completed. The supervisors checked all data for quality and completeness and helped complete interviews, as needed.

USAID/Mali's Technical Advisor for Child Survival (TACS), Dorothy Stevens, accompanied the team to Koutiala, where Dr. Golaz oversaw the entire study, assisted by Ms. Kante and Ms. Dolo. Dr. Golaz left after the Koutiala portion was fielded, leaving the study to Ms. Kante and Ms. Dolo for completion (as had been done for the baseline).

3. Data Collection Instruments, methods and key variables

The final evaluation instrument incorporated as much of the original baseline instrument as considered useful, and new items were added to capture NCP interventions introduced after the 1990 baseline.

   a. <u>Anthropometry and Nutritional Status</u>

Children were weighed using Salter suspension scales borrowed from the CDC in Atlanta. Length was measured using locally constructed length measuring boards, belonging to the NGOs. 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[22]. The following information was collected:

- Child's age - calculated by *Epi Info* from:
  Date of birth (from health post or village records)
  Date of interview
- Child's weight measured in kilograms to the nearest 0.1 kg
- Child's length (all children measured supine) in centimeters to the nearest 0.1 cm[23]
- Child's sex (male or female)

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[22]National Household Survey Capability Programme. DP/UN/INT-81-041/6E

[23]Children were measured supine in 1990 and 1994. The CDC recommends a corrective factor (-.35 cm) to adjust for supine measurement of children over 24 months of age, however, this step was considered non essential for this analysis. Approximately 20% of the children were over 24 months in each survey.

(1) Anthropometric Indicators

Three anthropometric indicators of nutritional status can be derived from height and weight measurements: height-for-age, weight-for-height and weight-for-age. Low height-for-age indicates growth *stunting*, which reflects a long term deficit of nutrition and a greater experience of disease such as diarrhea and acute respiratory infection. In a healthy reference population, the expected prevalence of growth stunting is 2.3%. In developing countries, this ranges from 10 to 60% nationally.

Low weight-for-height indicates *acute, wasting malnutrition*. It is often the consequence of severe food shortages and/or prolonged severe illness. Even in poor countries, the prevalence of wasting at the national level stays below 5% except under disaster conditions.

Low weight-for-age indicates that a child is malnourished, but does not distinguish between a child who is wasted, and one who is stunted, but proportioned.

In this report, height-for-age, weight-for-height and weight-for-age data are interpreted using "Z-scores" which are standard deviation units from the reference mean for each anthropometric indicator based on the international growth reference data approved by NCHS, CDC and WHO. The Z score allows for comparison across ages and sex, and permits computations of summary statistics. 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 6 standard deviations around the mean (Normally 3 up and 3 down from 0[24]). The *Epi Info* program automatically "flags" records which are missing data or fall outside of an accepted range (LE[25] -5 or GE 5 standard deviations), indicating a high likelihood of measurement/data entry error. Flagged records are excluded from the analysis. USAID, CDC, WHO and others recommend that a Z-score cut-off point of -2 be used to classify low height-for-age, low weight-for-height and low weight-for-age for the purpose of estimating the prevalence of malnutrition. (Other cut points might be indicated for other purposes).

(2) Dietary Assessment

Interviewers asked a series of open-ended questions concerning individual and family characteristics, food choices and food-related behavior. Dietary intake for adult pregnant and nursing women and for children over 6 months of age was assessed using a "24 hour recall" following the methodology of Gibson, R. *Principles of Nutrition Assessment*[26]. 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.

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[24]See Diagram, Appendix D, which displays relationship of Z-scores to NCHS percentiles.

[25]LE=Less than or equal to, GE=Greater than or equal to.

[26]Gibson, 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.

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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. A series of questions on target food purchasing, provision of money, and intra-household distribution of purchased foods was added[27].

b. Demographics, Knowledge, Attitudes and Practices

(1) Instruments and Methods

Adult participants were interviewed individually. The instrument is reproduced in Appendix A. The instrument consisted of a verbal and illustrated section.

The illustrated section was totally revised from the baseline to account for the innovations in NCP that occurred after 1990. The questions related to the Awa series flip charts, introduced in 1990; the 5-Step counseling approach and Communities in Good Health manual, introduced in 1992; the counseling cards, introduced in 1993; and radio program, launched only 2 weeks before the start of the survey. Pre-coded answer choices were provided for many of the questions to facilitate collecting data. While the new questions were not pre-tested for the purpose of the final evaluation, the illustrations themselves had been pre-tested (and were in use) with rural villagers, and the questions used in the final evaluation were originally developed for the material pre-testing or NGO staff training supervision visit assessments. Illustrations used in the survey appear in *Appendix A*.

(2) Key Variables

(a) NCP Individual Exposure Indices

Participants were shown samples of NCP media and asked if they had seen the material before, and under what circumstances. A scoring system was developed, which is shown in Table 4 below.

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[27]These questions were developed and tested in NCP's final evaluation in Niger which preceded the Mali and Burkina evaluations.

Table 4   NCP Individual Media Exposure Scoring

NCP Intervention	Possible Maximum Score	
	Community. Agent/ Volunteer	Other Channel
1-Saw Awa Flip Chart-Picture of Man Buying Liver @ Butcher	2	1
2-Counseling Card # 10-Healthworker administering "solution" to malnourished child in mother's lap	2	1
3-Counseling Card # 5-Feeding children w/separate bowl/spoon	2	1
4-Play or sketch concerning buying liver for family {Fsketch}	1	
5-Participated in group flip chart session.{Fboite}	1	
6-Radio program concerning buying liver for family {Fradio}	1	

Individual exposure score was calculated based on the first 5 interventions above (radio was handled separately as its range was not limited to the NCP trial or high exposure sites). A maximum score of 8 was possible if the individual saw each NCP intervention through a community agent, as well as saw a sketch and participated in a flip chart session.

(b) "Wealth" as measured by household possessions and livestock

Men and women were asked about household possessions and livestock as proxy variables for "wealth" in this largely non-monetized society.[28] A "point value" of 1-3 was assigned to each item based on its local cost. In the 1990 NCP Baseline report, there were no significant differences in wealth between trial and comparison villages, either combining sites or examining sites individually. However, families in Koutiala owned more "donkeys," "carts," "working radios" and "bicycles," than families in Dioro, but in general, did not possess a greater range of livestock. Because of the strong contribution by Koutiala of "trial" villages and of Dioro of "comparison" villages in 1994, there is a disproportional distribution of possessions in the trial villages in contrast to the

Household Item and "point value"
Donkey (2)
Cart (2)
Working Radio (1)
Bicycle (2)
Chicken (1)
Sheep (1)
Cow (2)
Horse (3)

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[28]The list was 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.

comparisons. The effects of wealth are discussed in each analysis (Pre-Post and Cross-Sectional) under "confounding factors".

(c) Child Survival Program Variables

As the impact of NCP was meant to add to the impact of Child Survival program inputs, participating programs were asked to select villages where these inputs were equivalent to the extent possible. The following information was assessed in individual interviews as follows:

Table 5   Child Survival Program Input Variables in 1994 survey

Indicator	Question/How assessed
Pump for water source	Part 1, 3B "Where do you go for your drinking water."
Filter water	Part 1, 3c "Do you treat your drinking water? In what manner?
Immunization card	Directly observed during interview
Received vaccination for Polio, Measles	Child's immunization card observed by interviewer
Received Vitamin A capsule	Capsule shown to mother who is asked if child has ever received one.

In addition, observations were made at the village level on the presence of large diameter wells, midwives and traditional birth attendants and other health personnel (trained/traditional) residing in the village. This is reported in Appendix C. Only Kolondieba had wide diameter wells, otherwise, there were no substantial differences.

(d) Individual children's health

Mothers were asked about the health of their children during the 2 weeks prior to the survey. As the majority of field interviewers were medically trained, fairly precise diagnoses (e.g. malaria, skin infection) were recorded on the forms, and entered into the data set. These are available upon request. The diagnoses were subsequently re-coded in Atlanta into the following symptom categories: diarrhea, vomiting, cough, fever, and "other."

4. Data entry and statistical analysis

Completed questionnaires were brought to Bamako for data entry. Bakary Doumbia, of INFO-STAT, oversaw a team of two data entry clerks. Dr. Golaz brought *EPI Info* Version 6, a Center for Disease Control (CDC) software program, for data entry and the transformation of raw data into anthropometric indices. Upon completion of data entry, diskettes were sent to Atlanta, arriving February 15th. Information critical to the data analysis was not made available until March 22, 1995. Karen Sagatelian and Claudia Fishman performed data cleaning, which involved correcting obvious data entry errors and merging data files.   Records with missing values were included , although obviously not used in specific analyses involving the missing variables. The sample size, which varies, is indicated for each analysis. The data were analyzed using SPSS/PC statistical software.

The research hypotheses, key findings and analyses are reported in the two separate results sections below, IV-Pre-Post Analysis, V-Cross Sectional Analysis.

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IV. RESULTS: ANALYSIS 1- PRE (1990) & POST (1994)

A. Analytical Features

1. Design

This analysis makes use of the original quasi-experimental protocol in which cooperating NGO Child Survival projects selected villages to receive the NCP intervention (designated as "trials") and villages to not receive the interventions (designated as "comparisons") throughout the duration of the project. Only Africare/Dioro and World Vision/Koutiala satisfy minimum requirements to be included in this analysis, which are: (1) Anthropometric, KAP and economic data were collected at both surveys (1990, 1994), (2) The NCP intervention was carried out in the trial villages for more than 1 full year between March, 1991 and June, 1994.

2. Selection of Villages

As can be seen in the diagram below, all but 4 comparison villages from Dioro, out of the original 16 in both sites, are "lost to follow-up," as are 8 of the original trial villages from both sites. The Pre-Post analysis is performed on children's data from 8 trial villages in 1994 (pooled from 2 trial villages from Dioro and 6 from Koutiala), against 16 trial villages in 1990. The weaker comparative analysis is based on only 4 comparison villages from Dioro in 1994 against 15 comparison villages in 1990. This is diagrammed below in Table 6:

Table 6   Villages Included in Pre-Post Analysis

Site	1990	1994	Pre-Post
Dioro	XXXXXXXX "Trials"	1 X	X_1X_2
		2 X	
		3 YYYY	YYYY
		4	
	YYYYYYY "Comparisons"	5 xxx	
		6 y	
Koutiala	XXXXXXXX "Trials"	1 XXXXX	$X_1X_1X_1X_1X_1X_2$
		2 X	
		3	
		4 xx	
	YYYYYYY "Comparisons"	5	
		6 yy	

As there were still over 100 children remaining in each group (Trial and Comparison), the data are worth analyzing at this level. Analyses requiring subclassifications produced weak results, which have largely not been included.

3. Hypotheses to be tested in Analysis 1

    a. Pregnant women and mothers of children less than 3 years of age living in trial villages will report better nutrition behavior (consumption/feeding of more foods recommended by the intervention) in 1994 than pregnant women and mothers of children of the same age range residing in NCP trial villages prior to the intervention (1990).

    b. Children less than 3 years of age living in trial villages will have better nutritional status (measured by anthropometric indices of weight-for-age, height-for-age and weight-for-height) in 1994 than children of the same age range residing in NCP trial villages prior to the intervention (1990).

    c. Comparably significant changes will not be seen in the comparison villages.

B. Findings

1. Sample Characteristics

    a. <u>Sample Size by category</u>

While some data are missing, (e.g. not all children had birth-date or height data), the numbers included in an analysis, unless otherwise indicated, appear in Table 7 below.

Table 7   Pre-Post Analysis Sample

Category:	1990		1994	
	Trial	Comparison	Trial	Comparison
Women	288	260	196	97
Men	201	205	100	47
Children	218	196	227	122

Of the total 348 children sampled, 337, or 97% had valid weight measurements, and 320, or 92% had valid height measurements for analysis.

    b. <u>Demographic Variables</u>

Within each region, the villages selected as trials and comparisons had similar socio-economic, educational and environmental conditions as well as health service provisions.

The sample at both times has an equal number of boys and girls. Few adults knew their ages. The distribution of children's ages in each sample is shown in figure 2.

Figure 2

Children's Age Distribution in 1990, 1994
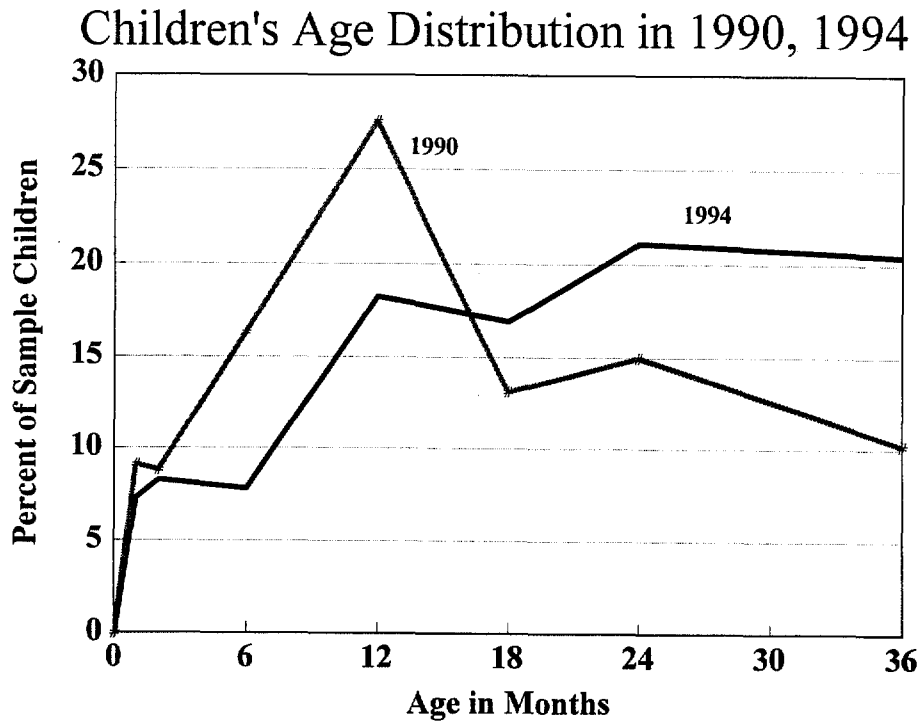
By chance, the median age of children in 1994 is 15 months, while it is 11 months in 1990. The tendency in this region is for children's anthropometric indices to deteriorate with age between 6 to 24 months. Therefore, the fact that children are older in the 1994 sample works against the probability of finding children with better WAZ and HAZ scores, unless an intervention had changed the trend.

c. Socioeconomic Variables

Between 1990 and 1994, nothing had occurred to alter primary occupation and level of education in the region. At the baseline, 99% of the respondents were farmers and nobody had any formal education. As the school system was just reaching the regions covered by the survey, and parents in the survey were beyond school age, educational level was presumed to have remained unchanged, or insignificantly altered. What chiefly distinguishes villagers surveyed in 1990 from those in 1994, are larger, more polygynous households, and additions of livestock and possessions. The entire southern region of Mali experienced improvements in agricultural production between 1992-1994. Any benefits accruing from this time of food security appear to be distributed fairly evenly across "trial" and "comparison" villages in the study, although the region of Koutiala, as it was at baseline, is relatively better off. As more "trial" villages in the pre-post analysis come from Koutiala, and more "comparison" villages come from Dioro, it was necessary to separate out the effects of both "region" and "associated wealth." Table 8 shows the differences in ownership, as reported by men in the 1994 survey. Men in Koutiala, and hence, Trial villages, are wealthier.

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Table 8   Ownership of Household Items and Livestock by NCP Designation, 1994

Household Item and "point value"	Trial	Comparison	Significance
Donkey (2)	67%	36%	.001
Cart (2)	71%	47%	.005
Working Radio (1)	59%	30%	.003
Bicycle (2)	76%	38%	.00001
Chicken (1)	76%	57%	.05
Sheep (1)	54%	57%	NS
Cow (2)	71%	66%	NS

2. Program Variables: NCP Reach

a. Individual Exposure Scores

The ability of individuals to recall NCP interventions is consistent with the presumed level of exposure according to "trial" or "comparison" classification.   This is shown in Table 9 below.

Table 9   Individual Exposure to NCP Interventions

Category:	Exposure Scores		
	Trial Mean (S.D.)	Comparison Mean (SD)	Sig.
Women	1.64 (2.38)	.36 (0.84)	.000
Men	0.99 (1.93)	.17 (0.67)	.005

As the means and standard deviations indicate, women in trial villages recalled nearly 2 NCP interventions, with the entire range of measured interventions (5 in all) accounting for 90% of the variability in the trial group. The average recall for women in comparison villages was less than 1. As mentioned before, the reported recall for NCP materials in comparison villages might be genuine (i.e. NGOs erroneously and briefly used NCP materials in these villages). Alternative explanations are that women frequently travel to health centers outside their own villages for maternity services, and might have seen NCP materials at this time, or, they confused other materials seen in health centers for those shown by NCP during the survey. As women were asked the circumstances for exposure, the most likely explanation is that women traveled to centers where NCP materials were used.

Men's scores are generally lower, although the average for men in trial villages is 1 NCP intervention, with far fewer reporting exposure in comparison sites. Village-specific mean exposure scores for men and women appear in *Appendix C, Table 4.*

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b. Overall Reach of NCP

These average scores translate into a fairly significant reach for NCP where it was meant to be applied. **In Trial villages, 30% of the sampled men and 45% of the women recalled one or more NCP intervention.** In Comparison villages 18% of women and 6% of men had an exposure score of 1 or more (i.e. recalled at least one NCP contact). While the extent to which villages were exposed to NCP interventions is not as sharp as originally intended, the difference between trial and comparison groups is highly significant, with p values of .00000 (women) and .001 (men).

It is therefore worth exploring the impact of the NCP intervention on key nutrition behavior and anthropometric outcome variables.

3. Breastfeeding, Introduction of Complementary Foods, Maternal Diet

The most important action a healthy woman can take to protect her infant's health is to feed the child her breastmilk, and her breastmilk alone, for the first 4-6 months. Besides being the superior form of nutrition, this strengthens the child's immune system[29]. While this fact is now well known scientifically, the medical profession promoted early introduction of supplementary foods, particularly in developing countries, 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 part of the overall child survival effort, and not directed to NCP trial villages exclusively.

Women were asked to recall at what age they first breastfed their child, gave the child water or a particular food. Table 10 below shows the proportion of women in Trial and Comparison villages who gave their child a particular food, as well as the percent introducing the food no earlier than 6 months and no later than 8-10 months, consistent with NCP promotional strategies. Women in trial villages are significantly more likely to have given their children high quality complementary foods in a timely fashion than women in the same villages before the start of the intervention. Some improvements on a much smaller scale are seen in the comparison villages, although the smaller sample size makes it difficult to rule out the element of chance in the analysis of comparison villages.

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

Table 10   Reported Breastfeeding and Timely Introduction of Complementary Foods

Infant Feeding Practice	1990 Trial n=271	1994 Trial n=196	TRIAL Change	1990 Comparison n=260	1994 Comparison n=97	COMP Change
Give Breastmilk First	25 %	58 %	+33	30%	42%	+12
Introduce water after 4 months	10%	21%	+11	11%	17%	+6
Feed Porridge @ 6-8 months	33%	53%	+20	27%	42%	+15
Feed Fruit @6-8 months	12%	27%	+15	8%	11%	+3
Feed cow's milk @ 6-8 months	NA	22%		NA	14%	
Feed leaves/leaf sauce @ 6-8 months	NA	21%		NA	7%	
Feed Meat/Liver @ 6-10 months	18%	35%	+17	16%	14%	-2

In 94/95, significantly more women in NCP trial villages than in comparison villages gave "breastmilk" as the first substance offered to their child, which is also more than a doubling of the number doing so in 1990. In 1990 about 10% of the population, in either trial or comparison villages, claimed to have introduced water no earlier than four months of age. In 94/95 the percentage in trial sites has grown to 21%, with comparison sites not far behind at 17%. Giving children only breastmilk for the first 4 months is among the most problematic messages of Child Survival programs, as the belief that infants need water is so widespread, and the health system has only begun to recently promote optimal infant feeding. However, with time, it seems that this idea can take root.

