THE TAMIL NADU INTEGRATED NUTRITION PROJECT:

A REVIEW OF THE PROJECT WITH SPECIAL EMPHASIS ON THE MONITORING AND INFORMATION SYSTEM

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ABBREVIATIONS

ASI	Assistant Statistical Inspector
AWW	Anganwadi Worker (of ICDS)
BLS	Baseline Survey
CNC	Community Nutrition Center
CNI	Community Nutrition Instructress
CNS	Community Nutrition Supervisor
CNW	Community Nutrition Worker
CWG	Children's Working Group
DEAR	Department of Evaluation and Applied Research
DPNO	District Project Nutrition Officer
HSC	Health Sub-Center
HUD	Health Unit Center
ICDS	Integrated Child Development Services Scheme
MIS	Monitoring and Information System
MPHW	Multi-Purpose Health Worker
MPR	Monthly Progress Report
NCHS	National Center for Health Statistics
NMP	Noon Meal Program
NNMB	National Nutrition Monitoring Bureau
ORS	Oral Rehydration Solution

PEM	Protein Energy Malnutrition
PHC	Primary Health Center
SC/ST	Scheduled castes/scheduled tribes
SES	Socioeconomic Status
SI	Statistical Inspector
TINP	Tamil Nadu Integrated Nutrition Project
TPNO	Taluk Project Nutrition Officer
WWG	Women's Working Group

FOREWORD

In 1980 the State Government of Tamil Nadu, India, and the World Bank began the Tamil Nadu Integrated Nutrition Program (TINP). Over time the program expanded to cover nine districts, 9,000 villages, and a population of 17 million people. The large-scale nature of the program, combined with the evidence of substantial reduction in protein-energy malnutrition, has generated much interest in TINP as one model for the successful planning and implementation of nutrition programs.

In this working paper, Meera Shekar describes a review of selected aspects of TINP undertaken in 1989 as part of a Rockefeller-funded project with the Cornell Food and Nutrition Policy Program. It is one of five such reviews designed to better understand the organization and mode of operation of successful nutrition programs in developing countries. The other programs are in Tanzania (Iringa), Kenya (Embu District), Colombia (Day Care Homes Program), and Dominican Republic (Applied Nutrition Education Project). The organizing principle in each of these reviews was to analyze, in particular, the role of information in program planning, implementation, and evaluation.

The review of TINP makes two major contributions to our understanding of this important program. First, through reanalysis of primary data collected from village centers in the original pilot block, the review suggests that the impact of the program is even greater than previously reported. Of particular interest is the application of more rigorous statistical methods for testing the significance of observed differences, and critical examination of the plausibility and coherence of the findings. The review also identifies the need for multivariate analysis to extend upon these overall results and identify specific program inputs responsible for positive nutrition impact.

The second important contribution, as with other case studies in this series, is to add to the sparse literature on information systems in nutrition programs, one of the most unglamorous but important features of successful programs. Again, a critical analysis is brought to bear on the extensive TINP Monitoring and Information System, revealing, in general, good fit between information generation and decisionmaking by program management. Weaknesses in the system are also identified, the primary ones being the collection of more information than necessary in some cases and inadequate institutional resources for rigorous impact evaluation. The paper identifies specific ways in which the TINP information system can be strengthened as it becomes adapted to other parts of Tamil Nadu, India, and other developing countries.

Finally, the review demonstrates that although information systems perform a vital function, they do not operate in isolation from other project components. TINP benefited from strong and experienced management, sound training, favorable

supervisor-to-health worker ratios, good institutional infrastructure, and reliable and adequate funding. In applying the lessons from TINP, Iringa, and other successful programs, the challenge remains one of finding ways to achieve these qualities in large-scale public health programs.

Ithaca, New York
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Per Pinstrup-Andersen
Director, CFNPP

EXECUTIVE SUMMARY

HISTORY AND BACKGROUND

Tamil Nadu state has a population of 48 million (1981 census) and a history of a surfeit of nutrition intervention programs. In the 1980s the state had a total of twenty-five different intervention programs, including the Integrated Child Development Services Scheme and the Chief Minister's Noon Meal Program. Governmental commitment to the population's health and nutrition notwithstanding, the need for a more pragmatic and streamlined approach to health care is apparent.

A review of nutrition policies and programs in India over the last decade implies that Tamil Nadu's current nutrition expenditure, if properly targeted, is adequate to combat malnutrition in the state. In reality, most Indian states have relatively untargeted feeding programs. These programs therefore fail to adequately address the malnutrition problem. Recent data indicate that in 1975, only 4.5 percent of all children between 1 and 5 years of age in Tamil Nadu were "normal" based on the National Center for Health Statistics (NCHS) standards. The percentage increased to 7.1 in 1989 while the percentage of severe malnutrition declined from 13.7 in 1975 to 5.3 in 1989. This decrease was not, however, accompanied by a concurrent increase in calorie consumption.

THE TAMIL NADU INTEGRATED NUTRITION PROJECT

The Tamil Nadu Integrated Nutrition Project (TINP), a World Bank assisted intervention program in rural south India, offers nutrition and health services to children under five and pregnant and lactating women. Universal growth monitoring, well-defined and strict targeting criteria, and short-term selective supplementary feeding are some of the program's unique features. Other inputs include nutrition education and counseling, immunization, deworming, prophylaxis against anemia and Vitamin A deficiency, and supportive referral health services. It currently covers a population base of 17 million in nine districts in rural south India. Cost per beneficiary has been estimated at US$ 9.41. Since the end of World Bank support in 1989, recurrent program costs have been included in the state government budget and are estimated to be less than 5 percent of the state's annual expenditure on nutrition. Implementation of a second generation TINP, TINP-II, is underway in new districts of Tamil Nadu. Experience from TINP is also expected to feed into bank supported development programs in four other states in India: Orissa, Bihar, Madhya Pradesh, and Andhra Pradesh.

IS TINP SUCCESSFUL?

Past documentation on the claimed impact of the TINP is unconvincing, based as it is on rather simple statistical comparisons. Nevertheless, despite methodological limitations, this rich data resource remains to be exploited to the advantage of TINP. Impressionistic judgment of these data indicate that analyzed appropriately and rigorously, the TINP data could demonstrate a greater impact than has been implied in published reports. These conclusions, however, must remain tentative until supported by appropriate statistical analyses. Furthermore, rigorous reanalyses of existing data can answer many other research questions raised by the international health and nutrition community. The need for greater emphasis on institution building to ensure in-house facilities for program evaluation is evident.

TINP evaluation reports profess that in the pilot block, third and fourth degree malnutrition decreased from 20.4 percent at baseline to 15.7 percent in 1984 and in the control block it increased from 15.1 percent at baseline to 17.8 percent in 1984. This indicates a 23 percent decline in the pilot block compared with a 17 percent increase in the control block. This result has been interpreted to indicate a 40 percent net decline in 3rd and 4th degree malnutrition *due to the project* (Government of Tamil Nadu 1984). The terminal evaluation report further claims that within the category of 6 to 36 month old children, a higher rate of reduction of severe malnourishment has been recorded in the subgroup of 13 to 24 month olds. Another section claims that the impact is greatest in the 37 to 60 month age group. These and other inconsistencies detract from the validity of these conclusions.

Many TINP beneficiaries overlapped with the Noon Meal Program (NMP) after two years of age. Thus the NMP inputs offer a competing explanation for nutritional improvements in children older than two. In children younger than two, all program impact (after accounting for secular trends) could theoretically be attributed to TINP. But TINP reports show a greater impact in the 13 to 36 month and 37 to 60 month age groups and less so during the 7 to 12 month age group. Corrections also need to be made for secular trends before observed improvements in nutritional status can be attributed to program impact.

ADDITIONAL INFORMATION ON THE IMPACT OF TINP

Analyses of primary data from 42 TINP village centers in the pilot block support the impression that the "true" impact of TINP may be greater than that claimed in evaluation reports. These data indicate a statistically significant improvement in nutritional status of children in TINP program areas. Process data support this conclusion. The effect is more pronounced in younger children, i.e., 6 to 25 months. These results, though inconsistent with TINP evaluation reports, support the conclusion that the improvement seen is attributable to TINP rather than to the NMP, since NMP beneficiaries are older than 24 months of age.

Analyses of these data show some improvement in mean weights of sample children after 11 months of program operation. After six years of program operation, differences between initial and final weights are larger, more consistent across ages, and more statistically significant. Thus it is concluded that TINP impact is evident within the first year but is even more so after five and one-half years of program operation. Data from the TINP evaluation reports (based on an independent data source) also imply a minimal improvement in weight between October 1980 and July 1982. Hence, it is concluded that the time required to see a substantial and consistent improvement in weight was somewhere between one and five-and-one-half years of program operation, but the positive changes began within the first year. Plausibility analyses show that much of the observed impact is attributable to TINP after allowing for competing explanations such as the NMP and secular trends. Detailed multivariate analyses would help identify specific program inputs that contribute to the improved nutritional status, and similar analyses in other blocks could strengthen the above conclusions.

WHY IS TINP SUCCESSFUL?

Reasons for the favorable impact of TINP include government commitment, attention to detail in program planning, emphasis on accountability in program implementation, precisely targeted service delivery, realistic workloads and worker-to-client ratios, planned job-oriented training, quality supervisory support, and a well-designed and implemented monitoring and information system. Implementation features that reinforced the design features include attention to detail in task specification, pragmatic worker selection and recruitment criteria, quality of training, and some midproject design modifications based on program management data. Constraints in TINP design and implementation include inadequate attention to the location of community nutrition centers (CNC) and consequently less utilization of services by the most needy, some lost opportunities for midproject design modifications, and limited emphasis on community participation.

While many of the successful features of TINP are retained in TINP-II, many others (including selective short-term feeding, field worker loads) are not to be replicated. Further, some of the weaknesses of TINP (such as the location of CNCs and the program evaluation system) may be unwittingly repeated in the follow-on project.

THE MONITORING AND INFORMATION SYSTEM IN TINP

The Monitoring and Information System (MIS) in TINP was designed to monitor program activities, progress, and impact. Seven channels of information generation, management, and use are identified here. These include the "monitoring system," the role played by statistical inspectors, nutritional surveillance, formal evaluation studies, specially commissioned operational

research studies, the project newsletter, and the periodic World Bank review missions. Voluminous and meticulous recordkeeping by field workers allows for efficient information generation. Nonetheless, a reduction in the volume of information generated and recorded at the field level is warranted, and can be achieved without compromising information needs. Channels for management and flow of information are well streamlined. Key indicators of program dynamics facilitate the use of information by project managers. Attempts have been made to ensure that at least some program information is repaid in the form of midproject design modifications.

The TINP MIS represents one of the best examples worldwide of efficient use of information for program management. Use of information for program evaluation and for timely warning is, however, lacking. Furthermore, there is a need to identify and distinguish data needs for program management and impact research. Efforts are also required to enhance the analytical capabilities and facilities through appropriate institution building. The data resource from the TINP MIS has great potential for future analytic research (both basic and evaluative research), and urgent efforts must be made to preserve this resource before the paper on which these data are recorded deteriorates. Passive recognition of these issues now needs to be supplanted with active support from the state government and the World Bank.

Many lessons can be drawn from the strengths and the weaknesses of the TINP MIS design. These include establishing a decentralized system to promote the use of information at many levels, planning during the program design phase to facilitate midproject modifications, integrating many approaches to data generation (e.g., component monitoring, surveillance, evaluation, special studies, etc.), and developing a strong and independent MIS infrastructure with requisite computing and analytic facilities.

1. INTRODUCTION

The Tamil Nadu Integrated Nutrition Program (TINP) has been lauded as one of the few large-scale "successful" nutrition interventions in the world. Nevertheless, published data to support this claim have been ambiguous.

This review of the TINP is among the few independent published reviews of the program. The primary data analyzed in the fourth section, as well as much of the information about program operation, were collected as part of a large epidemiological study in forty-two village-based TINP centers in the pilot block of TINP. This study, on Positive and Negative Deviance in Child Growth (Phase I), was funded by the Thrasher Research Fund. Additional information on the monitoring and information system were collected during a two-week follow-up field visit to Tamil Nadu in June 1989. The first draft of this report was prepared in October 1989.

The report has been organized into six sections. The first two sections detail the background and operational details of TINP. The third section reviews published data on TINP, pinpointing the lack of persuasiveness of this evidence. The fourth section presents results from more rigorous analyses of primary data to investigate the impact of TINP. Section five attempts to synthesize the successful design and implementation features of TINP. The last section focuses specifically on the monitoring and information system in TINP to ferret out the factors that may have contributed to the success of the program.

It is hoped that the end product will be useful to the health and nutrition community, including program managers and designers.

2. HISTORY AND BACKGROUND

The State Government of Tamil Nadu, India, and the World Bank together initiated the TINP in rural south India in 1980 in an attempt to develop a replicable model of an integrated nutrition intervention program. At this time, Tamil Nadu state had a total of twenty-five different intervention programs already under way, and yet another, the Noon Meal Program (NMP), was launched in July 1982. While this plethora of programs implies governmental concern and commitment to health and nutrition in the state, it also underlines the need for a more pragmatic and streamlined approach to health care.

A recent review of nutrition policies and programs in India over the last decade shows that current nutrition expenditures in Tamil Nadu, as well as in the states of Kerala, West Bengal, and Gujarat, are adequate for combating malnutrition in the state if properly targeted (Subbarao 1989). But, in reality, most Indian states have relatively untargeted feeding programs for all children who fall within the specified age cutoff and hence fail to adequately address the malnutrition problem.

Latest data from the National Nutrition Monitoring Bureau (1989) report that in 1975, only 4.5 percent of the 1 to 5 year old children in Tamil Nadu were classified as "normal" (as per Gomez classification, using National Center for Health Statistics [NCHS] standards). Equivalent percentages were found in Kerala, while those in Karnataka, Andhra Pradesh, Maharashtra, Gujarat, and Orissa (the other states where data are reported) ranged between 1.2 and 3.5 percent. By 1989, these figures had increased to 7.1 percent for Tamil Nadu, 8.8 percent for Kerala, and 2.4 to 5.4 percent for the rest of the five states. The prevalence of "severe" malnutrition in Tamil Nadu decreased from 13.7 percent in 1975 to 5.3 percent in 1989; severe malnutrition in Kerala decreased from 16.0 percent to 2.8 percent, and in the other five states it decreased from 12.9-26.2 percent to 9.2-21.7 percent. These data imply a trend toward an improvement in nutritional status in all states, the improvement being most dramatic in Kerala followed by Tamil Nadu and then the other states for which data are reported.

Data from the National Nutrition Monitoring Bureau on changes in consumption of nutrients, however, are confusing. States that show a decrease in incidence of malnutrition do not show corresponding increases in per capita calorie consumption. For example, in Tamil Nadu mean energy consumption decreased from 2,418 to 1,910 calories between 1975 and 1989. Recommended dietary allowance for Indians is 2,400 calories, and the mean intake for Tamil Nadu at 1,910 calories is the lowest among all states reported. Further, many of the other states, including Gujarat and Orissa, show marginal increases in calorie intakes, while others show no change. These and other inconsistencies between energy consumption and nutritional status reduce the credibility of these trend data.

But in the absence of other countrywide surveys, these continue to be the only source of national-level data.

Other studies from Tamil Nadu, including the Cantor (1973) study and the Madurai Village Health Project (World Bank 1980) study report somewhat lower levels of malnutrition in the late 1970s, coupled with deficiencies of iron and vitamin A. Using the Harvard standards as reference, the Madurai village health study reported 13.7 percent children as "normal," and 15.7 percent as severely malnourished in this district of rural Tamil Nadu.

Some of the documented decrease in malnutrition prevalence in Tamil Nadu over the last decade may reflect the government's concern and commitment to nutrition and health and the many existing nutrition and health interventions.

NUTRITION PROGRAMS IN TAMIL NADU

Of the many programs currently operating in Tamil Nadu, only two need mention here – the national-level Integrated Child Development Services Scheme (ICDS), and the state-sponsored NMP. Both of these programs aim at direct nutrition and health intervention and are not designed to be income-transfer programs like the Integrated Rural Development Program, the Public-Distribution System, Employment Guarantee Program, etc.