While progress has been slow in promoting exclusive breastfeeding, there has been a substantial increase in the timely introduction of porridge in all Child Survival sites, although trial sites are ahead in this regard. The women in NCP trial villages are also more likely to introduce fruit and meat, and to do so in a timely fashion, than they were at baseline. Women in comparison villages have also increased timely introduction of fruit, but not to as great an extent as the trial villages. More trial women also provide cow milk for their infants (as complementary food), and green leafy vegetables, than comparison women (baseline data are not available for these foods).

In terms of the 24-hour dietary recall, mothers in trial villages mentioned more frequently feeding their children porridge or toh,[30] rice, leaf sauce, green beans and bananas. Women in *comparison* villages more frequently mentioned giving their children animal milk in the past 24 hours.

Parents of children less than 3 years of age, living in villages with NCP interventions, report better feeding practices than parents of children of the same age range residing in trial villages in 1990, or in comparison villages in 1994. Are there any linkages between NCP's presence and improvements

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[30]toh is pounded millet paste eaten as the primary staple dish, usually with a sauce.

in children's nutritional status, or are these changes due to confounding variables? This is explored in the next section.

4. Nutritional Status

a. Weight and Height Z-Scores among Trial and Comparison Children

Table 11 below shows the mean and standard deviation for the anthropometric indicators of children measured in the 1990 and 1994 surveys.

Table 11: Mean Z-Scores for Anthropometric Indicators[31] Dioro and Koutiala, 1990[32] and 1994

Trials							
	1990			1994			Sig. of change
	Mean	SD	N	Mean	SD	N	
WAZ	-1.55	1.28	201	-1.28	1.17	233	.01
HAZ	-1.82	1.47	191	-1.47	1.16	216	.001
WHZ	-0.39	1.28	195	-0.69	1.15	228	.005

Comparisons							
	1990			1994			Sig. of change
	Mean	SD	N	Mean	SD	N	
WAZ	-1.76	1.25	182	-1.76	1.29	122	NS
HAZ	-2.02	1.35	173	-2.17	1.50	118	NS
WHZ	-0.42	1.09	177	-0.60	1.00	122	.001

At the time of the 1994 survey, children residing in trial villages were significantly taller and heavier for their age than children in the same villages measured before the intervention in 1990. While the sample of children in Comparison villages in 1994 is smaller (and based on fewer villages), the mean anthropometric Z-scores are virtually identical to what there were in 1990. Height, which reflects more long-term nutritional status, improved for children in trial villages, whereas it deteriorated somewhat in comparison villages. Weight-for-height, which indicates an acute wasting condition, appears to get worse for both trial and

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[31]NB: As the mean Z-scores are all negative numbers, smaller absolute values are better.

[32]Dr. Beffon Cisse measured the nutritional status of children under the age of 3 in the circle of Kolondieba between January-March, 1990 for his doctoral thesis in medicine. While villages participating in the NCP project were not specifically included, villages with similar characteristics were. In a sample of 1694 children, he found a mean WAZ of -1.41, HAZ of -1.63 and WHZ of -0.66. These data suggest that nutritional status in Kolondieba was similar to Koutiala and Dioro in 1990.

comparison children. However, as will be discussed below, this measurement is highly associated with "illness" at the time of the survey, whereas the weight/height-for age measurements are not.

Figures *3a and 3b* plot the distribution of **Weight-for-age** Z scores in 1990 and 1994 for children in Trial and Comparison villages, separately. Figures 4a and 4b show the **Height-for-Age** distribution.

Figure 3a
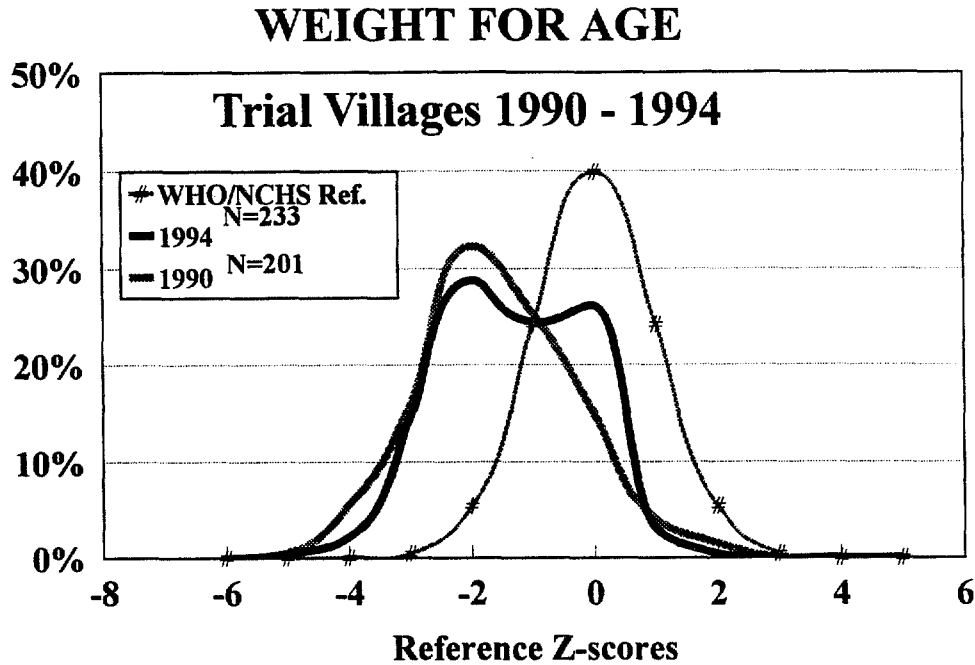
WEIGHT FOR AGE
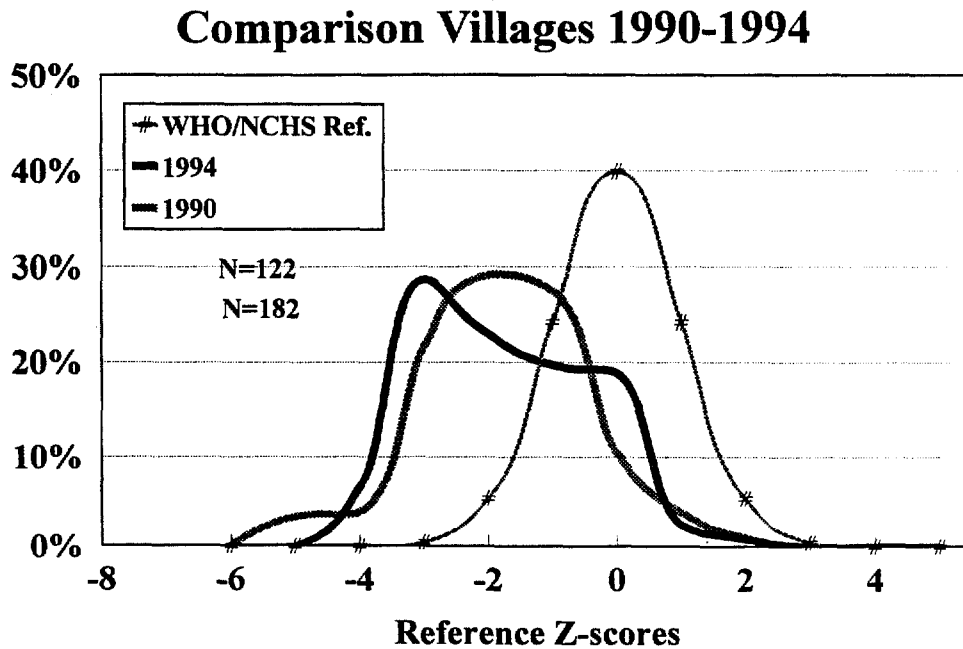
Figure 3b

HEIGHT FOR AGE
Trial 1990-1994

Figure 4a
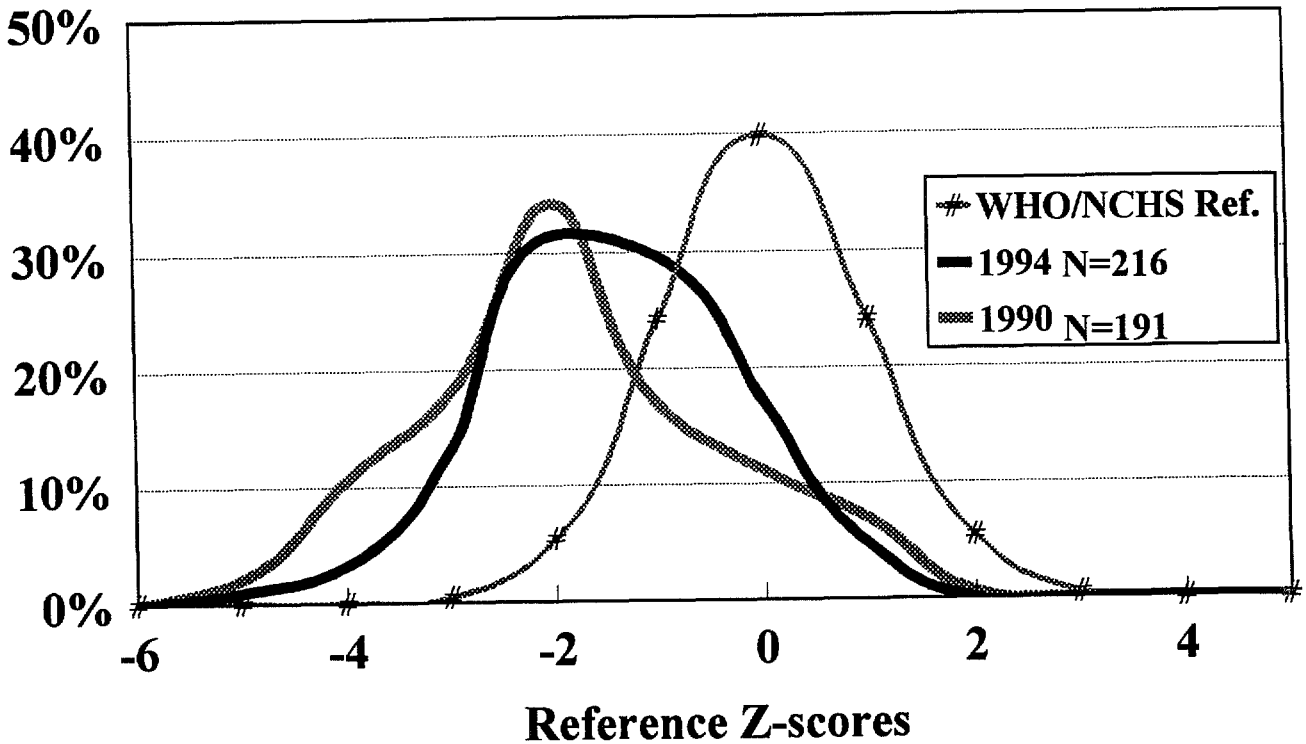
Figure 4b
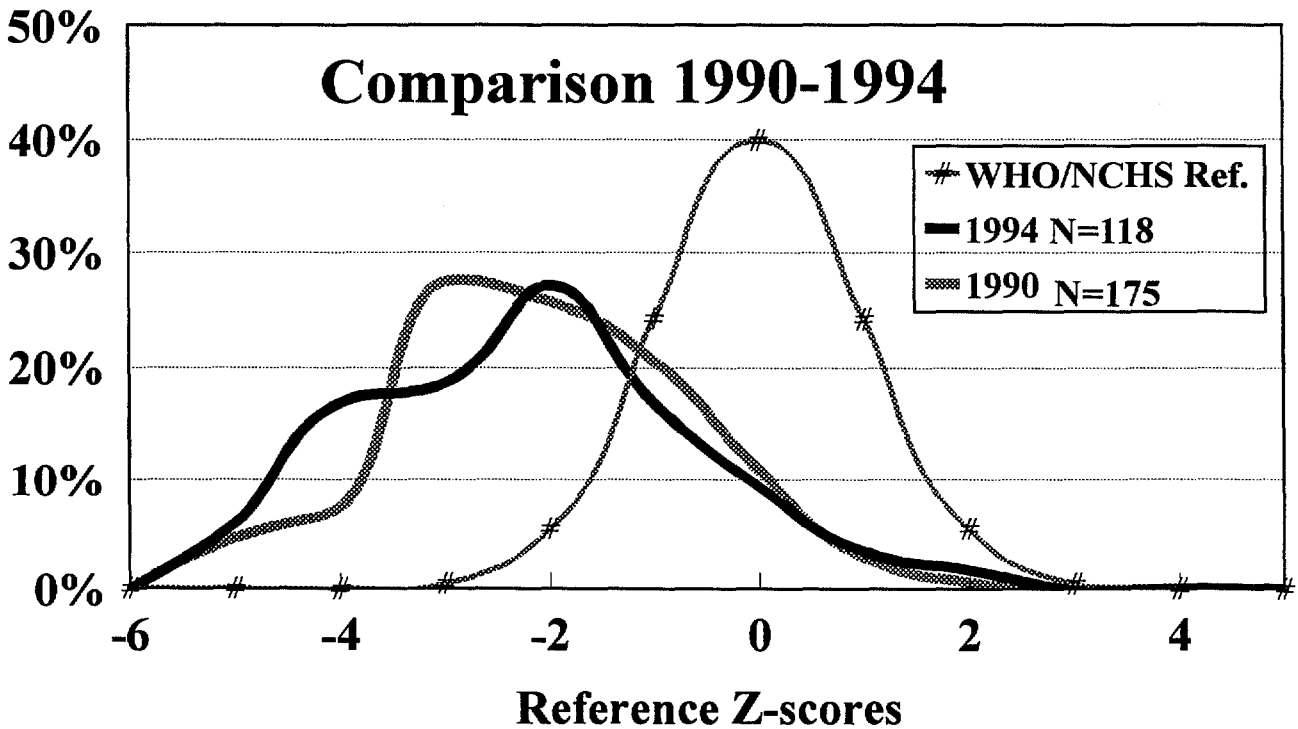
b. Prevalence of Malnutrition

(1) Pooled Data: Trial v. Comparison children

General malnutrition, which is assessed using the percent of children less than -2SD below the reference mean for weight/age, dropped 10 percentage points in trial villages (from 38% to 28%), while it increased slightly (From 42% to 43%) in comparison villages This is shown in Figure 1. NCP trial villages also show dramatic reductions in stunting, with an overall decrease of 15 percentage points (from 46% to 31%). In comparison villages, stunting climbed by 2.5 percentage points (from 50% to 52.5%). This is shown in Figure 5.

Figure 5

Percent of Stunted Children

	N=190	N=216	N=175	N=118
< -2 SD ☐	46%	31%	50%	52.5%
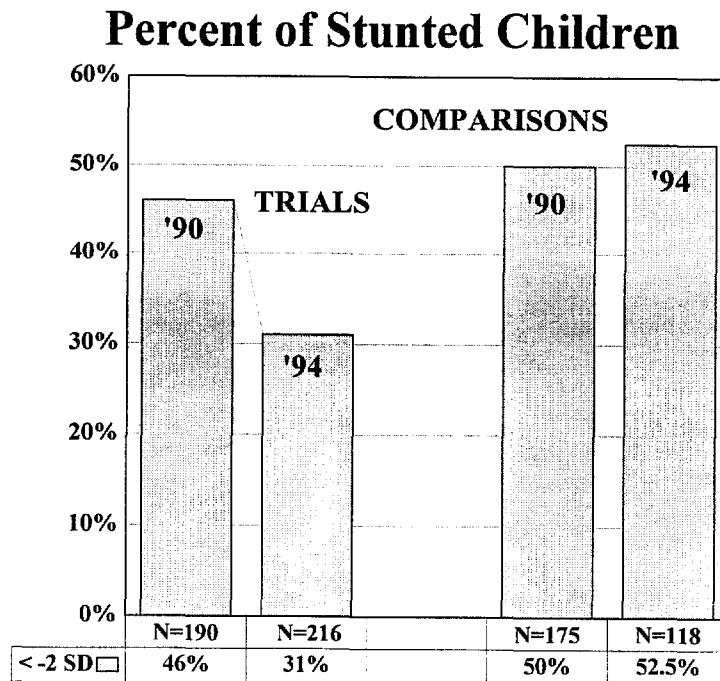
In 1994, 10.5 % of the children in trial villages show signs of wasting (low weight-for-height), which is a slight, but insignificant decline from the baseline of 11%. Wasting remains similarly unchanged in comparison sites, resting at 6% in 1990 and 6.6% in 1994. This is shown in Figure 6. As will be discussed in the cross-sectional assessment, low weight-for-height indicates an "acute" state, and does not seem particularly useful for assessing changes over a long time period. Weight-for-height is a very useful indicator for monitoring individual children's growth, and, in this case, identifies those children who are taller (i.e. they are not stunted), but temporarily suffering from low weight. Over 80% of these children were sick within 2 weeks (or at the time) of the survey.

Figure 6

Percent of Wasted Children

	N=195	N=228		N=177	N=122
< -2 SD ▢	11%	10.5%		6%	6.6%
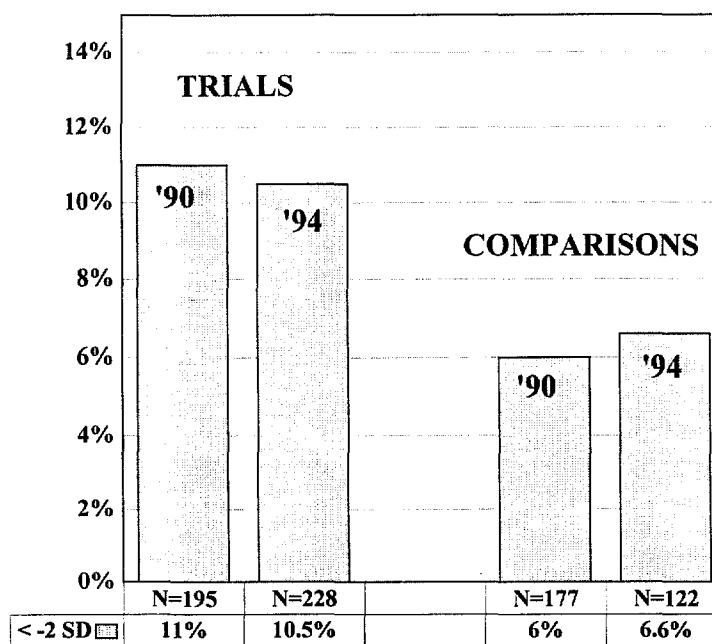
(2) Changes in Prevalence of Malnutrition at the Village level: 1990-1994 comparisons

Table 12 below shows the 1990 and 1994 levels of malnutrition, using the village as the unit of analysis. This is a less powerful analysis, as the sample size is 8 and 4, than using pooled children's data. The results, however, are quite similar to those reported above.