The Integrated Child Development Services Scheme

The ICDS, a program sponsored by the central Government of India and implemented by state governments, has been in operation in all the states in the country (including Tamil Nadu) in selected blocks since 1975. It aims at reducing child malnutrition, morbidity, and mortality through a defined package of services that include supplementary feeding, nutrition and health education, immunization, and health referral services. In addition, it also provides preschool education for the 3-5+ age group. While initial evaluations of the ICDS have claimed a fair degree of success for the program (Tandon 1983), recent reports even by sympathetic reviewers are more guarded. Gopalan (1988) writes: "... it seems doubtful if the AW (Anganwadi worker of the ICDS) had really succeeded in bringing about attitudinal changes with respect to habits of personal hygiene, dietary practices or child-rearing practices, or in achieving sustained and substantial improvement in nutritional status of mothers and children in the villages studied – this despite some significant successes that have been reported in local situations." However, the ICDS is the major large-scale national-level endeavor at combating infant and child malnutrition in India and enjoys strong political and bureaucratic commitment.

In March 1990, 1,962 ICDS projects were functioning in the country (out of a total of 2,424 projects sanctioned by the government), covering a population of nearly 200 million. In Tamil Nadu, of the 111 central sector ICDS projects sanctioned, 79 were operational in March 1990. There are no state-sponsored ICDS projects in Tamil Nadu unlike in the states of Haryana, Karnataka, Jammu and

Kashmir, Kerala, West Bengal, Rajasthan, Gujarat, Andhra Pradesh, and Uttar Pradesh, which have state-sponsored projects (Central Technical Committee 1986, 1987). Thus Tamil Nadu's commitment to ICDS is limited to implementing the centrally-sponsored projects.

The Chief Minister's Noon Meal Program

The Chief Minister's Noon Meal Program (NMP) was started as a populist program by the former chief minister of Tamil Nadu in July 1982 at a budgeted cost of rupees 1,200 million. The program was designed to improve nutritional status and school attendance of children between the ages of 2 and 10 years. Feeding is implemented for 2 to 5 year olds through *Balwadis* (preschool centers) and for older children through primary schools. A noon meal providing about 400 to 600 calories and 10 to 16 grams of protein is supplied to children between the ages of 2 and 14. In 1987, the program covered 8.5 million children in Tamil Nadu through 66,000 centers. The cost per child is approximately rupees 240 ($12 at April 1991 exchange rates) per annum for food and administrative costs. Though several achievements have been attributed to the CFNMP (Devadas 1983, 1987), no systematic evaluations of any substance or with scientific rigor have been conducted, and dole feeding continues to be the major activity of the program. However, within Tamil Nadu's populist political policies, the program continues to enjoy much support.

The Tamil Nadu Integrated Nutrition Program

The TINP was started in the shadow of the already functioning ICDS and comparisons with it were inevitable, which has contributed much toward an unhealthy and unwarranted competition between the two programs. Comparisons of TINP with the NMP are politically taboo. These unfortunate developments were perhaps some factors that led to an overprotectiveness of TINP project data from public scrutiny. Success claims of TINP until now have not been supported with sufficient data even though much data has been generated from the project. If analyzed appropriately, the claims of success could actually have been well supported by these data. It would do much for the image of TINP in the national and international health and nutrition community to release these data for public dialogue. This is especially relevant in the context of planning and implementation of the second generation TINP-II. A detailed description of the TINP follows.

3. THE TAMIL NADU INTEGRATED NUTRITION PROJECT

This section details the objectives, design, and implementation of the TINP. Much of the description contained herein pertains to the reality of the situation, i.e., the program as it is implemented. Where this departs from the original project design, a note has been made to that effect. Where relevant, the reasons for departure from design are analyzed and discussed.

The TINP is a World Bank assisted nutrition intervention program started as a pilot project in 1980 in Kottampatti Block, Madurai District, in rural south India. The program has since then been extended in a phased manner to cover nine districts in south India through 8,965 village-based community nutrition centers and 2,723 health subcenters that reach a rural population base of over 17 million out of a total population base of 48.4 million in Tamil Nadu state (32.5 million rural and 15.9 million urban, according to the 1981 census). Figure 1 highlights the areas in Tamil Nadu to which the TINP has been extended over time. World Bank financial support for the project ended in December 1989, following which the program was taken over by the state government. A second-generation project (TINP-II) is now being supported in Tamil Nadu by the World Bank. Negotiations are underway for World Bank support for similar projects in other states in the country.

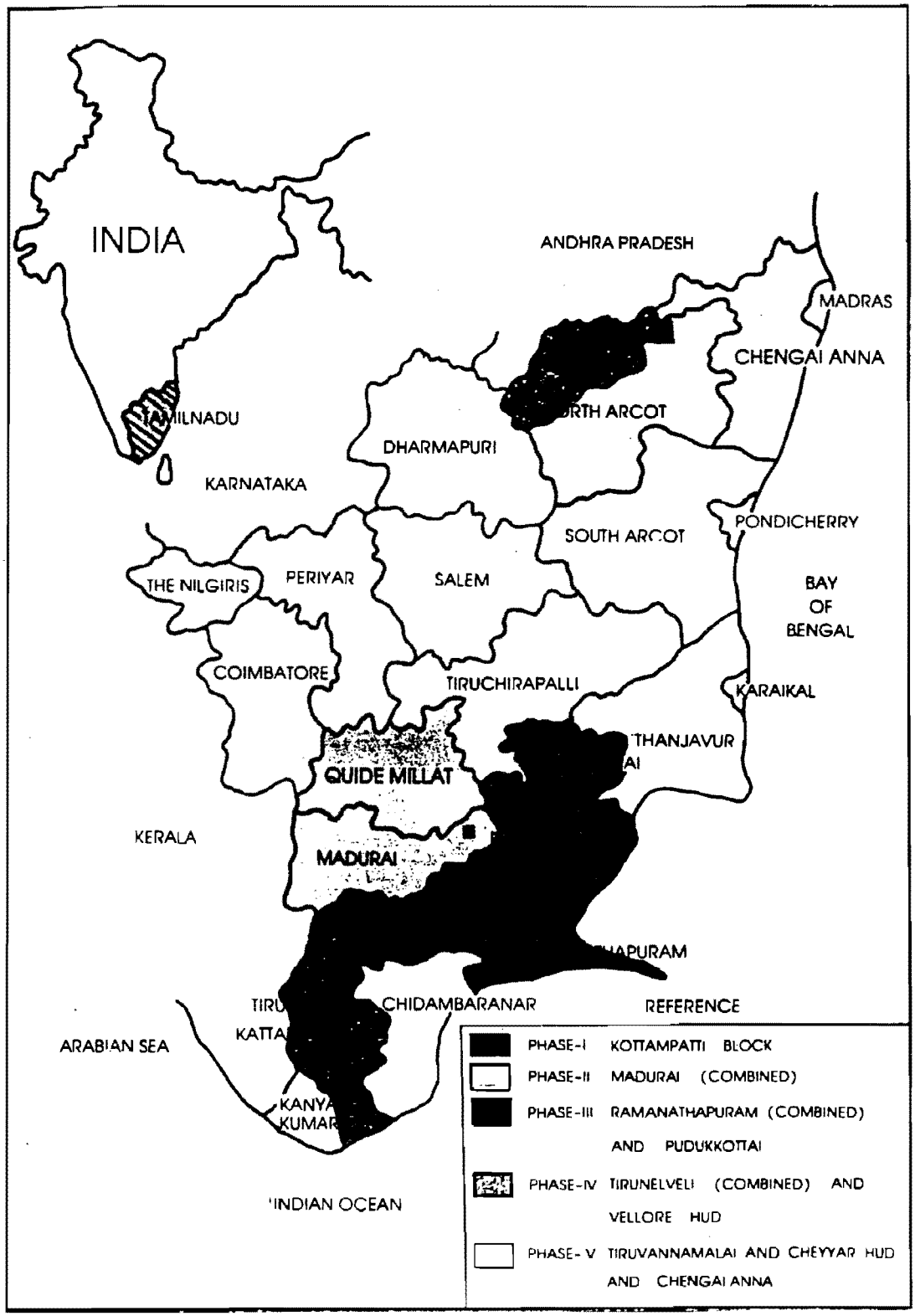
The total cost of the TINP project over nine years of operation has been about 984 million Rupees, averaging slightly more than one hundred million rupees per annum. Recurring costs for the project since 1989 onward ($4.7 million) are estimated to be less than 5 percent of the state's total annual expenditure on nutrition (Heaver 1990).

PROGRAM COMPONENTS AND OBJECTIVES

The program was designed to have four major components: nutritional services, basic rural health services, communications, and a separate, well defined monitoring and information system. Target groups included children under five, pregnant women, and nursing mothers. Services included growth monitoring, selective short-term supplementary feeding, nutrition counseling and education, health referral services, immunization, deworming, and iron and vitamin A prophylaxis. The primary objectives of the program included halving the levels of child malnutrition, reducing infant mortality by 25 percent, reducing vitamin A deficiency among children under five from 27 percent to 5 percent, and reducing anemia among pregnant women and nursing women from 55 percent to 20 percent.

Detailed objectives of the four components as described in the original project design (World Bank 1990) are listed below.

Figure 1 – Areas in Tamil Nadu to Which the TINP Has Been Extended



Objectives of the Nutritional Services

1) Determine and regularly monitor the nutritional status of children aged 6 through 36 months;

2) Help rehabilitate the malnourished and head off proximate malnourishment among these children through short-term food supplements;

3) Provide prophylaxis against specific nutrient deficiencies and widespread diarrhea among preschool children;

4) Improve home childcare and feeding practices through education;

5) Contribute to prospects for better infant survival and care through limited and selective food supplements for women during the critical stages of pregnancy and lactation; and

6) Improve the efficiency and effectiveness of the above actions through sustained performance monitoring and evaluation.

Objectives of the Basic Rural Health Services

1) Reduce the mortality and morbidity due to protein energy malnutrition (PEM);

2) Reduce the incidence of disease associated with specific nutrient deficiencies;

3) Rehabilitate cases of mild and moderate PEM; and

4) Improve the nutritional status of pregnant and nursing women.

Objectives of the Communications Services

1) Motivate target populations to change traditional family feeding patterns to provide better nutrition for 6 to 36 month-old children and expectant and nursing mothers.

Objectives of the Monitoring and Evaluation Component

1) Strengthen the Tamil Nadu government's monitoring and evaluation capacity in health and nutrition;

2) Determine whether various project components are progressing according to plans, targets, and implementation schedules;

3) Verify and update existing information about malnutrition in the area;

4) Ascertain the impact of project activities on nutritional status, morbidity, and mortality and relate these to socioeconomic status (SES), and environmental and behavioral variables;

5) Provide a basis for ongoing evaluation of program effectiveness by local-, district-, and state-level managements;

6) Permit continuous review and calibration of project design; and

7) Provide a basis for judging the relative merits of various approaches to the malnutrition problem outside the project.

PROGRAM DESIGN, OPERATIONS, AND IMPLEMENTATION

As mentioned earlier, the TINP has been a collaborative effort between the State Government of Tamil Nadu and the World Bank. Project design and guidelines have been prepared by the World Bank in consultation with and with the active participation of local government officials. The government of Tamil Nadu is responsible for administration, implementation, and monitoring of the program activities in the field.

Problem identification, planning, and design of the program were based on research results from the extensive Tamil Nadu Nutrition Survey supplemented by information from other local studies. Initial phases of the project experimented with several implementation strategies (including different criteria for selection of children for supplementary feeding).

In contrast to the process-oriented Iringa Nutrition Program in Tanzania, the Tamil Nadu program was fairly tightly defined both in design and implementation, with much attention paid to fine-tuning details of each intervention. This difference in philosophy between the two programs extended to the mode of implementation. While Iringa has a strong participatory element with little vertical control, TINP was implemented as a vertical program, with predefined inputs.

Program Administration

Within the governmental setup, program operations in TINP are headed by a specially designated "Project Coordinator" at the state level who is assisted in this task by appropriate staff. The nutrition-related component of the program is implemented by the State Directorate of Social Welfare, and the health component is implemented by the Directorate of Health Services.

At the district-level,[1] there is one District-Project Nutrition Officer (DPNO) for each district (backed by other office personnel) who supervises the "Taluk Project Nutrition Officers" (TPNOs) – one appointed for each "taluk" (a subdivision of a district). Within a taluk, one Community Nutrition Instructress is positioned for each block. At the field level, one Community Nutrition Center (CNC) is set up for every 1,500 people. Each CNC is staffed by one female community nutrition worker (CNW) and one ayah who assists the CNW. Supervisory support is provided by one community nutrition supervisor (CNS) for each of ten centers. Each village usually has one center, except villages with a population much greater than 1,500, in which case they may have two or even more CNCs. Small satellite hamlets adjacent to larger villages are generally served by centers located in the closest village, so that most CNCs serve a population of about 1,500. Figure 2 outlines the administrative organization of the TINP.

The focal point for delivery of most services is the village-based community nutrition center (CNC), where the community nutrition worker and ayah are based. Health-service support is provided by the multipurpose health worker (MPHW), who operates from a health subcenter (HSC). Thus the CNW, the MPHW, and the ayah together form the grass-roots level service delivery team. The MPHW enrolls children at birth, weighs them, and keeps records until the child is five months old, and then hands the responsibility over to the CNW, who monitors growth and provides the required interventions until the child is 36 months old. From the age of 36-60 months the child is once again the responsibility of the MPHW. The extent and nature of coordination required between the health and nutrition workers is implicit in this brief description of their activities.

Service Delivery

An integrated package of services is offered to the beneficiary population to cater to the objectives listed above. These include growth monitoring, short-term selective supplementary feeding, nutrition and health education/counseling, immunization, vitamin A and iron deficiency prophylaxis, deworming, and referral health services. Table 1 outlines the services provided and the target groups for each of these services.

The following subsections detail each of the interventions mentioned above.

Growth Monitoring. Weighing starts at birth when the multipurpose health worker (MPHW) weighs each child, records the weight in a weight card and continues to do so at monthly intervals until the child is five months old. Thereafter, the child's weight card is handed over to the community nutrition worker (CNW) until the child is 36 months. After the age of 36 months, the responsibility is handed back to the MPHW. During the 6 to 36 month-age period, the CNW weighs each child monthly and records the weight on a weight card. Weighing is conducted at the

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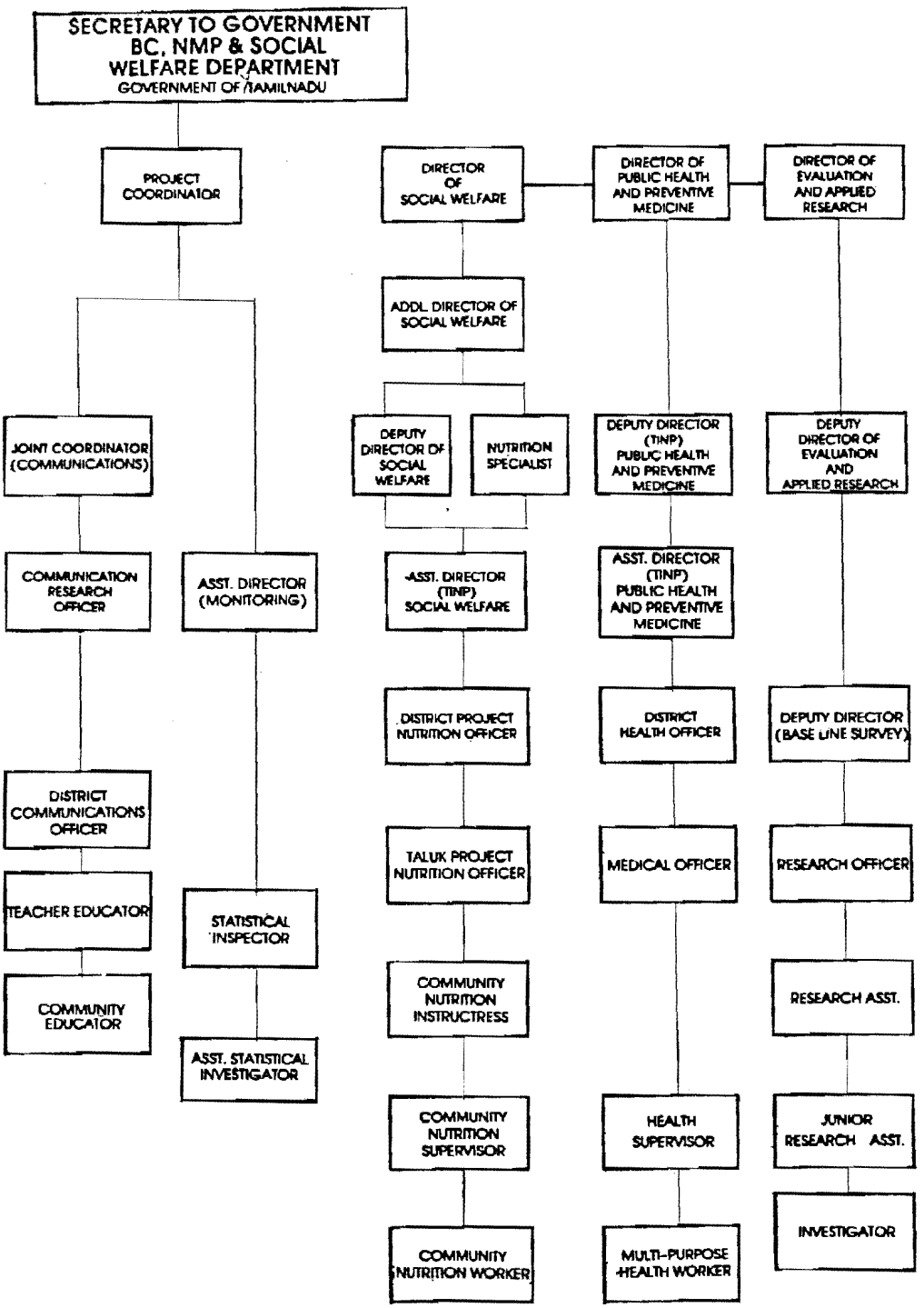
[1] Administrative units in India are divided into states; states are further subdivided into districts, districts into taluks, and taluks into blocks.