Table 12   Changes in Prevalence of Malnutrition using Village as Unit of Analysis: Pre-Post

Anthropometric Indices of Malnutrition	AVERAGE CHANGE	
	Trial Villages	Comparison Villages
Percent Weight-for-Age Z Score < -2 SD	-11.35	-1.95
Percent Height-for-Age Z Score < -2SD	-14.86	+12.8
Percent Weight-for-Height Z Score < -2SD	+2.26	-4.8

Appendix C, Tables 5-7 provide village-by-village statistics for these anthropometric indices.

c. Confounding Factors in Pre-Post Analysis

(1) Stratified Analysis of WAZ by bike/radio ownership within Time

Two summary scores for wealth were created to distinguish individuals owning more equipment (such as radios, bicycles, carts) or more livestock (e.g. cow, sheep), as described previously. Individuals were classified as being in the top or bottom 50th percentile for each of these parameters. A stratified analysis of weight-for-age Z scores was performed controlling for these two wealth categories. In addition, as bicycles and radios strongly distinguished trial and comparison groups (see Table 8), these were examined for their association with WAZ within time categories.

Table 13 below shows a stratified analysis of the association between either "owning a bicycle" or "owning a radio" on mean weight-for-age Z score at the time of each survey.

Table 13   Own Bike or Radio: Impact on WAZ in 1990/1994

Ownership	Yes - Mean WAZ	N	No - Mean WAZ	N	Significance
1990					
Bike	-1.6	211	-1.6	168	NS
Radio	-1.5	174	-1.6	205	NS
1994					
Bike	-1.4	143	-1.5	89	NS (.57)
Radio	-1.2	120	-1.6	114	NS (.07)

While bike and radio ownership are among the most distinguishing factors between the trial and comparison groups in terms of wealth differences, ownership of these possessions is not associated with having children with better nutritional status.

(2) Changes over Time; How are NCP & Wealth associated with WAZ?

In order to analyze how much of the change between pre-intervention and post-intervention weight-for-age Z scores is associated with program-related inputs and not confounding, two analyses were done. One on the village level change (reported in Table 12 above), and one using the individual as the unit of analysis.

(a) Village as unit of analysis within Trial and Comparison Groups

Multiple regression and analysis of variance were performed to analyze the potential confounding effects of mean village wealth scores in 1990 and 1994, and mean village WAZ scores in 1990, on the village change in WAZ achieved in 1994. Villages were grouped according to NCP status (Trials and Comparisons). Using these techniques,

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neither the previous village mean, nor the wealth scores at either time, were significantly associated with the change in WAZ[33].

(b) Individual as unit of analysis within Trial and Comparison Groups

Using MANOVA techniques to compare Trial and Comparison groups by Time, holding their household wealth category ("richer" or "poorer") constant, showed that NCP's impact was slightly greater, and achieved statistical significance, in the "richer" category, as shown in Table 14 below:

Table 14 MANOVA of WAZ by NCP status within Wealth groupings over Time

		Richer	Poorer
		Mean Z-Scores, Weight-for-Age	
1990	Trial	-1.5 (N=99)	-1.6 (N=102)
	Comparison	-1.7 (N=95)	-1.8 (N=87)
1994	Trial	-1.1 (N=120)	-1.5 (N=113)
	Comparison	-2.0 (N=29)	-1.7 (N=93)
		Decrease (-) or Increase (+) in Mean Z Score	
Change w/in Trial by Time		+.4SD, F=5.49, p=.02	+.1SD, F=1.09 p=.3 NS
Change w/in Comp by Time		-.3 SD, F=.73, p=.39 NS	+.1SD, F=.26, p=.6 NS

The sample sizes by cell become quite small for this analysis, particularly for the Comparison group. While the Trial group clearly achieves a significant improvement over time, while the Comparison group does not, most of this change is accounted for by children in the "wealthier" category. However, given the errors of sampling mentioned above, another way of interpreting these data is that most of the change is accounted for by children living in the region of Koutiala, where the majority of Trial children resided in 1994. Wealth alone is not responsible for this change, as suggested by contrasting the mean Z-score of children in the "richer" comparison group (-2.0) to children in the "poorer" trial group (-1.5). It does suggest that families with marginally better incomes, (which characterizes the region of Koutiala), if given nutrition education, make more effective use of this input than poorer families are able to do. In the cross-sectional analysis described below, the survey's wealth indicator is not significantly associated with growth when NCP program inputs are entered in the analysis.

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[33]Trials: Change in WAZ Intercept = 21.9, t=1.1, p=.3; Covariates (Old WAZ) 3.6, t=.4, p=.7; (Wealth) -3.6, t=-1.3, p=.3.
Comparisons: Change in WAZ Intercept = -110.6, t= -.7, p=.6; Covariates (Old WAZ) 3.17, t=.1, p=.9; (Wealth) 25.0, t=1.4, p=.39.

5.   Conclusion, Part IV

Because of deviations from the original research design (e.g. CARE dropped out; World Vision began applying NCP in all of its Child Survival villages by the 3rd year), and an error made in selecting villages for inclusion in the final survey (the majority of "trial" villages come from World Vision/Koutiala, the majority of "comparison" villages come from Africare/Dioro), the pre-post analysis results, while quite striking, are difficult to defend. However, they are consistent with both the retrospective results, as well as NCP's pre-post evaluation conducted for the CARE/Macina project in 1993. These pre-post data make a case for the *plausibility* that improvements in nutritional status are related to NCP alone and not other time- or regionally-affected factors (such as wealth, food availability, etc.)

V. RESULTS: CROSS-SECTIONAL COMPARISON OF VILLAGES AND INDIVIDUALS BY STRENGTH OF NCP EXPOSURE ASSESSED IN DECEMBER, 1994-JANUARY, 1995

A. ANALYTICAL FEATURES

1. Design

This analysis looks at the relationship of outcome variables (children's nutritional status, parents knowledge and behavior) to the "strength" of the NCP intervention which is measured two ways: (1) the length of time a village participated in NCP interventions (between 1/92 and 12/94); (2) individual recall of specific NCP media (5 media are scored).

2. Selection of Villages

Villages from Africare/Dioro, Save the Children/Kolondieba, and World Vision/Koutiala are included as explained previously, highlighted below in Table 15:

Table 15   Selection of Villages in Cross-Sectional Assessment

Site	1990	1994	Cross-Sectional
Dioro	XXXXXXXX	1 X	HI X_1
		2 X	
		3 YYYY	INT. X_2xxx
		4	
	YYYYYYY	5 xxx	LO/NO YYYYy
		6 y	
Koutiala	XXXXXXXX	1 XXXXX	HI $X_1X_1X_1X_1X_1$ X_4X_4
		2 X	
		3	INT. X_2
		4 xx	
	YYYYYYYY	5	LO/NO yy
		6 yy	
Kolondieba		1	HI xxxxxx
		2	
		3	INT. xxx
		4 xxxxxx	
		5 xxx	LO/NO y
		6 y	

3.   Hypotheses to be tested in Analysis 2:

a.   Children less than 3 years of age, living in villages with more NCP involvement ("High") will have better nutritional status (measured by anthropometric indices of weight-for-age, height-for-age and weight-for-height) than children of the same age range residing in villages with no or a low level of NCP involvement ("Low/No").

Specific associations to be tested are:

(1)   Pregnant women, and parents of children less than 3 years of age, living in villages with high NCP involvement, will have higher *individual exposure scores* than parents in low involvement villages (i.e. the media reached the target audience).

(2)   Recalled exposure to NCP will be positively associated with nutrition knowledge.

(3)   Recall of specific NCP messages will be positively associated with reported *behavioral outcomes* (measured 24 hour recall, food purchasing, child feeding skills).

(4)   Parents' knowledge and reported behavior will be positively associated with children's nutritional status.

b.   The likelihood that these associations are due to chance, or to confounding factors, is very small.

The analytical pathway is diagramed in Figure 7.

Figure 7

37
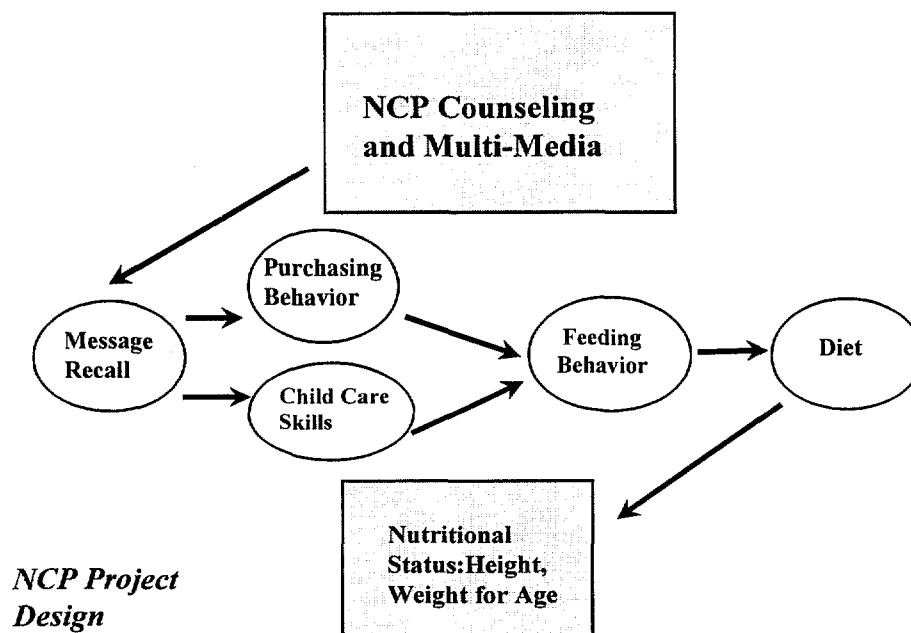
B. FINDINGS

1. Sample Characteristics

a. Sample of Men, Women and Children by Exposure Group

Table 16   Cross-Sectional Sample, 1994

Category	Total	High NCP	Intermediate	Low/No
Women	712	337	187	188
Men	354	169	92	93
Children	845	388	227	230

Of the 845 children in the total sample, 823 (97%) had sufficient data to analyze weight/age and 796 (94%) had sufficient data to analyze height/age.

b. Demographic Variables

Few adults knew their age, and there was no schooling in the region. Numbers of children per household were distributed without any significant differences in the entire sample population. Table 17 reports this and other household information. These characteristics were unrelated to any outcome variables.

Table 17   Household characteristics Cross Sectional Sample

Monogamous	49%

Polygynous: Woman interviewed by "marriage" order:
 	
          1st
          2nd
          3rd
	51%
	
	48%
	41%
	10%

Boys in sample Girls	444 412
Mean age of children in sample	16.0 months
Mean Number of children per household	4.3

The distribution of ages within the sample are shown in figure 8 below. While there is some heaping which is reflected in the difference in the mode for each sub-sample, the mean age for each group is 15.6 (low); 15.5 (intermediate); and 16.3 (high). The difference is not significant (p=.6).

Figure 8   Age Distribution in Cross Sectional Sample
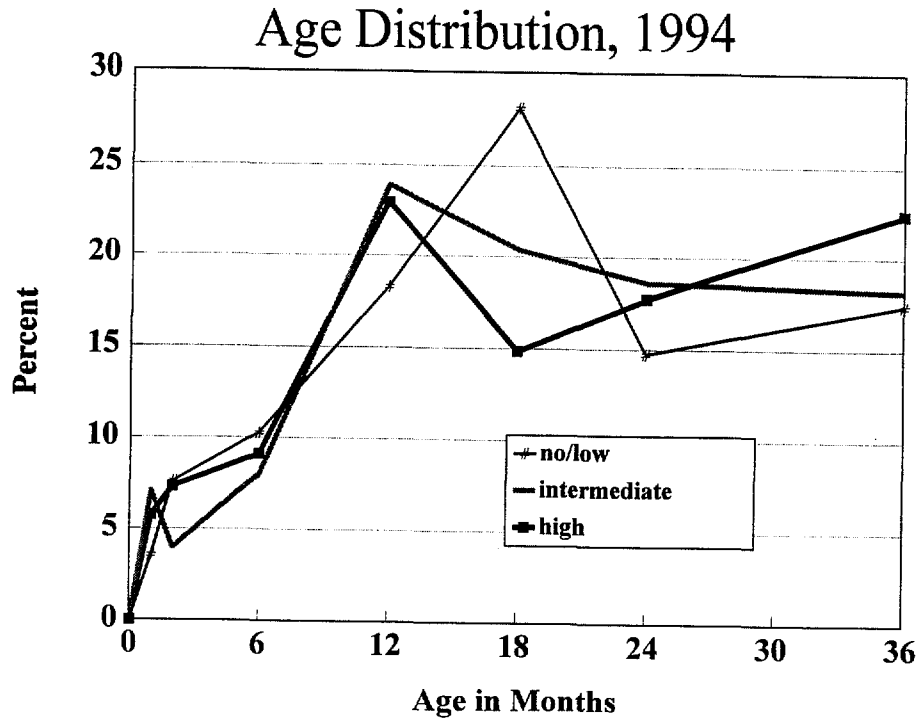
d. Health of children

Mothers were asked about the health of their children during the 2 weeks prior to the survey. There were no significant differences among villages. **Overall, 61% of the children had been sick, 27% with diarrhea.** The other suffered from fevers, coughs, vomiting, skin or eye problems. As will be discussed, there is a strong negative association between children's weight-for-height and illness status. Being sick does not predict which children have better or worse weight-for-age or height-for-age, and is not related to NCP exposure level. Reported illness by NCP exposure level is shown in Table 18 below.

Table 18   Children's Sickness Two Weeks Prior/During Survey by NCP Category

	Total	High NCP	Intermediate NCP	No/Low NCP	Signif. (Chi Sq.)
Sick (n=542)	61%	64%	53%	63%	.11 (NS)
Diarrhea	27%	29%	21%	30%	.16 (NS)
Vomiting	14%	13%	14%	16%	.58 (NS)
Fever	26%	27%	23%	28%	.56 (NS)
Cough	24%	27%	22%	22%	.36 (NS)

(NB: All percentages are from total N. More than one symptom may have been reported).

e.   Child Survival variables

Table 19 shows the indicators of child survival program inputs collected in the survey.

Table 19   Child Survival Program Inputs by NCP Classification

	High NCP	Intermediate NCP	No/Low NCP
Pump for water source	30%	30%	40%
Filter water	47%	31%	22%
Vaccination card	58%	67%	66%
Measles vaccine	40%	44%	43%
Received Vitamin A capsule	12%	10%	15%

Apart from filtering water, no other child survival program in-put was found to be significantly associated with exposure to NCP. The impact of this one distinguishing factor is discussed in the analysis of confounding section (see p. 62). As one of the NCP flip charts discussed filtering water, and it may well have been the topic of role plays developed by NCP-trained animators, it is difficult to say this was not also influenced by NCP.

f.   Wealth indicators

Wealth indicators as distribution by NCP exposure classification are shown in Table 20.

Table 20   Percent of Men Reporting Ownership of Household Items and Livestock, by NCP Exposure Categories, 1994

Household Item and "point value"	High	Intermediate	No/Low	Significance
Donkey (2)	50%	36%	38%	NS
Cart (2)	52%	37%	42%	.05
Working Radio (1)	60%	34%	42%	.0004
Bicycle (2)	82%	57%	48%	.00000
Chicken (1)	83%	70%	62%	.004
Sheep (1)	53%	53%	51%	NS
Cow (2)	60%	52%	54%	NS

These variables were combined into two scales, household possessions and livestock. The scales were based on the point values above. Those individuals with more points than the median were classified as upper 50th percentile for each scale. The break-down by NCP exposure classification is shown in Table 21 below.

Table 21 Relative Wealth Classification

Wealth Category	High	Intermediate	No/Low	Significance
Upper Half - Possessions	56%	37%	39%	.004
Upper Half-Livestock	58%	49%	46%	NS

2.   Program Indicators: NCP Reach

a. Program Coverage

The bottom line reach of NCP is about 50% of women, and 30% of men saw at least one intervention. Individual exposure score was calculated based on the first 5 interventions in the table below (radio was handled separately as its range was not limited to the NCP trial or high exposure sites). A maximum score of 8 was possible if the individual saw each NCP intervention through a community agent, as well as saw a sketch and participated in a flip chart session. Among women in high and intermediate exposure areas, **26% received an exposure score of 3 or more**, with 10% remembering both flip charts and counseling card sessions, and an additional 6% saw these interventions as well as remember the radio show. Approximately 22% of men also received an exposure score above 2. Total percentages of individuals receiving scores ranging from 0-8 in the sample of male and female participants *presumably exposed* to NCP (i.e. high and medium exposure villages), N=785, is shown in Table 22 below:

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Table 22   NCP Exposure Scores for Target Audience Groups in High/Medium NCP Villages

Score	Pregnant Women N=111	Moms: 0-6 months, N=71	Moms: 7-36 months, N=342	Men, N=261
0	54.1 %	53.5	52.6	71.6
1	15.3	12.7	11.7	5.4
2	6.3	14.1	12.6	1.1
Maximum Impact in Group Below: Total	24.3%	29.7%	23.1%	21.9%
3	7.2	5.6	7.9	9.6
4	.9	1.4	1.5	1.5
5	8.1	0	4.7	2.3
6	1.8	8.5	2.6	4.2
7	.9	0	0.3	0
8	5.4	4.2	6.2	4.2

Village by village exposure scores for men and women appear in Appendix C, Table 4.   The ability of individuals to recall NCP interventions is consistent with the presumed level of exposure according to "high", "intermediate" or "Low/no" classification.   This is shown in Table 23 below.

Table 23   Average Exposure Scores by Gender and NCP Classification

Category:	Exposure Scores			
	High Mean	Intermediate Mean	Low/No Mean	Sig.
Women	2.06	0.66	.43	.000
Men	1.34	.79	.31	.000

On average, there is a good correlation between length of time engaged in NCP ("High", "Intermediate" and "No/Low") and the project's reach. With a maximum individual media recall score of 8, women in "high" engagement villages average 2, women in intermediate engagement villages are less than 1, and in "no/low" engagement villages it is 0.43. The difference of the means (ANOVA) was highly significant (p=.000). Based on recall, villages participating more than 6 months but less than 1 year, or who dropped out of NCP more than 2 years ago after 1 year, ("intermediate") in fact, register little more than supposedly non-participating villages. Exposure in Low/No villages is partially due to a few extraordinary events. In one non-engaged village 22 women (out of 30) remembered seeing an NCP play.

However, this appeared to have been the only form of communication they had, and it occurred <u>after the October, 1994 training</u>. As the survey took place in December, 1994, it is not expected that this exposure could affect children's nutritional status, however, knowledge and reported behavior could well have been influenced. The averages result in the following reach for NCP interventions by exposure category:

Table 24   Percent recalling 1 or more NCP intervention by Gender and NCP Classification

	High	Intermediate	Low/No
Women	56.1	30.5	20.7
Men	33.7	18.5	10.8

Proportionally, 21% of women in No/Low engagement villages had an exposure score of 1 or more (i.e. recalled at least one NCP media contact) in contrast to 31% of women in Intermediate villages and 56% of women in High engagement villages. This creates almost a "dose" effect between length of time engaged in NCP (High, Intermediate and Low/No) and actual "exposure" to multiple NCP media. Again, men's scores are lower, but follow the same general pattern. A number of questions were used to pick apart exposure, recall, and their effects on behavior and nutritional status. These are presented below.

    b. <u>Recall Hearing/Seeing specific NCP messages</u>

        (1) Flip Charts

Survey participants were shown examples of media used in the NCP intervention (1 flip chart picture and 2 counseling cards). *(Please see Appendix A-questionnaire.)* The first set of
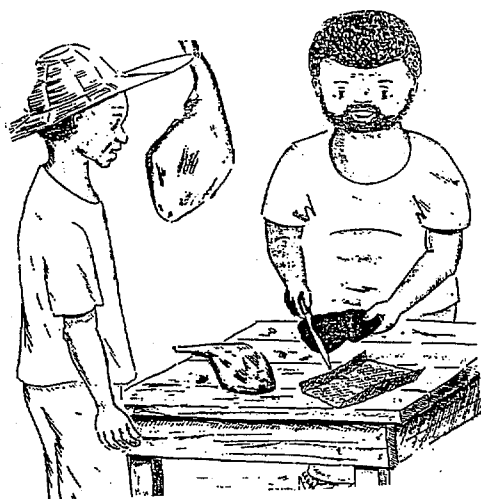
questions dealt with an image from the earliest NCP flip chart, introduced after the December, 1990 training-illustrated below. Respondents who said they had not seen the <u>picture</u> before were asked about the meaning. As it was possible they had heard the information through another channel, the following questions were asked: "Besides the picture I'm showing you, have you ever heard that it is important to eat liver?" Have you heard it from your spouse? mother/father? neighbor? Did you see it in a village role play? Did you see it in a "picture box" (which could be the flip chart, or another portable display.) Did you hear it on the radio? Table 25 shows the extent to which women report seeing and hearing various NCP messages:

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Table   25 Recall Hearing/Seeing "Liver" messages contained in NCP Flip Chart by Village Exposure Level

Flip Chart	High N=337		Intermediate N=187		Low/No N=188	
Said "Seen picture before	81	(24%)	10	(5%)	8	(4%)
Percentage in items below are of the population claiming to have seen the picture before.						
Community agent showed it	51	(64%)	4		2	
Health center staff/doctor	23	(29%)	4		0	
One-on-one (NS)	2		1		0	
In a group	79	(98%)	8		3	
Said "Not seen picture before"	204		176		180	
Percentage in items below are of the population claiming to have not seen the picture before (NB:.Total excludes NRs.)						
	N=200		N=173		N=180	
Heard about buying liver from spouse (NS)	22	(11%)	19	(11%)	14	(8%)
Heard about buying liver from parents (NS)	59	(30%)	67	(39%)	76	(42%)
Heard about buying liver from neighbor (NS)	29	(15%)	26	(15%)	27	(15%)
Saw a role play (NS)	10	(5%)	9	(5%)	16	(9%)
Saw a flip chart (NS)	10	(5%)	11	(6%)	5	(3%)
Heard it on the radio	20	(10%)	11	(6%)	10	(6%)

It is important to keep in mind that the picture from the flip chart was one of about 100 pictures that make up the entire flip chart series currently in use by NCP. Even if respondents had seen the picture before, the likelihood that it would be remembered would certainly depend upon how recent the exposure was, and the circumstances. The flip charts were introduced early in the NCP program, and many agents stopped carrying them once they had the more portable cards in 1993. However, the flip chart picture maintained a respectable 23% of the women remembering it, and as will be discussed in Section c below, virtually every person who saw the image could provide a relevant message un-aided by the interviewer.

(2) Radio or Role Plays

While we expect it was difficult for participants to extrapolate from a visual image to whether they had seen a play or heard a radio spot on the same subject, we asked anyway. About 5% of the respondents, regardless of village exposure level, claimed they had seen a play on the subject, loosely stated as "a man buying liver for his family." The radio drama and spots had been on the air about 2-5 weeks (2 weeks by the time the survey was started in Koutiala, 5 weeks by the time of its conclusion in Kolondieba). The fact that 6%-10% of the women remembered hearing about this topic on the radio speaks well for radio's power as a health communication tool. While the findings above are somewhat preliminary, they suggest that women who were already sensitized to the subject by other

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channels (health and community workers) were more likely to remember hearing the spots on the radio. The radio station broadcasts nationally. Interesting to note, while Koutiala men possessed more radios, there were as many survey participants in Kolondieba who heard the program. This suggests that continued broadcast and word-of-mouth might be able to overcome limited radio ownership at the community level.

(3) Counseling Cards

Two of 10 counseling cards, introduced in early 1993, were tested in the survey. These are illustrated below:

Counseling Card No. 5

Card 10
Questions C 48—
53
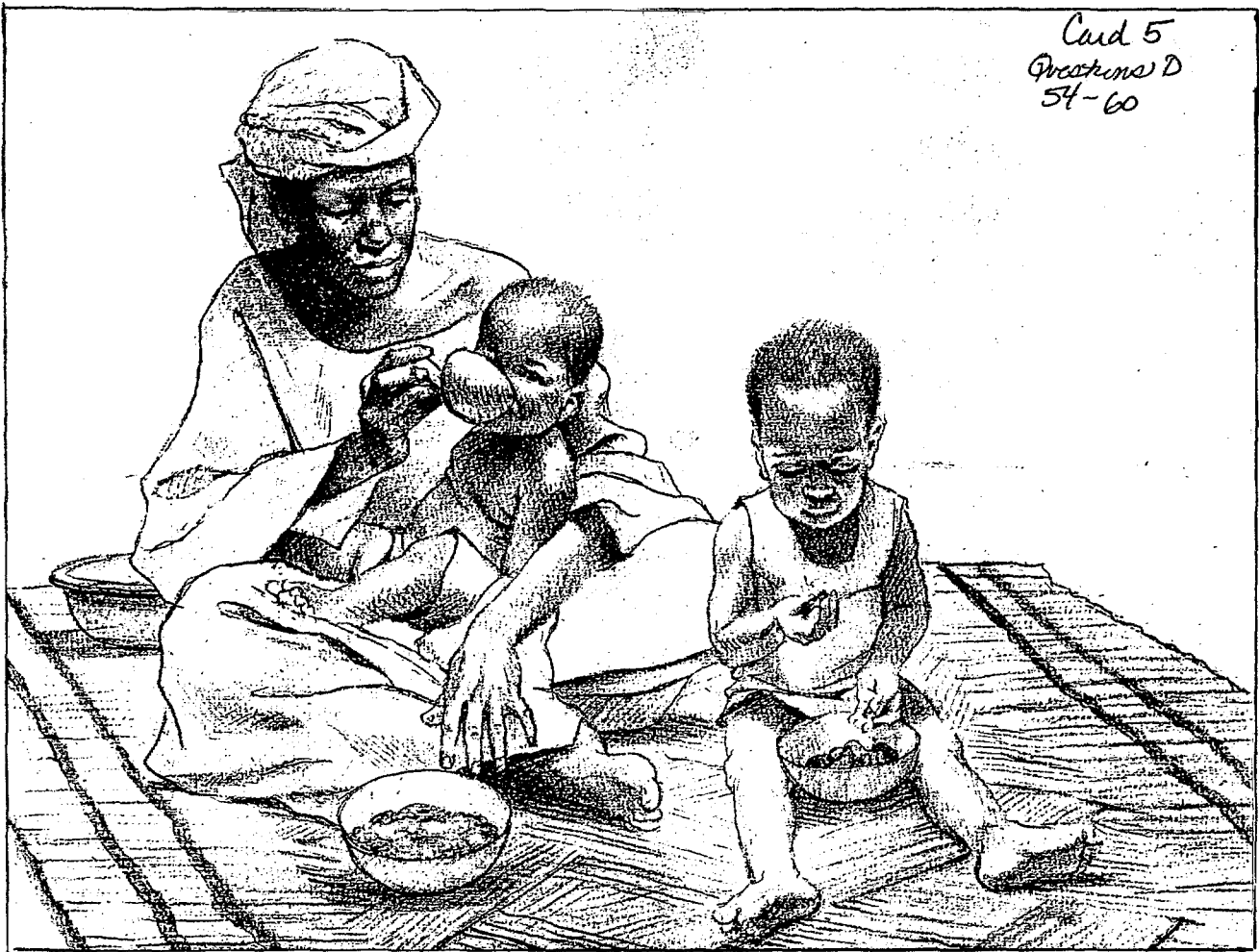
Table 26 below shows the penetration of NCP messages related to specific feeding skills illustrated by the counseling cards. Additional message channels are also investigated.

Table 26   Recall Hearing/Seeing Feeding Skill Messages in NCP Counseling Cards by Village Exposure Level

Counseling	High N=337		Intermediate N=187		Low/No N=188	
Seen Card 10 before	138	(41%)	20	(11%)	14	(7%)
Saw Card 5 before	116	(34%)	21	(11%)	10	(5%)
Items below are out of the population answering "yes" to the questions above.						
Community agent showed card 10	90	(65%)	10		7	
Health worker/doctor showed card 10	36	(26%)	5		2	
(Also) Learned about using feeding bowl (card 5) from mother	23	(20%)	21		4	
(Also) Learned from neighbor/village volunteer	19	(16%)	6		1	
(Also) Learned from community agent	61	(53%)	32		3	
(Also) Learned about using bowl from health center staff	31	(27%)	18		2	
(Also) Heard about feeding bowl on the radio	6	(5%)	7		0	

As mentioned above, the counseling cards are much newer materials than the flip charts. Forty-one percent of the women in High engagement villages recall seeing the card on recuperative feeding (No. 10) before, and 34% remember the card on feeding practices. The women in Intermediate villages lag far behind.

Overall, the women who were systematically exposed to NCP media have a relatively good recall of the images and messages, from 24% for the older flip charts to 34-41% for the newer counseling cards. The association of message recall (knowledge) on reported behavior is examined in the analyses below.

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3.   Purchasing Behavior

In the analyses below, High and Intermediate engagement villages are combined to contrast with No/Low Engagement villages.

a.   Men's Purchasing Behavior

The Top 10 foods promoted by NCP appear in the box:

Figure 9 shows the percent of women who report that their husband brought something other than the expected millet home to eat within the past week compared to those who brought one of the Top 10 foods recommended by NCP. Men in villages engaged in NCP were far more likely to bring an additional food home, and somewhat more likely to bring a recommended food, than men in Low/No engagement villages.

1 Liver   2 Milk
3 Meat   4 Green leaves
5 Peanuts
6 Fruit   7 Carrots
8 Other vegetables
9 Eggs   10 Bean cakes

Figure 9

Man brought food home for family
(in addition to millet)

Percent saying "yes"

According to women, N=712, p=.02
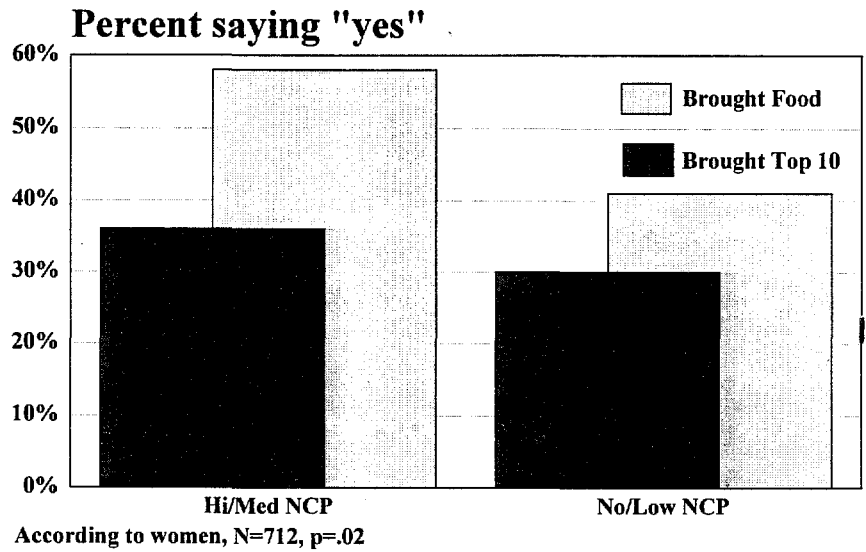
b.   Women's Purchasing Behavior

Figure 10 shows the proportion of women who received money from their husbands, as well as the foods they purchased with this money. Women in High/Medium villages were far more likely (p=.004) to purchase one of the recommended foods for their own and their children's consumption than women not receiving much NCP exposure.

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Figure 10

Money spent on healthy foods

Percent giving positive response

Among women, N=712, p=.04
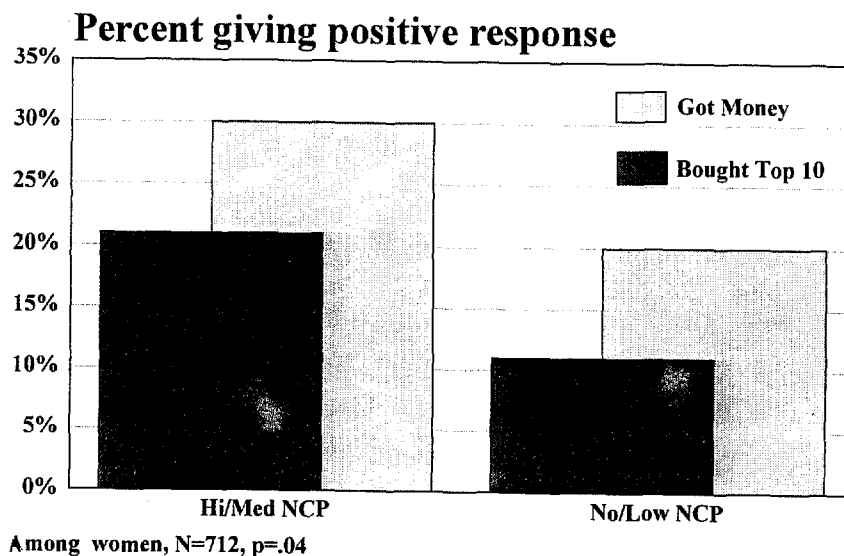
c. <u>Do men and women agree about how often liver is purchased?</u>

NCP strongly promoted that pregnant and breastfeeding women need more nutritious foods, with certain animal products featured because of their iron and vitamin A content. The data were analyzed to see the difference in *reporting* of liver purchasing *by gender and maternal classification*. Figure 11 shows the difference between what men say they purchased for their wives and children, and what pregnant and breastfeeding women said was purchased. Whether it is a difference in "reporting" or "actual purchasing behavior," it appears that pregnant women receive liver about half as often as men say they buy it, whereas nursing women report levels closer to men's estimations. The difference may be accounted for by some going to children, although it is not inconceivable that men over-reported liver purchasing more than women.

Figure 11

Reported Liver Purchasing by Men

Frequency of Purchase in 2 wks

N=599, p< .05

49
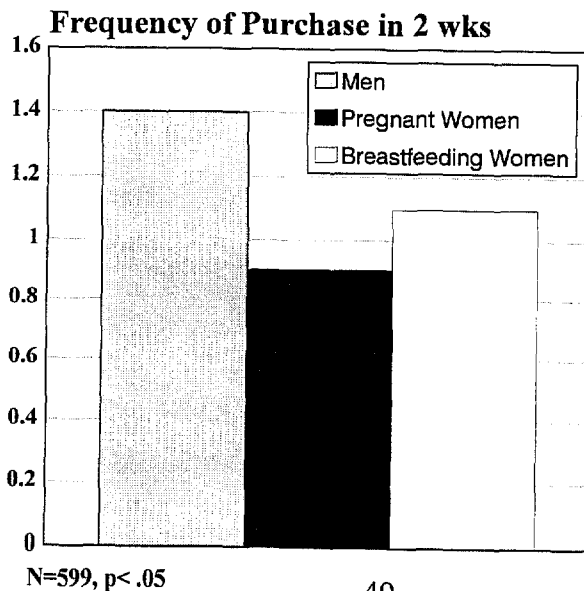
d. Purchasing and Consumption by Specific NCP Messages and Media

(1) Liver Purchasing Behavior

Figure 12 shows the frequency of liver purchasing during the 2 months prior to the survey with recall of specific NCP messages. This was answered by all adults (n=1066).

Figure 12

How many times liver purchased in past 2 months by message recall

ANOVA p=.007

Recall Message:

Recall Message	
Didn't See/Remember	n=445
"Something Else"	n=51
Men Are Also Responsible	n=16
Women And Children Need Liver	n=30
Prevents/Cures Night Blindness	n=25

All adults in study N=1066 Times Liver Purchased
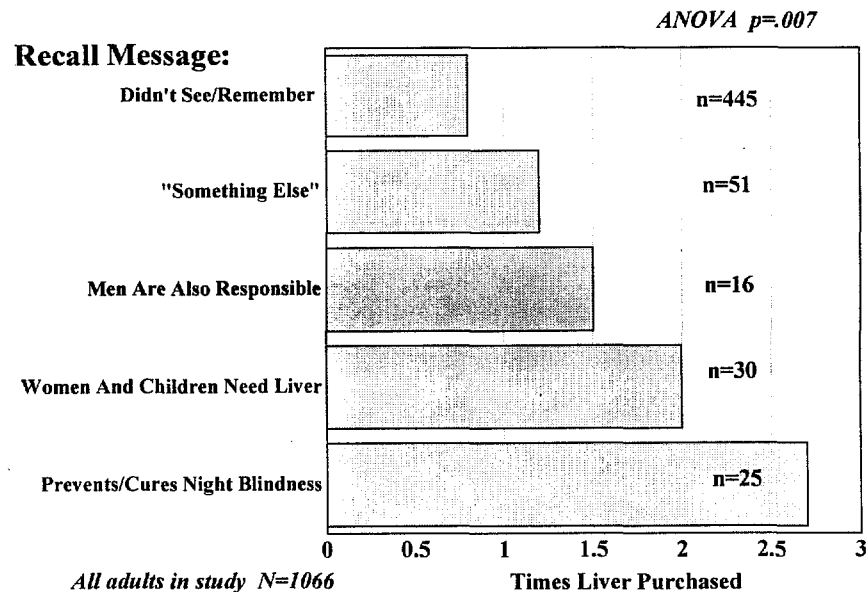
Those who did not see the flip chart or recall any messages purchased liver, on average, once during the time period. Parents who learned that "men are also responsible for providing liver for the family" on average purchased liver 1.6 times; those who learned that "women and children need liver" purchased liver 1.7 times. Those who remembered learning that liver can prevent or cure night blindness claimed to have purchased liver 3 times in the past 2 months. These relationships were quite significant (F=7.6, p=.0000).

(2) Radio's impact on meat purchasing behavior

The NCP radio spot series on pregnant women's and children's dietary needs had been on the air only 3-6 weeks prior to the survey implementation (depending upon the region). Among those who heard the spots at that time (N=73), 63% purchased meat for women and children to eat during the two weeks prior to the survey. Among those who knew they had not heard the spots (N=85), only 47% bought meat during the same period. The difference is significant (p=.003).

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Figure 13

Among men, meat purchasing by radio spot recall

Heard Spot   **Did not hear Spot**

Bought Meat   Bought Meat

63.0%   47.0%

37.0%   53.0%

Didn't Buy   Didn't Buy

N=73   N=85

Chi sq. p=.003, controlling for wealth
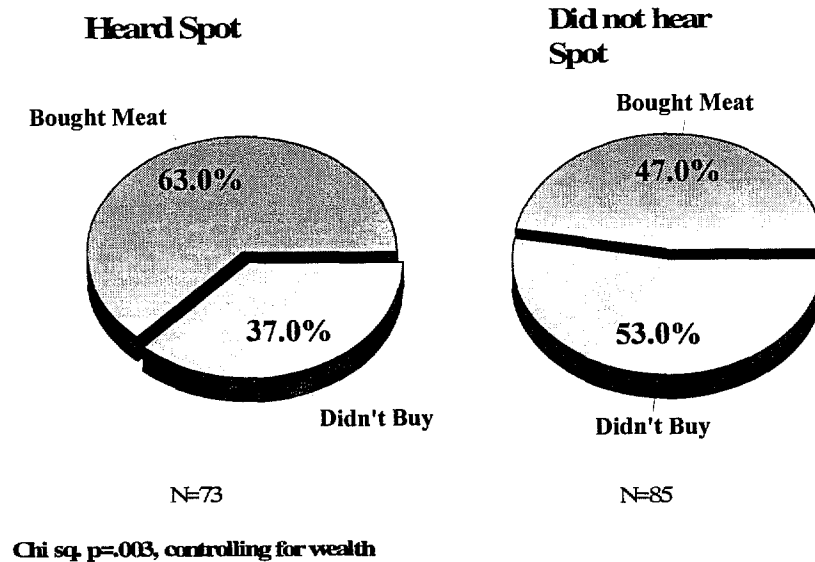
e. <u>Purchasing by wealth indicators</u>

The extent to which a man owns either household possessions or livestock did not influence whether he gave his wife money to buy foods for the family in this sample. That is to say, those who are richer were no more likely to give their wives money for food than those who are poorer.