Figure 2 – Organization Chart for TINP



Source: Government of Tamil Nadu (1989).

Table 1 – Tamil Nadu: Service Delivery in the TINP

Service	Target Group	Functionary Responsible
Weighing	Children 0-5 months	MPHW
	Children 6-36 months	CNW
	Children 36-60 months	MPHW
Growth monitoring	Children 6-36 months	CNW
Selective feeding	Children 6-36 months	CNW
	Pregnant and nursing women	CNW
Intensive follow-up at home	Children 6-36 months	CNW
Immunization	Children 0-36 months	MPHW
Nutrition education	Women	CNW
Iron and folate supplementation	Pregnant and nursing women	MPHW
Vitamin A prophylaxis	Children 6-36 months	MPHW
Deworming	Children 6-36 months	CNW
Health referral	Children 6-36 months	CNW/MPHW
	Pregnant and nursing women	CNW/MPHW

Note: CNW = community nutrition worker; MPHW = multi-purpose health worker.

center on three days each month. The days on which weighing is to be done are decided and set to the convenience of the functionaries. Children who do not come to the center for weighing on the prescribed days are usually followed up at home within the next two or three days to ensure regular weighing.

The pattern of growth of each child is closely observed by the community nutrition worker. Children who falter in growth are enrolled for short-term selective supplementary feeding at the center, as elaborated upon below. These children are also singled out for intensive follow-up in the home for targeted nutritional and health counseling. The worker, in consultation with the mother, attempts to analyze the reasons for growth faltering, and together they work out feasible solutions. The worker and the mother then initiate appropriate action at the center and in the home.

Much has been said about the quality of growth monitoring efforts in Tamil Nadu (Bhan and Ghosh 1986; Berg 1987; Shekar 1990; Shekar, Habicht, and Latham 1991). All of these reviews concur that the implementation of growth monitoring and promotion in Tamil Nadu has been among the most successful among similar large-scale programs worldwide. However, some aspects could be strengthened further. The most important among these is the coordination between the health worker and the nutrition worker. This issue has received considerable recognition within the TINP administration, but no satisfactory solutions have emerged to date. In view of this, it may be pragmatic to let the better equipped (vis-à-vis growth monitoring and promotion) nutrition worker assume responsibility for weighing on site. Another experiment that did not succeed was the one related to the mother retaining the growth cards. The program was designed for duplicate growth charts to be maintained for each child – one at the center and another with the mother. The mother's card would be updated at each weighing, and the card would be used as the takeoff point for nutritional counseling. However, in reality, not all cards were actually retained by mothers, few of these were up to date, and practically none were used for educational purposes.

Selective Short-term Supplementary Feeding at the CNC. Children 6 to 36 months of age are identified for selective short-term supplementary feeding on the basis of the growth patterns observed during growth monitoring. For most children who are identified for feeding, supplementation continues for at least 90 days. Subsequently, feeding at the CNC is discontinued for all children who meet the "exit" criteria delineated below. Concurrently, mothers are counseled to sustain improved growth through appropriate home measures. In cases where improvement in growth is not observed or where signs of disease or parasites are observed, the child is referred to the health worker. Supplementary feeding may be continued based on the recommendation of the MPHW, in 30-day increments subject to an overall maximum of 180 days continuous feeding. Criteria for identification of 6 to 11 month-old children for supplementary feeding are outlined briefly below:

Entry criteria for 6 to 11 month-old children are (1) failure to gain any weight in the previous one month; or (2) weight gain of less than 300 grams per month in the last two consecutive months.

Entry criteria for 12 to 36 month-old children are (1) current weight less than the weight three months ago; or (2) total weight gain over the last three months (i.e., in four weighings) less than 300 grams.

If any 6 to 36 month-old child had diarrhea during the week before weighing, the child would be weighed again one week after the end of the diarrheal episode and the above entry criteria would be reapplied. According to theoretical calculations (World Bank 1980) these criteria ensure that "children gaining weight at an inadequate rate will enter the feeding program with near certainty at least once over the thirty months of eligibility." Further, on the basis of experience gained from the early stages of project implementation, all children suffering from grades 3 and 4 malnutrition are identified for supplementary feeding, irrespective of the above criteria.

Exit criteria for 6 to 36 month-old children are weight gain of at least 500 grams during the 90-day feeding.

The food supplement consists of a cereal-pulse-groundnut-sugar mixture made into a snack food called a "laddoo." Since Tamil families traditionally do not consider a food to be a meal until it includes rice, a nonrice snack supplement (like laddoo) is less likely to substitute for a meal.

Home Visits, Follow-up, and Nutritional Counseling. As mentioned earlier, growth monitoring is complemented with intensive follow-up of children wherein mothers are advised about appropriate home measures to take to ensure improved health and nutritional status. Home visits are made by the nutrition worker and the health worker individually, and joint visits by the two together. The personalized education/counseling is among the most important services offered by the program since there is a very strong emphasis on minimizing program dependency. From the time a child is identified as malnourished, there is an effort to educate and motivate the mother to take necessary action. Maternal efforts are complemented by supplementary feeding at the CNC during critical phases. Once the child shows signs of improvement, feeding at the center is discontinued and the mother is encouraged to assume charge with sustained action at home.

Nutrition Education. Nutrition education is provided to all mothers who maintain contact with the center. Monthly education and demonstration sessions are held either at the CNC or at the homes of one of the mothers. One innovation of the TINP in this context is the women's working groups (WWG). Mothers get together to form small groups, one mother assuming the role of the leader and the CNW acting as a group facilitator. These group meetings are the focal points for nutrition education and in some areas, for income-generating activities. In some centers, the leader of the women's group is encouraged to assume charge of ten

other women in the locale, whose continued participation is ensured by the leader.

Oral rehydration therapy has been given special attention among the nutrition and health education topics covered. Children's working groups have also been initiated in some of the project areas wherein member children educate other children and adults about simple nutrition/health related messages through songs and jingles. The communications component of the program focuses on organization of special campaigns and drives on topics of common interest.

Immunization. Immunization coverage is provided against diphtheria, polio, tetanus, pertussis, and tuberculosis. Measles vaccinations have been added to this package recently. Immunization services are provided by the health worker with help from the CNW and records are entered on the weight card.

The MPHW is expected to visit the village at least once a week for immunization and other activities, but implementation of this feature is less than optimal.