Owning more livestock *was* associated with a higher likelihood of bringing additional foods home. Apart from liver (examined below), those who own more livestock were not likely to buy animal products for household consumption, nor did they buy more vegetables. They purchased more *cakes, snacks and other foods.* Not surprisingly, those who *own more livestock were more likely to consume milk; but not more likely to consume more eggs and meat.*

Table 27 below shows an analysis of the relationship between wealth indicators and liver purchasing in families with children measured in the study (n=567).

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Table 27   Analysis of liver purchasing by NCP message recall within wealth categories

Variables in Analysis	Mean (s.d.) Liver Purchase	N	Significance (ANOVA)
Co-variate (POSSESSIONS)			F=.37 p=.55 (NS)
Lower 50th Percentile			
Didn't See/Recall message	0.8 (1.6)	246	
Remembered NCP message	1.6 (2.5)	19	
Upper 50th Percentile			
Didn't See/Recall message	1.2 (2.0)	280	
Remembered NCP message	2.8 (3.2)	22	
Co-variate (LIVESTOCK)			F=7.9 p=.005
Lower 50th Percentile			
Didn't See/Recall message	.75 (1.5)	218	
Remembered NCP message	1.1 (1.5)	15	
Upper 50th Percentile			
Didn't See/Recall message	1.2 (1.9)	308	
Remembered NCP message	3.0 (3.0)	26	
Main Effects (MESSAGES)			F=8.2 p=.000

This analysis demonstrates that owning more household possessions is not significantly associated with purchasing more liver, while owning more livestock is. However, regardless of wealth classification (richer, poorer within indicator), "remembering NCP messages" is significantly associated with a higher level of liver purchasing behavior: it doubles, or nearly doubles it among the poorer groups, and increases it even further in the wealthier groups.

The conclusion to be drawn from this section is that NCP has strongly influenced food purchasing behavior. Where NCP has been most active, men are more likely to buy healthy foods for their families and provide money for food purchasing. Women are more likely to purchase healthy foods with the money they are given.

4. Diet and Child Feeding Behavior

a. Women's Diets

(1) *24 Hour Recall Data*

There appears to be an association between exposure to NCP and appearance of foods promoted by the intervention in the 24 hour dietary recall used to assess this indicator.

Women in High/Intermediate villages ate more:	Women in No/Low villages ate more:
Porridge, leaf sauce, tomatoes, bananas, green beans	Peanuts, cow's milk

(2) Concordance between reported purchasing and 24 hour recall data

Figure 14 shows the relationship between *a woman reporting that she purchased meat* within the past week (with the money she received from her husband) and *meat being included in her recall of foods consumed in the past 24 hours*. While this "test" is not fair, as a woman who purchased and ate meat *two days ago* would not have a good concordance between the two questions, it shows a general trend. As the figure displays, more women in villages exposed to NCP purchased meat, and a far greater proportion reported its consumption themselves.

Figure 14

Mom also eats what she buys

Percent saying "yes"

Legend: Meat purchased this week; Meat in 24 hour recall

Categories: Hi/Med NCP, No/Low NCP

Among pregnant and breastfeeding women, N=245, p=.005
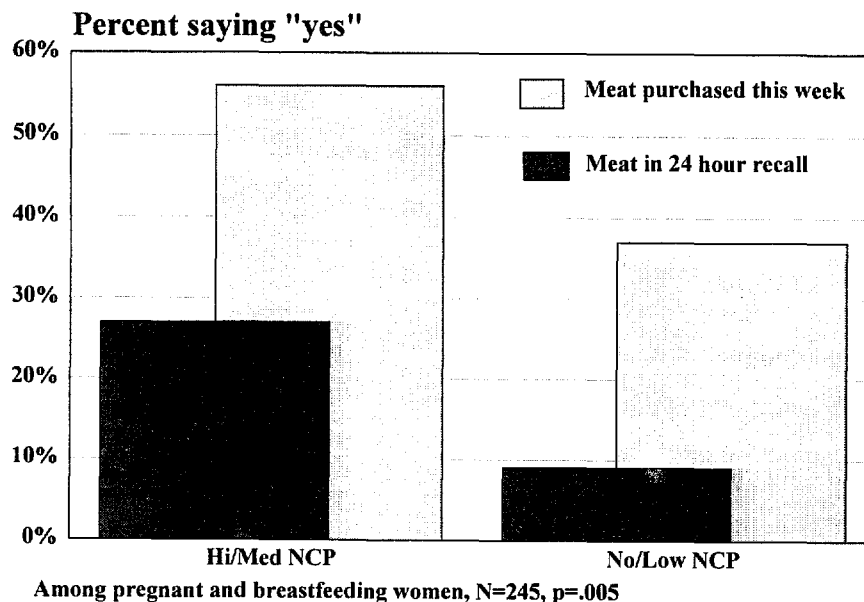
b. Breastfeeding and Introduction of Solids in a Timely Fashion

Women were asked to recall at what age they first breastfed their child, gave the child water or a particular food. Table 28 below shows the distribution of percentages of women in High, Intermediate and No/Low classifications villages who performed the child feeding

behavior in an "optimal" fashion (not too early, not too late), consistent with NCP promotional strategies.

Table 28   Percent of Sample Performing Optimal Infant Feeding Behaviors by NCP Category

Infant Feeding Practice	High	Intermediate	Low/No	Significance
Give Breastmilk First	59.4	50.3	39.7	.0008
Introduce water after 4 months	76.6	84.2	68.9	.008
Feed Porridge @ 6-8 months	68.5	64.4	66.2	.68 (NS)
Feed Fruit @6-8 months	71.4	51.4	51.4	.00001
Feed cow's milk @ 6-8 months	78.2	81.5	83.8	.38 (NS)
Feed leaves/leaf sauce @ 6-8 months	43.1	27.4	23.6	.00007
Feed Meat/Liver @ 6-10 months	79.8	87.0	79.7	.16 (NS)

As shown above, several key behaviors were extensively more reported in the High, and sometimes intermediate villages, than in the no/low villages. Specifically, women who were systematically exposed to NCP were more likely to give breastmilk as the first substance, to not introduce water before 4 months of age, to give fruit and leaves or leaf sauce as complementary foods, between 6 to 8 months of age. Other feeding behaviors (such as appropriate introduction of porridge, first introduction of meat) are not significantly different among the three groups.

c. 24 hour dietary recall reported by mothers for children over 1 year

Among older children, the following signficiant differences (p< .05) appeared in the 24 hour recall data:

Children in High/Intermediate villages ate more:	Children in No/Low villages ate more:
Porridge/toh, rice, leaf sauce, green beans, bananas	cow's milk

This suggests that women in High/Intermediate villages gave their children more of the foods recommended by NCP. However, mothers in non-exposed villages reported giving their children more cow's milk than NCP villages.

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5.   Child Care Skills

a.   Recuperative Feeding

Data reported here are based on NCP Counseling Card No. 10 (shown on p.). Those who had seen the picture were asked about the circumstances of its display. The participants were asked to give an example of something learned from this card (open-ended, un-prompted question). Those who had seen the picture as well as those who had not were asked: "As you can see the child is sick. In fact, he is very weak and has lost weight because he is sick. What must the mother do to re-establish her child's health?".

Table 29 below shows women's answers to these questions by NCP participation group. <u>Only women who say they saw the counselling card answered these questions.</u>

Table 29   What mothers learned from Counseling Card No. 10

Saw Counseling Card No. 10	High N=101		Intermediate N= 57		Low/No N=14
Learned about ORT or that sick children need to be encouraged to eat (p=.01)	11	(14%)	6 (10%)		2
Learned to be patient and give sick children small portions (p=.00000)	61	(60%))	31	(54%)	8
Learned about enriched porridge, bananas and other foods for sick children. (p=.01)	43	(43%)	29	(50%)	7

The women in villages more highly exposed to NCP show the most significant difference in terms of using patience with sick children, and feeding them small portions. At the outset of NCP, the formative research strongly supported the hypothesis that rural Malian mothers tended to "give up" feeding sick children, interpreting the child's anorexia as an indication that the child didn't need or want food.   NCP messages stressed the need to persist with sick children, giving them sweet, mashed fruits, or other foods the child liked to eat, and to actually force a child to eat something, if necessary. The impact of mothers believing and trying this message is quite dramatic, as described in the following section on NCP's nutritional impact.

b)   Supervised feeding and use of a bowl to feed weaning-age children

NCP also promoted more attentive supervision of toddlers during their meals (in contrast to a fairly relaxed attitude concerning consumption) as well as use of a small bowl to regulate the portion consumed by small children (in contrast to eating from a common plate with all the older children). Counseling Card No. 5 (shown p.) illustrates a mother feeding her youngest child out of a small bowl and watching while her child of about 2-3 years eats his meal sitting next to her. The older child also uses a small bowl for his portion. All participants were asked the following series of questions regardless of whether they had seen the picture or not:

"As you can see, the woman has two children. The youngest is 6 months, and the older child is a little more than 2 years old. Why is the older child eating right by his mother's side? In your opinion, why is she using this bowl to feed this child *(interviewer indicated the bowl used by the older child)*?

Have you ever used a small bowl or calabash (gourd bowl) to feed an individual child who is more than 1 year old? How did you learn to do this?

Based on length of time enrolled in NCP (HI, Intermediate, Low), women with children over 6 months of age (N=542) reported using a bowl as follows:

High	Intermediate	Low/No	Signif.
68.5 %	59.6%	56.1%	Pearson .03
			M-H linear. .009

Length of time a woman is exposed to NCP is clearly associated with this practice. Table 30 examines a range of answers derived from this question, showing responses divided by those who had seen the card before compared to those who had not.

Table 30   Use of Feeding Bowl for Weaning Age Child and Recall of NCP Card No. 5

Card No. 5	Saw Card N= 147		Didn't See Card N= 546		Significance
Believe woman uses bowl to check that child eats his meal	88	(60%)	268	(49%)	p=.05
Have used a feeding bowl for child of this age	106	(72%)	326	(60%)	p=.00000
Learned about using bowl from mother	5	(5%)	65	(36%)	p=.00000
Learned from neighbor/village volunteer	7	(7%)	20	(11%)	
Learned from community agent	57	(54%)	50	(28%)	
Learned from health center staff	30	(28%)	27	(15%)	
Heard on the radio	5	(5%)	9	(5%)	

It's clear that the message of using the feeding bowl, which was virtually unheard of at the time of the NCP formative research, has spread even beyond the reach of the counseling cards. Of the 546 women who had not seen the card, 59% had learned about using a bowl from a community agent, a health worker, a village volunteer or the radio, indicating the spread of NCP messages from their original media. *Women who actually saw the card were more likely to use a bowl for this purpose, suggesting that the visually-supported counseling was more effective.*

The relationship of these new knowledge areas, attitudes and behaviors on children's nutritional status is discussed below.

6. Nutritional Status

a. Anthropometric Indicators

(1) Distribution of Z Scores in the Sample

Children in villages participating in NCP for at least one year are taller and heavier than in villages where the project was not present for this long a period of time, as shown in Table 31:

Table 31   Descriptive Statistics for Anthropometric Indicators of Nutritional Status for Children in Cross-Sectional Sample, 1994

Indicator	Children 0 - 3 Years of Age						
	High. N=388		Intermediate N=226		Low/No N=229		Signif.
Mean Weight/Age Z-Score	-1.33	SD	-1.78	SD	-1.66	SD	p=.0001
		1.18		1.14		1.14	
Mean Height/Age Z-Score	-1.51	1.26	-1.74	1.23	-1.92	1.46	p = .001
Mean Weight/Height Z-Score	-0.69	1.06	-0.91	1.14	-0.78	1.09	p=.06 (NS)

There appears to be something of a "dose" response with exposure to NCP, or that a certain threshold of exposure, in terms of either length of time or number of media seen, might be necessary to achieve results in nutritional status. Children in high engagement villages are clearly better-off in terms of weight than either intermediate or low engagement villages, while children in intermediate villages fall squarely between the high and low villages in terms of height. For more clarity, Figures 15 and 16 show the distribution of weight and height in the 1994/95 sample, comparing only children in "High" and "Low/No" exposure villages, removing intermediate villages from the analysis.

Figure 15

Height/Age Distribution

1994 Cross Section by NCP Exposure

Legend:
- WHO/NCHS Ref.
- Hi n=374
- Lo/No n=221

Reference Z-scores
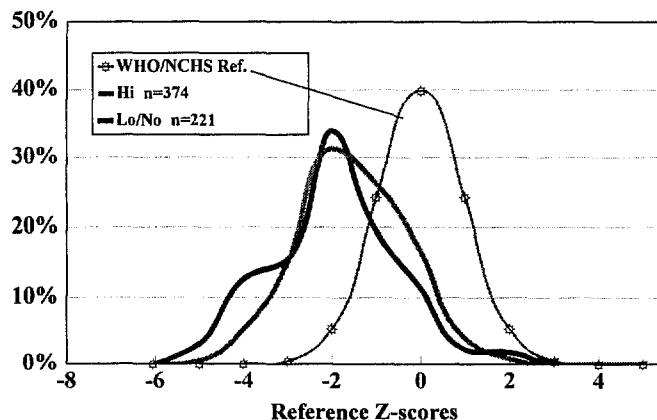
Hi NCP, Mean HAZ=-1.5, SD=1.3
Low/No NCP Mean HAZ=-1.9, SD=1.5. Sig. p=.001

Figure 16

Weight/Age Distribution

1994 Cross Section by NCP Exposure

Legend:
- WHO/NCHS Ref.
- Hi n=388
- Lo/No n=229

Reference Z-scores
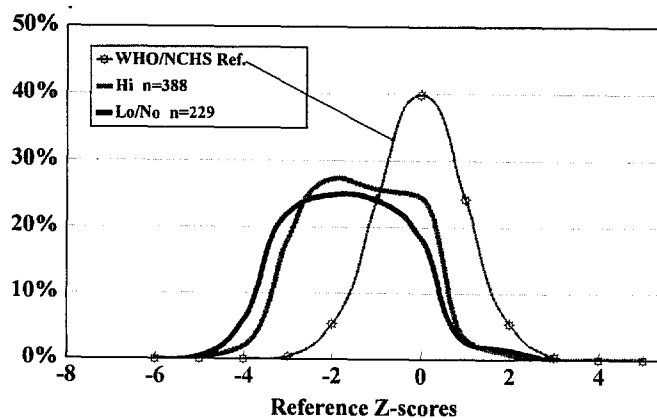
Hi NCP, Mean WAZ=-1.3, SD=1.1
Low/No NCP Mean WAZ=-1.8, SD=1.2. Sig. p=.0001

(2) Prevalence of Malnutrition

Figures 17, 18 and 19 show the proportion of children classified as malnourished based on having weight-for-age, weight-or height or height-for-age Z scores less than -2SD of the WHO/NCHS reference for their age.

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Figure 17

Percent of Malnourished Children based on Weight-for-Age less than -2 S.D.

1994 Cross Section by NCP Exposure

	Hi NCP N=396	No/Low NCP N=455
< -2 SD ■	29%	44%
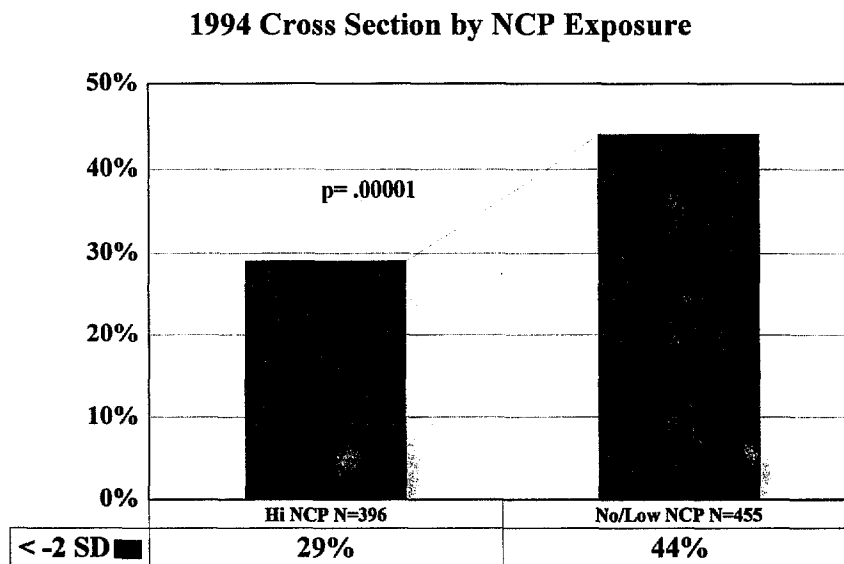
Figure 18

Percent of Malnourished Children based on Height-for-Age less than -2 S.D.

1994 Cross Section by NCP Exposure

	Hi NCP N=375	No/Low NCP N=445
< -2 SD ■	34%	44%
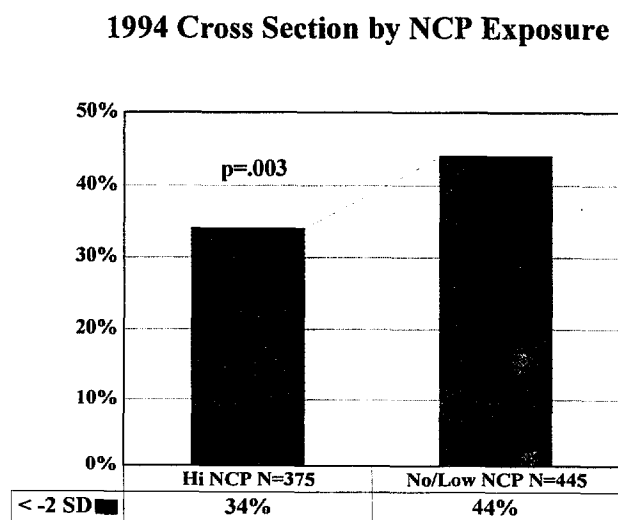
Figure 19

Percent of Malnourished Children based on
Weight-for-Height less than -2 S.D.