Iron and Folate Supplementation. Iron and folate supplements are provided to all pregnant and nursing women as a means of reducing the incidence of nutritional anemia. Implementation of this feature has been tardy due to intermittent supplies and inadequate attention to compliance.

Vitamin A Prophylaxis. Vitamin A supplements are provided to all children under the age of three and as many other preschool children as possible through a massive six-monthly dose of 200,000 IU provided in the form of retinal palmitate. The supplement is currently supplied to beneficiaries by MPHWs on a biannual campaign basis.

Deworming. All children in the 6 to 36 month-age group are dewormed every four months by the CNW. Information on deworming status is entered on the growth chart.

Health Referral. Children with inadequate weight gain who fail to "graduate" from the feeding component within the 90-day period are referred to the MPHW. Other overt cases of disease are also referred when detected by the CNW. This supportive service helps to take care of medical problems outside the capability of the nutrition worker. Further, this service is also available for pregnant women for checkups and immunization.

TRAINING OF PROJECT FUNCTIONARIES

Training of community nutrition workers is conducted at block headquarters and at a model CNC in the block for a total of two months. This is followed up with continuous, on-the-job training imparted mainly by the Community Nutrition Instructress and the Community Nutrition Supervisors, with support from the district and taluk project nutrition officers. Replacement CNWs (new recruits

who join between training courses) are given a total of 12 days training in the field.

Community nutrition instructresses and community nutrition supervisors are trained at the Gandhigram Institute of Rural Health and Family Welfare or at Sri Avinashlingam College of Home Science for a period of two months each.

COST ISSUES

Information on cost of TINP is limited. Berg (1987) mentions a cost per beneficiary per year of US$ 9.41 for the year 1984-1985. (At an exchange rate of approximately rupees 11 per US$ in 1984-1985, this translates to about rupees 104 per beneficiary). The total cost of the project for the same year is US$ 8,475,000 of which $2,491,000 (29.4 percent) was spent on food and $5,984,000 on other recurrent costs. Total cost per 100,000 "persons" is listed as $102,000, averaging at a little over $1 per person per year.

Annual costs as per the TINP project office are listed in Table 2. According to this, the total cost of the project averages at slightly more than Indian rupees one hundred million per annum. Assuming a beneficiary population of one million per year, this averages to rupees 109 per beneficiary per year over the nine years of program operation. Of this, 4 percent was spent on communications, 3.7 percent on administration, 47 percent on nutrition-related expenses (mainly food), 24 percent on health-related expenses, less than 0.5 percent on evaluation and applied research, and the remaining 21 percent on hardware costs.

Recurring costs from 1989 onward (US$ 4.7 million) are estimated to be less than 5 percent of Tamil Nadu's total annual expenditure on nutrition (Heaver 1990).

Table 2 – Tamil Nadu: TINP: Year-wise Expense Statement

Component	Total Project Outlay	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	Total Expenditure
	100,000 Indian Rupees										
Directorate of Social Welfare	4,504.63	9.96	80.54	232.51	464.87	696.17	830.92	728.63	750.10	801.75	4,615.45
Directorate of Medical Education	–	6.64	9.91	7.11	–	–	–	–	–	–	14.66
Directorate of Public Health and Preventive Medicine	2,336.10	1.47	51.06	112.81	176.98	292.66	289.13 381.36	292.05	400.97	342.98	2,341.47
Highways and Rural Works	1,753.43	5.20	159.45	159.99	327.71	465.39	330.78	306.37	2.22	–	1,757.31
Public Works Department	340.59	93.38	146.70	23.21	6.90	9.96	0.12	0.73	20.57	12.96	313.07
Evaluation and Applied Research	43.29	0.78	2.95	4.74	5.74	11.89	5.55	8.05	3.46	0.22	43.38
Communication	429.63	0.31	2.73	48.79	42.48	72.09	89.95	44.83	46.74	48.56	396.48
Project Coordination Office	369.91	6.27	6.34	6.82	21.84	12.21	42.74	77.04	90.99	99.28	363.53
Total	**9,777.58**	**124.01**	**450.68**	**615.98**	**1,046.52**	**1,560.37**	**1,970.55**	**1,456.44**	**1,315.05**	**1,305.75**	**9,845.33**

4. IS TINP SUCCESSFUL?

Claims for the success of TINP have been many – both the state government of Tamil Nadu and the donor agency have claimed success. This section attempts to review these claims in the light of available documentation.

The success of TINP is assessed here in terms of the project impact. Measurement of nutritional impact is restricted to weight-for-age.

PRESENTATION AND REVIEW OF PUBLISHED DATA ON THE IMPACT OF TINP

Three formal sources have generated data on the TINP:

1. The *monitoring wing* of TINP generates reports from which the monthly *monitoring data* are extracted. These data cover the project, i.e., data were collected and collated from all children enrolled in the project.

2. Sample households in "control" and "project" villages are the source of monthly nutritional *surveillance data*. The Department of Evaluation and Applied Research (DEAR) collected the data, which were limited to a fairly smallsample of 436 to 660 children in project and control villages.

3. DEAR conducts specially designed *evaluation studies*, which include baseline studies in pilot and control blocks; midterm impact evaluation in pilot and control blocks and process evaluation in other extended areas of TINP; and terminal evaluation in pilot, control, and extended blocks (impact and process data).

While the program monitoring wing is a department within the project implementation office, the DEAR is an external agency appointed for program evaluation. DEAR has published two program evaluation reports: the Midterm Impact Evaluation (Government of Tamil Nadu 1984) and the Terminal Evaluation Report (Government of Tamil Nadu 1989).

The two reports are based on data from the monthly surveillance of selected areas undertaken to estimate the numbers of children in different grades of malnutrition and the trends in these over time, and the special evaluation studies. These reports also refer to the monitoring data collected primarily for program management. However, there are some discrepancies between the trends indicated by the two sources of data, i.e., monitoring (collected by the program monitoring wing), and evaluation and surveillance (collected by DEAR). Results from the two reports are discussed in the following paragraphs. While a more comprehensive critique of these data are presented in the following subsection,

major issues relevant to each point are discussed alongside to facilitate readability.

The terminal evaluation report claims a "positive correlation between the duration of project operation and the rate of reduction of severe malnutrition." Monitoring data support these conclusions. The data show that initial levels of severe malnutrition reduced from a baseline of between 19.5-24.5 percent in different project areas, to 7.5 percent, 7.1 percent, and 8.2-13.2 percent in areas where the program has been in operation for six years (Phase 1), five and one-half years (Phase 2), and four years (Phase 3), respectively. These data imply a dose-response relationship between the number of years of program operation and the degree of decline in severe malnutrition. However, the report made no mention of nonprogram factors that might have contributed to this decline in severe malnutrition. No statistical tests have been conducted to support these conclusions.

The terminal evaluation report further claims that "within the category of 6-36 months children, a higher rate of reduction of severe malnourishment has been recorded in the sub-group 13-24 months" (Government of Tamil Nadu 1989). The terminal evaluation report shows no age-disaggregated data to support this statement.

Table 3 (based on evaluation data from DEAR) reproduced from the midterm evaluation report sheds some light on the age-wise impact on nutritional status. These data support the contention that a greater impact occurred in children in the 13 to 36 month-age group between baseline (1980) and midterm (1984). Many reports (Mathew 1985; Government of Tamil Nadu 1984) profess that nutritional status of children in the 13 to 36 month-age group improved in the pilot block and deteriorated in the control block. In the pilot block, third and fourth degree malnutrition decreased from 20.4 percent at baseline to 15.7 percent in 1984 and increased in the control block from 15.1 percent at baseline to 17.8 percent in 1984. This indicates a 23 percent decline in the pilot block compared with a 17 percent increase in the control block. This result has been interpreted to indicate a "40 percent net decline in 3rd and 4th degree malnutrition *due to the project*."

But, in view of the small sample sizes, the lack of statistical testing is a major concern, and it weakens these conclusions. Table 3 also shows a much lesser decline in severe malnutrition in children between 7 and 12 months in experimental versus control villages. The report did not address this trend.

Another section of the terminal evaluation report claims that "impact has been felt more on the 37-60 month-age group" (Government of Tamil Nadu 1989, 34). This statement is based on data from the pilot block reproduced in Table 4. The report suggests that the distribution of severely malnourished children has consistently decreased in the 37 to 60 month-age group and increased in the 6 to 36 month-age group, probably reflecting a proportionately greater decrease in severe malnutrition among the 37 to 60 month olds. The report concludes that early detection and correction of severe malnutrition increases the nutritional advantage of children in the 37 to 60 month-age group.

Table 3 — Tamil Nadu: Midterm Evaluation: Changes in Nutritional Status of Children (7-60 Months), by Age Group

	Pilot Block			Control Block		
	Baseline Survey (October 1980)	Midterm Evaluation (March 1984)	Percentage Point Increase (+) or Decrease (-)	Baseline Survey (October 1980)	Midterm Evaluation (March 1984)	Percentage Point Increase (+) or Decrease (-)
7-12 months						
Normal	17 (47.2)	29 (29.7)	(-) 17.5	18 (24.3)	41 (38.3)	(+) 14.0
Grade 1	11 (30.6)	46 (46.9)	(+) 16.3	25 (33.8)	35 (32.7)	(-) 1.1
Grade 2	5 (13.9)	19 (19.4)	(+) 5.5	15 (20.3)	24 (22.4)	(+) 2.1
Grade 3	3 (8.3)	2 (2.0)	(-) 6.3	3 (4.0)	6 (5.6)	(+) 1.6
Grade 4	0	2 (2.0)	(+) (2.0)	13 (17.6)	1 (1.0)	(-) 16.6
Normal + Grade 1	28 (77.8)	75 (76.6)	(-) 1.2	43 (58.1)	76 (71.0)	(+) 12.9
Grades 3 + 4	3 (8.3)	4 (4.0)	(-) 4.3	16 (21.6)	7 (6.6)	(-) 15.0
13-36 months						
Normal	34 (14.2)	43 (12.5)	(-) 1.7	64 (23.4)	46 (16.1)	(-) 7.3
Grade 1	66 (27.5)	123 (35.9)	(+) 8.4	92 (33.7)	92 (32.2)	(-) 1.5
Grade 2	91 (37.9)	123 (35.9)	(-) 2.0	76 (27.8)	97 (33.9)	(+) 6.1
Grade 3	30 (12.5)	47 (13.7)	(+) 1.2	25 (9.2)	37 (12.9)	(+) 3.7
Grade 4	19 (7.9)	7 (2.0)	(-) 5.9	16 (5.9)	14 (4.9)	(-) 1.0
Normal + Grade 1	100 (41.7)	166 (48.4)	(+) 6.7	156 (57.1)	138 (48.3)	(-) 8.8
Grades 3 + 4	49 (20.4)	54 (15.7)	(-) 4.7	41 (15.1)	51 (17.8)	(+) 2.7
37-60 months						
Normal	33 (13.2)	32 (14.6)	(+) 1.4	72 (30.0)	27 (10.5)	(-) 19.5
Grade 1	84 (33.6)	99 (45.3)	(+) 11.7	77 (32.1)	116 (45.5)	(+) 13.4
Grade 2	94 (37.6)	73 (33.3)	(+) 4.3	61 (25.4)	95 (37.3)	(+) 11.9
Grade 3	36 (14.4)	13 (5.9)	(-) 8.5	25 (10.4)	13 (5.1)	(-) 5.3
Grade 4	3 (1.2)	2 (0.9)	(-) 0.3	5 (2.1)	4 (1.6)	(-) 0.5
Normal + Grade 1	117 (46.8)	131 (59.9)	(+) 13.1	149 (62.1)	143 (56.0)	(-) 6.1
Grades 3 + 4	39 (15.6)	15 (6.8)	(-) 8.8	30 (12.5)	17 (6.7)	(-) 5.8

Source: Government of Tamil Nadu (1984).

Table 4 – Tamil Nadu: Distribution of Grades 3 and 4 Malnourished Children in Kottampatti

Observation Time	Age Group		
	6-36 Months	37-60 Months	6-60 Months
October 1980	57.1	42.9	100.0
July 1982	76.7	23.3	100.0
March 1984	79.5	20.5	100.0
October 1986	80.0	20.0	100.0

Source: Government of Tamil Nadu (1989).

The report also mentions that impact was more pronounced among males than among females. Of all the severely malnourished children in the 6 to 60 month-age group, the percentage of severely malnourished females varied between 58 and 66 percent in different districts. These percentages increased further at the time of terminal evaluation, and the report concludes that the project did not reduce the disparities in nutritional status between the two sexes.

Table 5 shows the impact data from the final round of evaluation studies conducted by DEAR in different districts.

Severe malnutrition consistently declined in all the districts for which data are reported. Increase in "normal + grade 1" is less consistent. The relatively lower impact in Madurai over 48 months of project operations is attributed to a better initial nutritional status: 10 percent severe malnutrition as against 15 to 17 percent in other areas (as per DEAR estimates). In addition, Madurai was also estimated to have a higher "economic development index." The nature of this index is not discussed, but it is supposed to be a rough proxy for GNP.

Program management data from the monitoring wing show more dramatic decreases in severe malnutrition (Table 6).

The following subsection outlines the reasons for the discrepancy between DEAR and monitoring data.

Table 7 presents weight data on children from pilot and control blocks. According to these data, mean weights in pilot areas increased while corresponding weights in control areas decreased over time. The report concludes that mean weights of children in pilot villages had increased due to the project, and that the older children (37 to 60 months) show a greater improvement. However, the report makes no reference to the validity of a comparison between experimental and control villages in view of the six-month age groupings in this table. Nor does it cite reasons for the observed loss in weight among children in control villages. (Other sources reveal that the entire state recorded poor rainfall during this period, which could have contributed to the observed decline in nutritional status.) These data and the relevant comparisons would have been much more informative if presented by single monthly ages. Additionally, the decrease in the level of severe malnutrition (grades 3 and 4) among 37 to 60 month-old children in control villages reported in Table 3 is not consistent with the large reduction in mean weights reported here.

FURTHER CRITIQUE OF PUBLISHED DATA

The results presented above are impressive inasmuch as they are based on fairly large numbers, and data from other projects indicate that such improvements in nutritional status do not usually occur without a concurrent and dramatic improvement in socioeconomic conditions. However, several factors need to be considered before authoritative statements about program impact can be

Table 5 – Tamil Nadu: Changes in Nutritional Status Between Baseline and Final Evaluation: Estimates from DEAR Data

District	Reduction in Severe Malnutrition (Grades 3 and 4)[b]	Change in Normal and Grade 1[b]
	Percent	
Kottampatti (Phase 1[a])	55.0	+21.9
Madurai (Phase 2[a])	24.0	-9.4
Ramanathapuram (Phase 3[a])	34.5	-4.9
Puddukkottai (Phase 3[a])	37.7	+25.2

Source: Government of Tamil Nadu (1989).

[a] The project was initiated in Kottampatti block in Phase 1 (October 1980), in Madurai district in Phase 2 (April 1982), and in Ramanathapuram and Pudukkottai districts in Phase 3 (July 1983).

[b] Changes recorded between January 1981 and January 1987, i.e., 72 months of program operation in Kottampatti, 54 months in Madurai, and 48 months in Ramanathapuram and Pudukkottai.

Table 6 – Tamil Nadu: Changes in Nutritional Status Between Baseline and Final Evaluation: Estimates from Monitoring Data

District	Reduction in Severe Malnutrition (Grades 3 and 4)[b]	Change in Normal and Grade 1[c]
	Percent	
Kottampatti (Phase 1[a])	66.7	+6.7
Madurai (Phase 2[a])	63.6	+14.3
Ramanathapuram (Phase 3[a])	66.5	+11.3
Puddukkottai (Phase 3[a])	36.5	+10.5

Source: Government of Tamil Nadu (1989).

[a] The project was initiated in Kottampatti block in Phase 1 (October 1980), in Madurai district in Phase 2 (April 1982), and in Ramanathapuram and Pudukkottai districts in Phase 3 (July 1983).

[b] Changes recorded between January 1981 and January 1987, i.e., 72 months of program operation in Kottampatti, 54 months in Madurai, and 48 months in Ramanathapuram and Pudukkottai.

[c] Changes recorded between February 1983 and January 1987.