1994 Cross Section by NCP Exposure

	Hi NCP N=375	No/Low NCP N=445
< -2 SD■	11%	13%
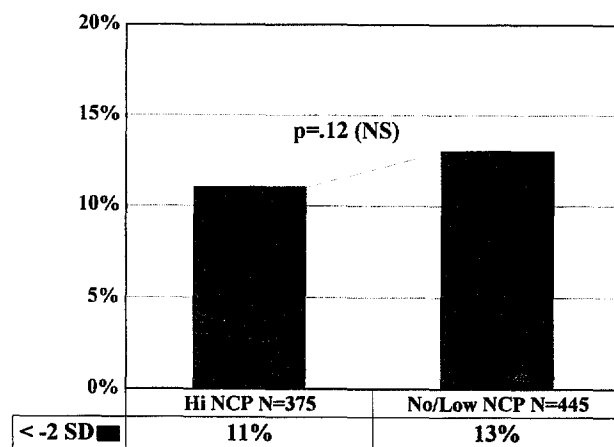
There appears to be a clear association between exposure to NCPfor more than 1 year's time, and children's anthropometric indicators. The next set of analyses seeks to explore whether these are associated with exposure to NCP messages and reported behaviors, and, what role confounding factors, such as wealth or child survival program indicators, have played.

b. Reported Behavior's Impact on Growth

(1) Relationship of Infant Feeding Knowledge and Weight-for-Age

This relationship was analyzed using analysis of variance (ANOVA) and logistic regression on the anthropometric Z- scores. As illustrated by Figure 20, women who saw NCP counseling cards and who could remember (unprompted) any of the specific recuperative feeding skills modeled by the card, had children whose weight-for-age Z-scores were, on average, .5 SD greater than anyone else's children. This difference was significant (p=.004)

Figure 20

Weight for Age and NCP Counseling Cards

Weight/Age Z Score
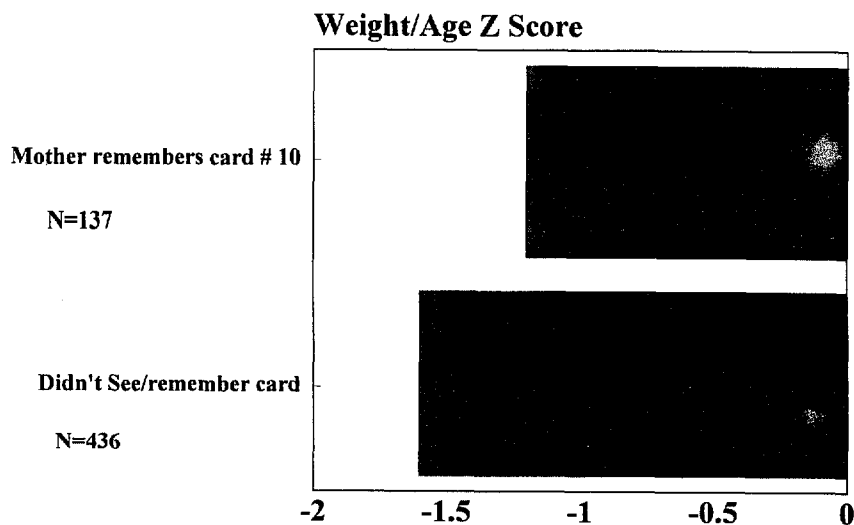
Mothers of children > 6 months, N= 573   ANOVA p=.007

Is NCP associated with better weight-for-age scores? It is impossible to say with **certainty**. However, Figure 21 breaks down the "something" that some women learned by specific messages, and shows their individual association with growth. This time, rather than plotting gains in SD increment, the graph shows actual mean WAZ scores. The smaller numbers are therefore better:

Figure 21

Recalled Recuperative Feeding Message and Childrens' WAZ

Recall Message:

Weight/Age Z Score
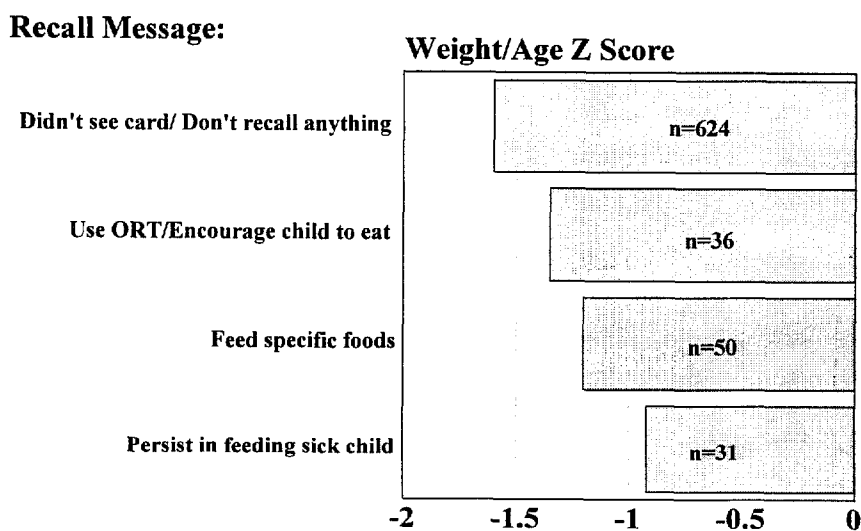
Among Mothers of Children 6 months +, N= 573 ANOVA p=.01

There is 1 *full standard deviation* difference in the mean WAZ of children whose mothers said the card taught them to "use patience" or "feed small amounts at a time" when the child was sick. Those who remembered specific foods for sick children (e.g. fish soup, bananas) gained one half a standard deviation over the others. Those mothers who thought the card taught them to "encourage sick children to eat" or to "use oral rehydration therapy" had children approximately one third of a standard deviation above those who never saw the card or remembered nothing. When modeled together, these relationships were highly significant (p=.002).

c. Confounders

In 1990, the only associated variables in the data set were mother's marital order and stunting. In 1990, women who were 2nd wives had more chronically malnourished children than those who were first (or only) wives. In 1994, this factor is no longer significant. Wealth indicators, (which remain somewhat linked to region), play a role, but a role modulated by NCP, as shown in the analyses below.

(1) Stratified analysis of WAZ by levels of wealth

The proxy variables used for wealth in this study have been discussed previously. The analysis below examines the association of NCP Exposure Category (High and Low) with Weight-for-Age Z-Scores, controlling for wealth categories (More Equipment/Less Equipment; More Livestock/Less Livestock). The children of poorer villagers in High NCP Exposure villages have better mean weight-for-age Z-scores than children of the relatively better-off in villages that were minimally exposed, or did not participate in NCP. Table 32 presents the findings.

Table 32   Stratified Analysis of WAZ by Exposure and Wealth Categories

Category	Mean WAZ	N	Significance
High Exposure Villages			
More Equipment	-1.26	171	NS (.29)
Less Equipment	-1.38	225	
More Livestock	-1.28	192	NS (.46)
Less Livestock	-1.37	204	
Low/No Exposure Villages			
More Equipment	-1.77	73	NS (.38)
Less Equipment	-1.60	156	
More Livestock	-1.72	78	NS (.58)
Less Livestock	-1.62	151	

The analysis above demonstrates that the mean WAZ scores within the High/Low categories can not be differentiated by ownership of equipment or livestock. However, a stratified analysis only paints part of the picture, and the analyses below enter wealth together with the other non-project variables simultaneously in a logistic regression analysis.

2) Prevalence of Malnutrition by Exposure Category and Region

This analysis examines the relationship of each NGO program to the prevalence of malnutrition indicated by low weight-for age, comparing similar levels of exposure. The intention is to examine the "intangible/unassessed" confounding factors that might be associated with the NGO's location, or how it delivered its services. This is presented in Table 33.

Table 33 Prevalence of Low Weight-for-Age, by Site and Classification

Exposure Classification (See Table 2)	N	Dioro	Kolondieba	Koutiala	Sig.
1	178	15.4		24.3	NS (.31)
2	55	48.3		38.5	NS (.46)
3	122	45.1			X
4	218		32.3	28.9	NS (.38)
5	171	46.3	51.7		NS (.48)
6	107	36.0	43.3	38.8	NS (.41)

The purpose of this table is not to show the difference within sites associated with levels of exposure, although "High" exposure villages (Class 1 and 4) are better, as this is analyzed using more powerful methods elsewhere in this report. Instead, the table focuses on the relative equivalence of impact from one Child Survival Project to the next, within exposure categories, despite significant difference among projects in terms of staff deployment and other factors. For example, World Vision/Koutiala had a professional staff of 4 at the time and trained non-literate village volunteers to animate counseling sessions. Save the Children/Kolondieba and Africare/Dioro had larger professional teams that conducted counseling and village animation activities. NCP's counseling materials and approaches, when consistently applied, appear to even out the differences in staffing modality.

3) Wealth and Child Survival Program inputs -- v. NCP

In this analysis, the NCP variables that have surfaced as most strongly associated with positive outcomes are examined simultaneously with wealth indicators (equipment and livestock) and the child survival program inputs. This allows us to examine which more

strongly predict whether children are malnourished or not (i.e. have a weight-for-age Z score above -2 SD, and have a height-for-age Z score above -2SD).

The following variables were examined in a logistic regression equation: NCP MEDIA RECALL SCORE ABOVE 2; Child Survival Project variables: (1) Have Immunization card; (2) Filter or Boil drinking water; Wealth variables: (1) Equipment above sample 50th percentile; (2) Livestock above sample 50th percentile. Only children older THAN 6 MONTHS OF AGE are included. A total N of 436 children had adequate data to complete this analysis.

Table 34 Logistic regression Model for Weight-for-Age

Variables in full model	Odds	95% C.I.	Significance (p value)
Individual Media Exposure >2	2.04	1.52, 2.57	.008
Variables Dropped from Model			
Treat Water			.96
Immunization card			.41
Equipment above 50th percentile			.83
Livestock above 50th			.84

This model suggests that when NCP exposure, Child Survival and Wealth variables are modeled simultaneously, NCP exposure variables increase the odds of children having weight-for-age scores better than -2 standard deviations of the WHO reference. Other variables have no significant impact on weight-for-age (positively or negatively) when examined in this model. Similar results were obtained when we examined height-for-age (chronic malnutrition), as shown in Table 35.

Table 35 Logistic regression Model for Height-for-Age and Child Survival

Variables in full Model	Odds	95% C.I.	Significance (p value)
Individual Media Exposure >2	3.37	2.80, 3.94	.0000
Variables Dropped from Model			
Treat Water			.11
Immunization card			.26
Equipment above 50th percentile			.48
Livestock above 50th			.50

The NCP exposure variable again emerges as the most significant predictor of positive height-for-age, with all other variables having no predictive value. Other variables neither increase the odds, nor do they confound the action of the main effects variables.

VI. FINAL CONCLUSIONS

There is sufficient evidence to see a strong, statistically significant association between exposure to NCP approaches and materials and:

- more parental nutrition knowledge;
- more parental purchasing of recommended foods;
- more consumption of recommended foods by women and children;
- better children's nutritional status

This has been demonstrated in relationship to the level of exposure to the project's inputs, and is suggested by a before-and-after examination of the data. The Nutrition Communication Project should be judged to have had "an impact" as can be best determined using the methods and analyses in this survey.

In order to reach the World Summit Goal of halving Protein-Energy Malnutrition, most African countries need to make what appears to be an impossibly large reduction in the number of children with low weight for age (the index used by the ACC/SCN to track progress against the Year 2000 goals), on the order of 3-4 percentage points/year. Countries reducing malnutrition by even one percentage point/year are considered to be making progress towards the goal, as few are even touching their problem[34]. Over the 4 year period measured by this survey, Malian villages engaged in NCP reduced protein-energy malnutrition at an average rate of 2.8 percentage points per year. Where NCP was not applied, despite other Child Survival interventions, there was no progress against malnutrition.

- The impact of wealth on nutritional status, when all other factors are controlled, is not significant. And, the impact of being in an NCP "trial" or "high exposure" villages, when wealth is controlled, remains statistically significant.

This finding suggests that within a poor, rural environment, money spent on purchasing livestock or equipment is not ncecessarily associated with improvements in children's nutritional status. And conversely, among the poorer households, where other child survival services are offered, improvements in nutrition practices and growth can be obtained with simple educational inputs, even when wealth does not significantly improve.

- NCP approaches resulted in fairly standard improvements regardless of the Child Survival Project's mode of interaction with the target population.

The quality of communication with villagers concerning nutrition was determined by the individual agents themselves, and by their NGO supervisors. This varied by agent within Child Survival projects, and from one Child Survival project to another. However, one of the key contributions of NCP was to create materials adaptable to almost any community-based setting. As the evaluation indicates, regardless of whether the Child Survival project relied on village volunteers, or paid

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[34] ACC/SCN Nutrition News, 1995.

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professional nurses, the positive impact on nutritional status was similar where NGOs used NCP approaches and materials consistently.

The child survival literature now indicates that nutritional status is responsible for 56% of a child's likelihood of living or dying in the first 5 years[35]. The children of women who saw 2 or more NCP media were twice as likely to have better nutritional status than children whose mothers did not see or remember these intervention. On this basis, the reduction in child malnutrition alone, achieved through NCP activities, is estimated to have prevented the deaths of approximately 850 children per year by the end of the project[36]. The long term impact of NCP on the population of approximately 750,000 persons taking part in the community-based component, or those listening to the radio broadcasts (which potentially reach any Bambara speaker in the country of 9 million people), remains to be seen. While funding for USAID's project ended in March, 1995, in Mali, NCP continues under the direction of its lead government agency, the National Center for Health Information, Education and Communication (CNIECS), the Group pivot for Child Survival (an NGO coordinating group, partially supported by USAID), and the network of NGOs, and additional support from UNICEF.

See Pelletier, D.L., Frongillo, E. J.-P. Habicht, 1993. Epidemiologic evidence for a potentiating effect of malnutrition on child mortality. *AJPH 83*:1130-33.

[36]J.Ross, PROFILES analyst, p.c.

Appendix A - Questionnaire and illustrations

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CAT:MERE D'ENFANT DE 7 MOIS A 36 MOIS   **Famille No.** _____
Enqueteur: _____
Reg: □ **Dioro**   □ **Koutiala**   □ **Kolondieba**   **Village:** _____
☞□ Femme aussi interviewee en tante que femme enceinte (**Repetez Partie II seulement**)
☞□ Fiche de l'enfant
☞□ Mari est inclu aussi
☞□ Autre enfant est inclu aussi

Partie I: *Nous commencons par faire connaissance:*

1.   Etes vous dans un foyer monogame *ou* polygame?
       1=monogame (*sautez a 3*)   2=polygame

2.   Etes vous la 1er, 2ieme ou 3ieme femme?   1^{e,} 2^{ieme} 3^{ieme}

3.   Vous ou votre mari, possedez-vous du betail ou des objets suivants:

   a. velo   oui   non   e. ane   oui   non
   b. vache(s)   oui   non   f. volaille/pintade   oui   non
   c. mouton(s)   oui   non   g. radio qui marche oui   non
   d. charette   oui   non   h. table/boutique   oui   non

3b.   Ou allez vous actuellement chercher de l'eau potable? 1 = puits du village 2 = pompe
                                                           3 = riviere ou source 4=autre

3c: Traitez-vous l'eau de boisson   1 = non, rien
       et de quelle manière? _____   2 = filtrer/faire passer en tissu
                                              3 = bouillir 4 = javel   5 = autres
4.   Quel âge avez-vous?   _____ (Ne Sait Pas = 99)
       (Aidez la femme a etablir son age)

5.   Combien d'enfants avez vous? (nombre en vie) _____

6.   Au cour de la semaine derniere, est-ce que votre mari
       vous a amene des aliments ou friandises, <u>autre que le mil,</u>
       pour manger?   _____ Oui   ___Non *(Sautez a 9)*

7.   Qu'est-ce qu'il vous a amene comme aliment? (**ne pas lire la liste**)

       1=foie 2=lait 3=viande 4=gateau de haricots 5=arachides 6=fruit 7=carotes 8=autres
       legumes 9 = oeufs 10=feuilles 11=pate de tomates/tomates
       12=autres_____ (*Si la reponse ne figure pas ici, posez encore "Rien
       d'autre pour vous ou vos enfants?"*☞☞ *Cochez la boite a droite*□)

8.   Quels membres de la famille ont mange cet aliment ou friandise? **(Ne pas lire la liste)**
     1=toute la famille 2=la femme/mere 3= les enfants 4 = le mari 5= les vieux 6=les malades 7=autres

9.   Au cours de la semaine derniere, est-ce que votre mari vous a donne de l'argent pour acheter des aliments ou friandises?_____ Oui   _____ Non *(Sautez a Partie II)*

10. Qu'est-ce que vous avez achete comme aliment ou friandise avec cet argent? **(Ne pas lire la liste)**

     1=foie 2=lait 3=viande 4=gateau de haricots 5=arachides 6=fruit 7=carotes 8=autres legumes 9 = oeufs 10=feuilles 11=pate de tomates/tomates
     12=autres_____(*Si la reponse ne figure pas ici, posez encore "Rien d'autre pour vous ou vos enfants?"* ☞☞*Cochez la boite a droite* ❑*)*

11. Quels membres de la famille ont mange cet aliment ou friandise? **(Ne pas lire la liste)**

     1=toute la famille 2=la femme/mere 3= les enfants 4 = le mari 5= les vieux 6=les malades 7=autres

Partie II: Alimentation

12. Votre plus jeune enfant, *(nom)* _____, a quel age maintenant? _____

12b. Quelle a été la 1ere substance   **(Ne pas lire la liste)**
     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

12c. Au cours de la premiere semaine de sa vie, avez vous lui donne votre premier lait/lait jaune? _____ Oui   _____ Non

13. Est-ce qu'il continue a teter actuellement? _____ oui   _____ non

14. *(En plus du lait maternel)* Combien de fois a-t-il mange hier? ("repas" ou entre repas)
     _____

14b. Avec qui a-t-il mangé à chaque repas?
     Qui repas 1 _____ Qui repas 2 _____   Qui repas 3 _____   Qui repas 4 _____
     Qui autre repas_____ **(Ne pas lire la liste)**
     1=seule 2=mere/grandmere 3=tante/co-epouse 4=pere 5=autre adulte(s) 5=autres enfants de moins de 8 ans 6=autres enfants de plus de 8 ans

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14c.   Décrivez ce que l' enfant,*(nom)* _____, a mangé toute la journée hier.
(Cochez le numero pour l'aliment chaque fois que la mere dit que l'enfant l'a mange.
Commencez avec les repas, puis tous que l'enfant a mange "entre" les repas ou apres).

(Ne pas lire la liste) - Aliment	*Nombre de fois consomme pendant la journee hier*					
Mil (toh)	*1*	*2*	*3*	*4*	*5*	*6*
Bouillie	*1*	*2*	*3*	*4*	*5*	*6*
Riz / Maize	*1*	*2*	*3*	*4*	*5*	*6*
Arachide/Pate d'arachides/niebe	*1*	*2*	*3*	*4*	*5*	*6*
Lait/lait caille	*1*	*2*	*3*	*4*	*5*	*6*
Foie	*1*	*2*	*3*	*4*	*5*	*6*
Viande/Poisson/Volaille -en morceau	*1*	*2*	*3*	*4*	*5*	*6*
Sauce de viande/poisson	*1*	*2*	*3*	*4*	*5*	*6*
Sauce de Feuilles (oseille, gombo, patates, baobob, etc.)	*1*	*2*	*3*	*4*	*5*	*6*
Sauce d'onions	*1*	*2*	*3*	*4*	*5*	*6*
Corge/citrouille	*1*	*2*	*3*	*4*	*5*	*6*
mangue/papaye	*1*	*2*	*3*	*4*	*5*	*6*
carotte	*1*	*2*	*3*	*4*	*5*	*6*
tomates/pate de tomates/sauce tomates/patate jaune	*1*	*2*	*3*	*4*	*5*	*6*
banane	*1*	*2*	*3*	*4*	*5*	*6*
oeuf/nere	*1*	*2*	*3*	*4*	*5*	*6*
gateau de haricots	*1*	*2*	*3*	*4*	*5*	*6*
Autre/Preciser:	*1*	*2*	*3*	*4*	*5*	*6*

15. Donnez-vous de l'eau a l'enfant? _____ Oui _____ Non
15b. A quel age avez-vous commence? _____âge en jours _____ age en semains ___ age en mois. Naissance = 0, nsp = 99)

16. Donnez-vous du lait de vache ou de chevre a l'enfant?____ Oui _____ Non
16. b A quel age avez-vous commence? _____âge en jours ____ age en semains ___ age en mois. Naissance = 0, nsp = 99)

17. Donnez-vous de la bouillie a l'enfant? _____ Oui _____ Non
17b. A quel age avez-vous commence? _____âge en jours ____ age en semains ___ age en mois. Naissance = 0, nsp = 99)

17c. Quels sont les ingredients que vous utilisez pour preparer de la bouillie?

(Ne pas lire la liste)
❑ mil ❑ l'eau ❑ sucre ❑ huile ❑ arachides/pate d'arachides ❑ niebe ❑ carotte ❑ soya
❑ poisson seche ❑ autre_____

18. Donnez-vous du fruit ou du jus de fruit a votre enfant? _____ Oui _____ Non
18b. A quel age avez-vous commence? _____âge en jours ____ age en semains ___ age en mois. Naissance = 0, nsp = 99)

19. Donnez-vous du foie a votre enfant?____ Oui _____ Non
19b. A quel age avez-vous commence? _____âge en jours ____ age en semains ___ age en mois. Naissance = 0, nsp = 99)

20. Donnez-vous des feuilles/sauce a base des feuilles a votre enfant? __ Oui ___Non
20b. A quel age avez-vous commence? _____âge en jours ____ age en semains ___ age en mois. Naissance = 0, nsp = 99)

21. Donnez-vous des arachides/arachides ecrases a votre enfant? ___ Oui ___ Non
21b. A quel age avez-vous commence? _____âge en jours ____ age en semains ___ age en mois. Naissance = 0, nsp = 99)

22. Donnez-vous autre chose a manger ou a boire a cet enfant?
22b. Qu'est-ce que vous lui avez donne?_____

A la Partie III

La Partie III - Radio et Dessins

A. Radio

36.   Pendant le mois passe, avez-vous entendu une emission ou des emissions a la radio (chez vous ou ailleurs) concernant la famille, la grosesse, les enfants? ___ Oui
___ Non *(sautez a 39)*

37.   Est-ce que c'etait un message bref ou un sketch/feuilleton, ou tous les deux?
(Chochez chaque reponse) ____ feuilleton (_____ message ou _____NSP --*passez a 38*)

Pour ceux qui souvienent le feuilleton:

37b.Pouvez-vous me dire le nom de cet programme? **(Ne lire pas)** ☐ Saheli Sama *(passez a 37d)* ☐ Autre/NSP

37c. Je voudrais poser quelques questions par rapport a la famille de Sidi, le "Saheli Sama," et sa femme Lala. Avez-vous capte le feuilleton qui parle de cette famille? ___ oui
___ non *(passez a 38)*

37d.   D'apres vous, quel est l'idee principale du feuilleton?

_____

(Codage plus tard)

37e.   Avez-vous l'impression que les problemes des familles du feuilleton vous aide a apprendre
        quel que chose? ____ Oui ____ Non   Si oui, veuillez citer un exemple--

_____

(Codage plus tard)

38.   Peut etre vous avez entendu quelques annonces ou messages brefs portant sur la nutrition ou
        sante? Que vous souvenez-vous de cette emission/ces emissions?

_____

(Codage plus tard)

B.   Dessins

Montrez l'image (Boite a image "Awa," image du bucher) et dites:

39.   Avez-vous jamais vu cette image?
        _____ oui _____ non *(passez a)*

40.   Qui vous l'a montree?   1 = un de mes voisins/volontaire du village 2=agent communautaire/monitrice 3 = agent de sante/infirmier/medecin 4 = instituteur d'alphabetisation 5 = instituteur de l'ecole 6= agent agricole 7 = autre

_____

41.   Etiez-vous avec d'autres personnes en regardant cette image-- Avec qui etiez-vous? **(Ne pas lire la liste)** 1 = moi et la personne *(mentionnee ci-dessus)* 2 = avec une autre femme/homme de ma famille 3 = avec mon epoux   4 = dans un groupe

42.   Veuillez me donner un exemple de quelque chose que vous avez appris dans les discussions concernant cette carte. *(plusiers reponses possibles - Ne PAS LIRE la liste)*

1=le foie protege <u>contre</u> la cecite nocturne 2=le foie peut <u>guerir</u> la cecite nocturne 3=une femme enceinte devrait manger du foie 4=les enfants ont besoin de foie   5=le mari peut acheter du foie pour sa famille 6=l'homme joue un role important dans la protection de la sante de sa famille. 7= autre *(ecrivez)* _____

43.   Durant les deux mois passe, est-ce que vous ou votre mari a achete du foie (au bucher ou grille/friandise) pour la famille?
        _____oui _____non *(passez a C)*   43b. Si oui, combien de fois? _____

Si vous avez complete cette section, Passez a la Section C

44.   D'apres vous, qu'est-ce que l'homme portant un chapeau fait?

        1=il achete du foie 2=il achete de la viande 3=NSP

45.   Il achete du foie. Pour quelle raison achete-t-il du foie? **(Ne pas lire la liste)**

1=pour en manger lui meme ·2=pour en donner a sa femme 3=pour en donner aux enfants 4=pour la famille 5= pour en donner a quelqu'un qui souffre de cecite nocturne 6=NSP 7=autre_____

46.   Est-ce que vous aviez entendu qu'il faut manger du foie, avant d'avoir vu l'image?
        Par exemple, est-ce que ...(LISEZ la liste ci-dessous et cochez chaque reponse--
☐ Votre conjoint vous en avez parle? ☐ Est-ce que votre mere/pere vous en a parle?☐ Est-ce que votre voisin ☐ Est-ce qu'on vous l'a demontre par sketch/jeu de role au village? ☐ Avez-

vous vu une boite a image qui represente plus ou moins de la meme idee? ☐ A-t-on parle de cette idee a la radio?

47. Durant les deux mois passe, est-ce que vous ou votre mari a achete du foie (au bucher ou grille/friandise) pour la famille?

_____oui _____non *(passez a C)*

47b.   Si oui, combien de fois? _____

C.   *Montrez l'image (Carte de Conseils No. 10) et dites:*

48.   Avez-vous jamais vu cette image?
_____ oui _____ non *(sautez a 55)*

49.   Qui vous l'a montre?   1 = un de mes voisins/volontaire du village 2=agent communautaire/monitrice 3 = agent de sante/infirmier/medecin 4 = instituteur d'alphabetisation 5 = instituteur de l'ecole 6= agent agricole 7 = autre _ _

---

50.   Etiez-vous avec d'autres personnes en regardant cette image-- Avec qui etiez-vous? **(Ne pas lire la liste)** 1 = moi et la personne *(mentionnee ci-dessus)* 2 = avec une autre femme/homme de ma famille 3 = avec mon epoux 4 = dans un groupe

51.   Veuillez me donner un exemple de quelque chose que vous avez appris par cette carte. **(Ne pas lire la liste)** 1=donner de l'eau/kene a ji/ORS 2=donner a manger aux enfants malades avec patience 3=encourager les enfants malades a manger 4=la bouillie enrichie, la soupe de poisson est bonne pour l'enfant malade. 5. La banane ecrasee ou un fruit sucre et bonne pour les enfants malades. 6=autres_____

52.   Comme vous voyez, cet enfant est malade. En effet, il est tres faible et perd du poids parce qu'il est malade. Que doit faire la mere pour que son enfant se retablisse?
 (Ne pas lire la liste) *(Cochez la premiere reponse qui s'applique)*:
 ☐ Donner beaucoup a boire   ☐ Continuer avec keneaji/ORS   ☐ Donner plus a manger
 ☐Donner a manger avec patience ☐ Donner a manger en petites quantites a la fois
 ☐ Preparer la bouillie, la banane, de la soupe de poisson, ou un fruit pour encourager enfant a manger. ☐ Je ne sais pas   ☐Autre:_____

53. Quoi d'autre *(Cochez la deuxieme reponse a partir de la liste ci-dessus.)*

D. *Montrez l'image (Carte No.5) et dites:*

54.   Avez-vous jamais vu cette image?

_____ oui _____ non

55.   Comme vous le voyez, la dame a deux enfants. Le plus jeune a 6 mois, l'ainee a un peu plus de 2 ans. Pourquoi est-ce que l'ainee mange a cote de sa mere? **(Ne pas lire la liste)** 1=pour que la mere puisse controler qu'il mange bien 2 = **pour qu'elle** puisse verifier si l'enfant fini son repas 3 =par habitude,   comment faire **autrement** 4 = autre reponse

_____

56.   D'apres vous, pourquoi utilise-t-elle ce bol pour cet enfant *(indiquez l'ainee)* **(Ne pas lire la liste)**
1=elle a ete recomande par l'agent/monitrice 2=c'est plus simple/c'est pratique 3=c'est plus net/agreable 4=c'est plus facile de veiller sur l'alimentation de l'enfant 5=l'enfant est fragile 6=c'est son habitude 7=NSP 8=autre_____

57.   Avez-vous deja utilise un <u>petit</u> bol/une <u>petite</u> calebasse pour donner a manger individullement a un seule enfant de plus d'un an? _____ Oui _____Non

58.   Aviez-vous deja entendu qu'il fallait donner a manger comme ca?
_____ oui _____ non *(Si non, passez a 60)*

59.   Comment l'avez vous entendu?   1 =belle mere/autre parente   2=co-epouse 3=un de mes voisins/volontaire de village 4=agent communautaire/monitrice 5 = agent de sante/infirmier/medecin 6 = instituteur d'alphabetisation 7 = instituteur de l'ecole 8= agent agricole 9 = radio   10=autre _____

60.   Que pensez-vous de cette idee? **LISEZ LA LISTE** ___ je pense que c'est une mauvaise idee ____ je pense que c'est une bonne idee, mais je ne veux pas l'essayer ____ je pense que c'est une bonne idee, mais je ne peux pas l'essayer ____je pense que c'est une bonne idee, et je voudrais l'essayer.

FIN.   MERCI.

AVEZ VOUS LA FICHE DE L'ENFANT ET   LE QUESTIONNAIRE DU MARI,   SI NECESSAIRE?

23a.☞☛☐Plus jeune enfant dans l'enquete   ☛☐ Deuxieme enfant dans l'enquete
☛☐ Mere est inclu aussi *(Cherchez le Questionnaire "Femme")*
☛☐ Pere est inclu aussi *(Cherchez le Questionnaire "Homme")*

Nom de l'enfant _____   *Sex 1 gaucon 2 fille*

Nom du père _____

Nom de la mère _____

23b.   Date de naissance   ____ ____   ____ ____   ____ ____
                                  J   J   M   M   A   A

24.   Date d'aujourd'hui   ____ ____   ____ ____   ____ ____
                                J   J   M   M   A   A

25.   Age en mois ____ ____ (estimer a plus proche)

26.   Age (en mois) de l'enfant ne juste avant cet enfant   ____   ____

27.   Poids ____ ____ , ____ ____ (kilos)

28.   Taille ____ ____ , ____ (cm)

29.   Au cours des deux dernieres semaines, est-ce que cet enfant a souffert de: (cochez tous les reponses necessaires--plusieurs possibles)

    ☐ diarrhee <Y>   ☐ vomissement <Y>   ☐ toux <Y>
    ☐ fievre <Y>   ☐ autre probleme <Y> (preciser probleme) _____
    ☐ Rien, l'enfant est en bonne sante <Y>

30.   Est-ce que l'enfant a une carnet de vaccination? _____ oui ____ non (sautez a 32)

31.   *(Si oui - verifiez si l'enfant est vaccine contre)*:

    ☐ la polio <Y>   ☐ la rougeole <Y>

32.   *(Montrez la capsule de vitamine A et posez:)* Est-ce que l'enfant a jamais recu cette capsule? _____ oui _____ non

A etre calculer par logiciel: 33Age   34a WAZ   34b HAZ   35WHZ

Superviseur--Agraphez cette fiche apres la Partie II de la Questionnaire Femme avec le meme "Numero de Famille", si la femme est inclu dans l'enquete.

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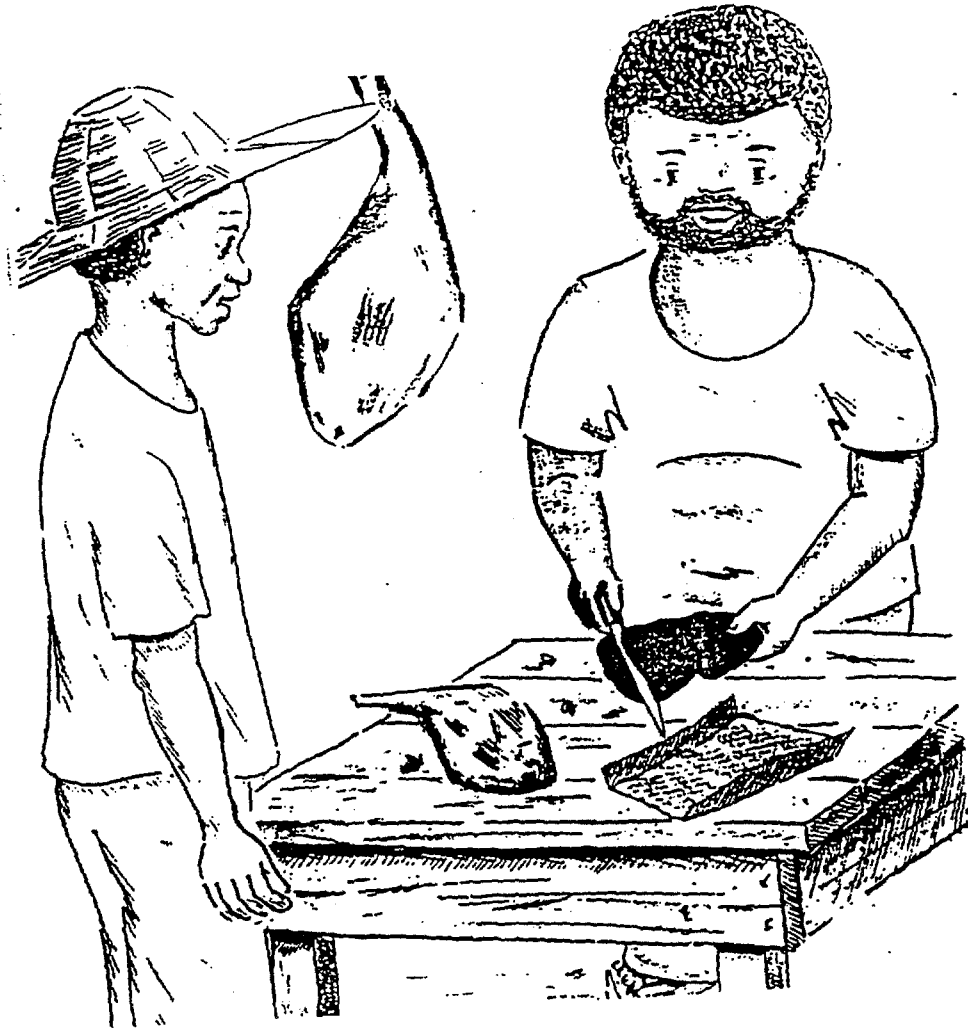
"Awa Flip Chart"
Questions IIIB 39-47

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Card 5
Questions D
54-60

Card 10
Questions C 48-
53

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Appendix B - Sampling Instructions

29 novembre

PROCEDURE POUR CHOISIR LES PARTICIPANTS DE L'ENQUETE

Nous avons deja discuter le choix des villages dans chaque ONG. Vous avez choisi 8 villages ou vous avez applique le plus fort possible les interventions "NCP" et 8 ou vous avez fait beaucoup moins d'effort dans la communication pour la nutrition (meme, rien). Maintenant, il faut responsibiliser un de vos agents pour "tirer un echantillon" de la population dans chaque village.

Chaque village va contribuer 30 enfants moins de 3 ans, 24 femmes et 14 hommes selon les criteres suivantes

Categorie/Age	Enfants	Meres	Peres
Femme Enceinte	X	4	2
0-6 mois	6	4	2
7-12 mois	6	4	2
13-24 mois	12	8	4
25-36	6	4	2
Totale par village	30	24	12
Totale par ONG 16 villages	480	384	224
Totale pour l'etude (3 ONG) 16 villages	1440	1152	672

On va peser et mesurer la taille des enfants et regarder leur carnets de vaccination (s'il y en a). On va poser a peu pres 40 questions a chaque mere, et 25 questions a chaque pere. Vous n'avez pas besoin de si beaucoup des meres que des enfants, et encore moins des peres. C'est possible que quelques meres qui sont enceintes seront interviewer dans leur capacite d'une mere d'enfant (24 a 36 mois).

Nous suggerons la procedure suivante pour inscriver les meres, les peres et les enfants dans l'enquete. Commencant avec les femmes enceintes et les meres des enfants moins de 3 ans, faire une liste de tous les noms des femmes et tous leurs enfants moins de 3 ans. Par exemple:

1.Coulibaly Mariam - enceinte - enfant 26 mois
2.Coulibaly Fatimata-enceinte - enfant 30 mois
3.Coulibaly Fanta - enceinte-enfant 29 mois
4. Coulibaly Halima -enceinte-enfant 28 mois
5.Kante Mama - enceinte - enfant 35 mois
6.Kante Fanta   - enceinte - X   (X veut dire, pas d'autre enfant moins de 3 ans)
7.Kante Suzu - enceinte - enfant 34 mois
8.Maiga Fatime -enceinte -X
9.Sisokko Katy - enceinte - enfant 30 mois
10.Coulibaly Awa - enfant 4 mois - enfant 36 mois
11.Coulibaly Bintou -enfant 2 mois - X

12. Coulibaly Fatou -enfant 7 mois - enfant 35 mois
13. Coulibaly Kadi - enfant 9 mois -enfant 30 mois
14. Diarra Awa - enfant 26 mois-X
15. Diarra Bintou - enfant 12 mois - enfant 34 moi
16. Diarra Fatime - enfant 18 mois -X
17. Diarra Halima - enfant 5 mois-enfant 28 mois
18. Diarra Katy - enfant 30 mois - X
19. Kante Awa - enfant 1 mois - enfant 28 mois
20. Kante Bintou -enfant 10 mois - X
21. Maiga Fatou - enfant 9 mois - enfant 36 mois
22. Maiga Awa - enfant 2 mois - enfant 34 mois
23. Maiga Fatimata - enfant 15 mois - enfant 36 mois
24. Maiga Katy - enfant 18 mois - X
25. Maiga Mariam - enfant 24 mois - X
26. Sissoko Katy -enfant 5 mois - X
27. Sissoko Jenebou - enfant 20 mois
28. Traore Awa - enfant 1 mois -X
29. Traore Daffa - enfant 18 mois - X
30. Traore Fati - enfant 26 mois -X
31. Traore Halima - enfant 12 mois - 34 mois

etc. juste a inclure chaque femme dans la village avec un enfant moins de 3 ans.

Prenez la formulaire pour l'enquete. Vous voyez qu'il faut trouver 4 femmes enceintes. Dans cette village, vous en avez 9. Demandez a quelqu'un d'autre, qui ne comprend pas ce que vous faites, a choisir un numero -au hasard- entre 1 et 9. Dans cet cas, le personne dit "8". Vous regardez votre liste des femme enceintes -voila encore une fois en bas -et vous circulez le nom de Maiga Fatime. Puis, vous continuez avec numero 9, Sissoko Katy et vous revenez au numero 1 Coulibaly Mariam et numero 2 Coulibaly Fatimata. Voila les 4 femmes enceintes pour cette village dans l'etude (cependent qu'elle accepte d'etre interviewer).

1.Coulibaly Mariam - enceinte - enfant 26 mois
2.Coulibaly Fatimata-enceinte - enfant 30 mois
3.Coulibaly Fanta - enceinte-enfant 29 mois
4. Coulibaly Halima -enceinte-enfant 28 mois
5.Kante Mama - enceinte - enfant 35 mois
6.Kante Fanta   - enceinte - X   (X veut dire, pas d'autre enfant moins de 3 ans)
7.Kante Suzu - enceinte - enfant 34 mois

8.Maiga Fatime -enceinte -X

9.Sissoko Katy - enceinte - enfant 30 mois

Si la personne a dit numero "2," vous commencez avec le 2, puis prennez le 3, 4 et 5.

Maintenant, vous pouvez ajouter les noms des femmes enceintes qui reste, qui ont aussi les enfants moins de 3 ans, a votre liste des enfants.

Pour remplir la fiche avec les enfants, il faut chercher l'enfant le plus jeune de chaque femme. Vous en avez besoin de 6 enfant de moins de 6 mois, 6 enfants entre 7 mois a 12 mois, 12 enfants entre 13 mois a 24 mois et 6 enfants entre 25 et 36 mois.

Cherchez votre liste et trouvez le plus jeune enfant de tous les enfants.

Voici la liste encore une fois:

10. Coulibaly Awa - enfant 4 mois - enfant 36 mois
11. Coulibaly Bintou -enfant 2 mois - X
12. Coulibaly Fatou -enfant 7 mois - enfant 35 mois
13. Coulibaly Kadi - enfant 9 mois -enfant 30 mois
14. Diarra Awa - enfant 26 mois-X
15. Diarra Bintou - enfant 12 mois - enfant 34 moi
16. Diarra Fatime - enfant 3 mois -X
17. Diarra Halima - enfant 5 mois-enfant 28 mois
18. Diarra Katy - enfant 30 mois - X
19. Kante Awa - **enfant 1 mois** - enfant 28 mois
20. Kante Bintou -enfant 10 mois - X
21. Maiga Fatou - enfant 9 mois - enfant 36 mois
22. Maiga Awa - enfant 2 mois - enfant 34 mois
23. Maiga Fatimata - enfant 15 mois - enfant 36 mois
24. Maiga Katy - enfant 18 mois - X
25. Maiga Mariam - enfant 24 mois - X
26. Sissoko Katy -enfant 5 mois - X
27. Sissoko Jenebou - enfant 20 mois
28. Traore Awa - <u>enfant 1 mois</u> -X
29. Traore Daffa - enfant 18 mois - X
30. Traore Fati - enfant 26 mois -X
31. Traore Halima - enfant 12 mois - 34 mois
----- ajouter les femmes enceintes qui reste avec les enfants moins de 3 ans:

3. Coulibaly Fanta - enceinte-enfant 29 mois
4. Coulibaly Halima -enceinte-enfant 28 mois
5. Kante Mama - enceinte - enfant 35 mois
7. Kante Suzu - enceinte - enfant 34 mois

Vous en avez deux enfants de 1 mois. Commencez avec le premier sur votre liste-l'enfant de Kante Awa- et ecrire son nom dans votre formulare pour l'enfant moins de 6 mois. Maintenant,
continue a cherchez pour chaque enfant moins de 6 mois. Vous en avez numero 22 -l'enfant de Maiga Awa, 26 - l'enfant de Sissoko Katy, 28-l'enfant de Traore Awa, puis vous recommencez en tete de votre liste, et vous trouvez les enfants de 10 - Coulibaly Awa, 11- Coulibaly Bintou et 16- Diarra Fatime. Vous en avez de la chance-voila les 6 enfants qui'il vous faut de moins de 6 mois.

Vous continuez dans cette maniere a remplir votre fiche des meres, peres et enfants.

Femmes Enceintes	Meres 1. 2. 3. 4.		Peres 1. 2.
Enfants 0 - 6 mois	Enfants 1. 2. 3. 4. 5. 6.	Meres 1. 2. 3. 4.	Peres 1. 2.
Enfants 7 - 12 mois	Enfants 1. 2. 3. 4. 5. 6.	Meres 1. 2. 3. 4.	Peres 1. 2.
Enfants 13-24 mois	Enfants 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.	Meres 1. 2. 3. 4. 5. 6. 7. 8.	Peres 1. 2. 3. 4.
Enfants 25-36 mois	Enfants 1. 2. 3. 4. 5. 6.	Meres 1. 2. 3. 4.	Peres 1. 2.

Appendix C- Village Classification

The tables C1-C3 below show every villages ever surveyed by NCP in 1990 and 1994 as described by Child Survival Project Coordinators (Description), as well as their analytical ("trucase") categories.

Table C1 KOUTIALA Village	Description (Baseline #)	In Pre-Post Analysis	Trucase Designation
1 Baramba	New Comparison	X	4
2 Debela	Trial '90 (4)	Trial	1
3 La Ferme	New Trial	X	6
4 Karanguana	Trial '90 (2)	Trial	1
5 Nampossela	Trial '90 (14)	Trial	1
6 N'Tiesso	New Comparison	X	4
7 Pekena	Trial '90 (3)	Trial	1
8 Yafola Central	Trial '90 (51)	Trial	1
9 Zamblala	New Trial	X	6
10 Zebala	Trial '90 - stopped (12)	Trial	2
(1) Diela	comparison	not sampled	
(6) Pakasso	comparison	not sampled	
(7) Dougouniena	comparison	not sampled	
(8) Karangasso	trial	not sampled	
(9) N'Tossoni	trial	not sampled	
(10) Bamana	comparison	not sampled	
(11) Songuela	comparison	not sampled	
(13) Zansiola	comparison	not sampled	
(15) Nintabougouro	comparison	not sampled	
(52) Yafola	comparison	not sampled	

Table C 2 Dioro Village	Description (Baseline village #)	In Pre-Post Analysis	Trucase Designation
1 Babougou	Trial '90 (1)	**Trial**	1
12 Koila Bamanan	Trial '90 (5)	**Trial**	2
13 Korokounou	Comparison '90 (7)	**Comparison**	3
14 Maraka Tintin	Comparison '90 (6)	**Comparison**	3
15 Sanye	New Comparison '94	X	4
16 Sindian	Started training in 1/94	X	5
17 Tatila	Comparison '90 (15)	**Comparison**	3
18 Tibi 1	Comparison '90 (14)	**Comparison**	3
19 Touan	Started training in 1/94	X	5
20 Yollo-Were	Started training in 1/94	X	5
(2) Pogo	Comparison '90	Not sampled	
(3) N'Gabakoro	Comparison '90	Not sampled	
(4) Soke	Trial '90	Not sampled	
(8) Maribougou	Trial '90	Not sampled	
(9) Senenkou	Trial '90	Not sampled	
(11) Werekoura	Comparison '90	Not sampled	
(12) Dougounikoro	Trial '90	Not sampled	
(13) Tibi	Trial '90	Not sampled	
(16) Koussi	Trial '90	Not sampled	

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Table C 3 Kolondieba Village	Description	Not in Pre-Post	Trucase Designation
21 Bougoula	1 year	X	6
22 Donteregue	Just 1 year (+/- not sure exactly)	X	5
23 Koloni-Bondio	Since 1992	X	6
24 M'Piebougoula	"way less than year" (not sure)	X	5
25 Tousseguela	Just 1 year (+/- not sure)	X	6
26 Kaara	1 year	X	6
27 Kouen	Less than 1 year	X	5
28 Mafele	Since 1992	X	6
29 Torokoro	1 year	X	6
30 Kebila	maybe 6 months	X	4

Table C 4

Mean Exposure Scores for Women and Men by Village

VILLAGE	MEAN SCORES	S.D	N
1	W=0.50 M=0.00	W=1.00 M=0.00	W=20 M=11
2	W=1.00 M=0.23	W=1.85 M=0.83	W=26 M=13
3	W=1.65 M=0.00	W=2.42 M=0.00	W=23 M=12
4	W=1.48 M=2.18	W=2.10 M=1.94	W=25 M=11
5	W=1.96 M=0.40	W=2.30 M=1.55	W=25 M=15
6	W=0.28 M=1.58	W=0.84 M=2.07	W=25 M=12
7	W=1.04 M=1.00	W=1.55 M=1.71	W=24 M=12
8	W=5.36 M=2.00	W=2.78 M=1.76	W=25 M=12
9	W=4.46 M=2.42	W=2.69 M=2.39	W=24 M=12
10	W=0.87 M=0.08	W=0.29 M=0.28	W=23 M=13
11	W=0.96 M=0.58	W=1.37 M=1.51	W=24 M=12
12	W=1.04 M=1.83	W=1.63 M=3.49	W=24 M=12
13	W=0.12 M=0.00	W=0.60 M=0.00	W=25 M=11
14	W=0.71 M=0.25	W=1.04 M=0.87	W=24 M=12
15	W=0.45 M=0.00	W=1.06 m=0.00	W=22 M=11
16	W=0.00 M=0.67	W=0.00 M=2.00	W=21 M=9
17	W=0.38 M=0.00	W=0.88 M=0.00	W=24 M=12
18	W=0.25 M=0.42	W=0.74 M=0.99	W=24 M=12
19	W=0.71 M=0.00	W=1.20 M=0.00	W=24 M=12
20	W=5.00 M=0.25	W=0.83 M=0.45	W=24 M=12
21	W=0.80 M=1.86	W=1.12 M=2.88	W=25 M=14
22	W=2.00 M=1.60	W=2.89 M=2.84	W=23 M=10
23	W=2.09 M=3.08	W=2.54 M=3.45	W=23 M=12
24	W=0.42 M=2.00	W=0.83 M=3.05	W=24 M=12

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25	W=2.00 M=4.00	W=2.50 M=3.44	W=24 M=12
26	W=1.42 M=0.83	W=1.91 M=1.34	W=24 M=12
27	W=0.46 M=0.08	W=0.59 M=0.29	W=24 M=12
28	W=1.83 M=0.00	W=2.87 M=0.00	W=24 M=12
29	W=2.95 M=0.00	W=2.92 M=0.00	W=21 M=8
30	W=0.75 M=0.17	W=1.48 M=0.39	W=24 M=12

Tables C5-C7
1990 & 1994 Children's Mean Anthropometric Results by Village

Tables C5-C7 show children's mean anthropometric results, by villages included in 1990 and 1994 surveys, as well as the summary change in value.

C5-Mean WAZ & Prevalence Low Weight-for Age Z-Score by Village by Time

Village (1990/94 i.d.)	Mean WAZ (S.D.) 1990		% Low WAZ 1990	Mean WAZ (S.D.) 1994		% Low WAZ 1994	Change in Value
Babougou (101/11)	M (σ)	n	8.3	M (σ)	n	15.4	+7.1
	-.27 (1.35)	12		-.91 (1.19)	26		
Koila (105/12)	-2.15 (1.36)	13	53.8	-1.83 (1.24)	29	48.3	-5.5
Karaguana (202/4)	-1.46 (1.35)	16	43.8	-.67 (1.13)	30	43.3	-0.5
Peguena (203/7)	-1.40 (.88)	13	30.8	-1.25 (1.23)	32	25.0	-5.8
Debala (204/2)	-1.24 (1.2)	13	38.5	-1.18 (.88)	30	13.3	-25.2
Zebala (212/10)	-1.80 (1.4)	9	55.6	-1.67 (1.12)	26	38.5	-17.1
Namposela (214/5)	-1.50 (1.34)	11	36.4	-.67 (1.16)	29	20.7	-15.7
Yafola Central (205/8)	-1.62 (1.06)	19	47.4	-1.13 (1.05)	31	19.4	-28.0
Markatinti (106/14)	-1.59 (1.24)	17	41.2	-1.65 (1.36)	30	43.3	+2.1
Korokonou (107/13)	-2.20 (1.37)	12	58.3	-1.89 (1.17)	31	48.4	-9.9
TibiWere (114/18)	-1.83 (.88)	8	25.0	-1.83 (1.32)	30	46.7	+21.7
Tatila (115/17)	-2.58 (1.48)	11	63.6	-1.68 (1.38)	31	41.9	-21.7

C6-Mean HAZ & Prevalence Low Height-for Age Z-Score by Village by Time

Village	Mean HAZ (SD) 1990	% Low HAZ 1990	Mean HAZ (S.D.) 1994	% Low HAZ 1994	Change in Value
Babougou (101/11)	-.40 (1.74)	16.7	-.77 (.83)	8.3	-8.4
Koila (105/12)	-1.96 (1.34)	41.7	-1.73 (1.15)	40.7	-1.0
Karaguana (202/4)	-2.93 (1.63)	78.6	-1.79 (1.11)	40.0	-38.6
Peguena (203/7)	-1.85 (1.27)	41.7	-1.48 (1.37)	32.1	-9.6
Debala (204/2)	-1.24 (1.2)	81.8	-1.47 (.96)	30.0	-51.8
Zebala (212/10)	-1.83 (1.65)	33.3	-1.44 (1.36)	30.8	-2.5
Namposela (214/5)	-1.33 (1.66)	27.3	-1.42 (1.13)	30.8	+3.5
Yafola Central (205/8)	-1.79 (.77)	43.8	-1.55 (1.15)	33.3	-10.5
Markatinti (106/14)	-1.42 (1.10)	41.2	-1.95 (1.52)	50.0	+8.8
Korokonou (107/13)	-2.03 (1.24)	35.3	-2.33 (1.42)	51.6	+16.3
TibiWere (114/18)	-1.37 (1.28)	12.5	-2.39 (1.49)	58.6	+46.1
Tatila (115/17)	-2.59 (1.17)	70.0	-1.99 (1.74)	50.0	-20.0

C7-Mean WHZ & Prevalence Low Weight-for Height Z-Score by Village by Time

| Village	Mean WHZ (SD) 1990	% Low WHZ 1990	Mean WHZ (S.D.) 1994	% Low WHZ 1994	Change in Value
Babougou (101/11)	-.31 (1.42)	9.1	-.47 (1.35)	7.1	-2.0
Koila (105/12)	-1.19 (1.05)	25.0	-1.25 (1.13)	34.5	+9.5
Karaguana (202/4)	-.78 (1.44)	0.0	-1.18 (1.16)	22.2	+22.2
Peguena (203/7)	-.05 (1.09)	0.0	-.71 (1.08)	3.3	+3.3
Debala (204/2)	-.85 (1.71)	10.0	-.33 (.87)	0.0	-10.0
Zebala (212/10)	-.75 (1.04)	10.0	-.85 (1.17)	16.0	+6.0
Namposela (214/5)	-.77 (1.22)	8.3	-.15 (1.05)	0.0	-8.3
Yafola Central (205/8)	-.12 (1.20)	5.9	-.62 (1.04)	3.3	-2.6
Markatinti (106/14)	-.87 (.94)	5.9	-.71 (1.09)	13.3	+7.4
Korokonou (107/13)	-.76 (.91)	9.1	-.49 (1.07)	6.5	-2.6
TibiWere (114/18)	-1.11 (.90)	12.5	-.63 (1.01)	6.7	-5.8
Tatila (115/17)	-.92 (1.00)	18.2	-.57 (.83)	0.0	-18.2
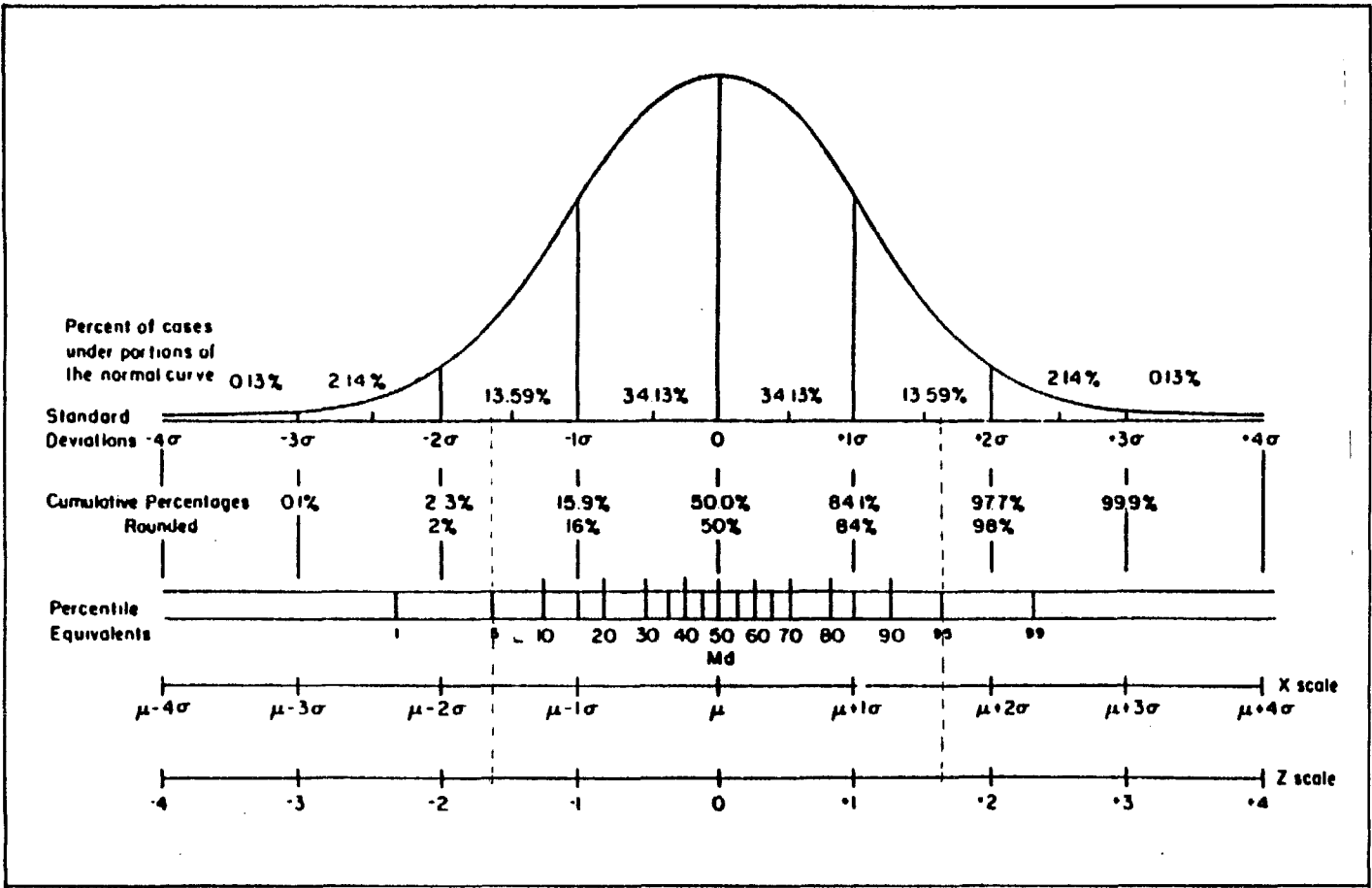
Figure 1: Normal curve showing the relationship between standard deviations, percentiles, and the Z score. This figure is a modification of a figure shown in: Valadian I, Porter D. *Physical Growth and Development: From Conception to Maturity.* Boston: Little, Brown & Co., 1977.

5%   10%   90%   95%

—1.645   —1.282   1.282   1.645