Table 7 — Average Weights of Children by Age

Block/Age Group	Baseline Survey (October 1980) Total Children Weighed	Baseline Survey (October 1980) Average Weight	Midterm Evaluation (March 1984) Total Children Weighed	Midterm Evaluation (March 1984) Average Weight	Increase (+) or Decrease (-)
Months		Kilograms		Kilograms	Kilograms
Pilot block					
7-12	36	6.744	98	6.839	(+) 0.095
13-24	120	7.519	166	7.849	(+) 0.330
25-36	120	9.600	177	9.896	(+) 0.296
37-48	145	11.031	132	11.427	(+) 0.396
49-60	105	12.200	87	12.814	(+) 0.614
Control block					
7-12	74	6.480	107	6.785	(+) 0.305
13-24	144	8.500	143	8.040	(-) 0.460
25-36	129	10.582	143	9.810	(-) 0.772
37-48	94	12.021	144	11.214	(-) 0.807
49-60	146	13.740	111	12.608	(-) 1.132

Source: Government of Tamil Nadu (1984).

made. The analysis must account for the lack of comparability between project and control villages (in terms of socioeconomic status and initial levels of malnutrition). This is especially relevant since the villages were not selected randomly, as planned in original project documents. Glossing over these differences in a cursory fashion, as has currently been done, may invalidate some of the conclusions reported above. If initial levels of malnutrition were higher in pilot villages than in control villages, response (improvement in nutritional status) is likely to be more pronounced in the pilot areas, and the two responses are not directly comparable.

No one has attempted to conduct any statistical tests on these data, and hence any claims about "positive correlations" are misleading. Even statements about program impact based on mean values alone are statistically unsound unless supported by at least basic information about standard deviations around the means. This is especially true about the smaller data sets like the evaluation data from "control and pilot" villages where sample sizes vary from 436 to 648 for a combined sample of 6 to 60 month-old children. The plausibility of conclusions about program impact could be greatly enhanced by appropriate and rigorous statistical analyses of these existing data. As it stands, there are several contradictions in the data presented. Some of these have already been mentioned earlier. Others are discussed here.

First, as mentioned before, estimates of decrease in levels of malnutrition vary between the different data sources (i.e., monitoring and evaluation data). DEAR estimates of malnutrition are much lower than monitoring estimates. The terminal evaluation report mentions three possible reasons for this discrepancy:

1. Monitoring estimates of initial levels of malnutrition were higher (than those of DEAR) in all areas except Kottampatti. Since base estimates were higher, the reduction in malnutrition was also higher.

2. A reduction in the number of children suffering from grades 3 and 4 malnutrition is not accompanied by a corresponding decrease in the number of children selected for feeding. This led to the conclusion that the reduction in grades 3 and 4 malnutrition is "offset fully or partially by an increase in mild or moderate forms of malnutrition." (This explanation does not clearly account for the differences between the two data sources, but it is reproduced here for the record).

3. The third reason mentioned for the discrepancy is related to the method of measuring malnutrition by the monitoring wing. The numbers of malnourished children are measured as a ratio of the number of children suffering different grades to the total numbers weighed. It is argued that as project coverage increased (from 70 to 90 percent) over time, the denominator in this ratio increased, but the numerator did not increase at the same pace, since the children excluded from weighing in initial stages were better nourished than those included. Data to support the argument that those excluded initially were better off (Government of Tamil Nadu 1989) are flimsy, being based on small samples and no statistical tests. The report presumes that those excluded from weighing represent "... a hard-core of mothers, steeped in tradition, whom it is

very difficult to convince, would always be there .... Since they are impelled by considerations of social status and sentiments, it would be safe to assume that their children would be nutritionally sound." Analysis of additional data presented in Section 4 further discount this assumption.

None of the explanations proffered above are adequate to reconcile the two data sets. Perhaps the important reason for the differences is the different sampling procedures and data sources used by the two agencies. The DEAR data is based on primary data from a sample survey, but monitoring information is based on secondary monitoring data obtained from a comprehensive sample. While the sampling procedures as explained in the evaluation reports are a little unclear, it is understood that in the evaluation surveys (excluding the baseline) an effort was made to oversample households with pregnant and lactating women and those that reported "maternal and infant deaths." If this is true and if this oversampling was not accounted for in the analyses, then the surveys (excluding baseline) would have overestimated the point prevalence of malnutrition (after program initiation, but not before, since oversampling was not done for the baseline). This probably explains why the DEAR estimates of the impact of the program (in terms of reduction of levels of malnutrition) are lower than the monitoring estimates. Accordingly, one is more inclined to accept the monitoring estimates of impact (which indicate a larger impact) as against the DEAR estimates, notwithstanding the fact that the TINP evaluation report has accepted a midway compromise between the two.

Analyzed appropriately, the available data can actually demonstrate a larger impact than has been currently implied. To substantiate these tentative conclusions, it will be necessary to look at standard deviations around the means for each of the estimates. Further, the rationale for using a gross measure of impact like shifts in grades of malnutrition is not clear, especially when actual weight data are available. This is discussed in greater detail in a later section.

Several other issues related to study design need to be discussed. Only a few of these are mentioned here. First, differences in sampling strategies between the baseline survey and subsequent surveys detract from the validity of the DEAR results. Different agencies conducted the baseline and subsequent surveys, introducing an element of nonstandardization of methods and procedures. Seasonality is not accounted for. The cross-sectional DEAR evaluation surveys were conducted at different times of the year, except in Madurai district where all the surveys were conducted in April. Information on clinical signs are not discussed here. Various nonstandard teams of "trained" nonmedical personnel collected this information, and the results are suspect. Limited sample sizes and analysis constrained the mortality data, so a reduction in infant mortality cannot be convincingly documented through currently available data and analysis.

Yet another issue pertains to the inadequate utilization of longitudinal data collected through nutritional surveillance. This very valuable data could support many of the claims of success, provided that it is analyzed appropriately as a longitudinal data set and not as a cross-sectional one. The few efforts

that have been made in looking at this data to-date are biased toward a cross-sectional approach.

The NMP overlapped with the TINP in benefiting children older than two years of age. Thus the Noon Meal inputs offer a competing explanation for nutritional improvements in children older than two years. It is essential to account for these effects. All program impact on children younger than two (after accounting for secular trends) could theoretically be attributed to TINP. However, TINP reports show a greater impact in the 13 to 36 month- and 37 to 60 month-age group than in the 7 to 12 month-age group.

Appropriate statistical analyses are required to make "prudent inferences about the plausibility or implausibility of alternative, competing explanations of observed changes" as envisaged during the planning of the project (World Bank 1980). Furthermore, some estimates should be made of the contribution of various project inputs toward impact. This exercise would be extremely valuable in designing future programs as well as in refining the TINP package – thus going a step ahead of evaluation of impact. The data to address such issues clearly exist.

CONCLUSIONS

In conclusion, impact data on the TINP presented in this section support the inference that the intervention has favorably affected the growth of beneficiary children. Though there is much confusion about the size of the impact and the age group that has benefited the most, the true impact may be larger than that claimed in TINP evaluation reports. These conclusions, however, must remain tentative in view of lack of adequate statistical analyses. Furthermore, rigorous reanalyses of the existing data can answer many of the questions on program impact raised by the international health and nutrition community.

5. ADDITIONAL INFORMATION ON THE IMPACT OF TINP

This section analyses some primary data from the pilot block of TINP (Kottampatti block) to arrive at plausible conclusions about program impact. The data used herein was collected as part of an epidemiological study on positive and negative deviance in child growth (Shekar, Habicht, and Latham n.d.). The major limitation of these data is that they were not collected as part of an evaluation exercise. Although this data set was not designed to be an evaluation data set, it provides an opportunity to address some of the impact questions noted above.

The data analyzed here were collected from the pilot block of the TINP project, i.e., Kottampatti block, Madurai district. Out of a total of 68 community nutrition centers in Kottampatti, 42 were randomly selected. Children between 6 and 36 months of age were sampled comprehensively from all the selected CNCs. Data were extracted from existing village-level records in the 42 CNCs for the two periods October 1980 through September 1981, and April 1986 through March 1987. These included monthly growth data for all children enrolled and weighed in the CNCs, and social demographic data for each child. Supplementary information on program operations were elicited from social ethnographic observations in two villages in Kottampatti block. The two villages selected for ethnography represented the best and worst cases.

To supplement the available data, we spent about two weeks in the field (in July 1989) collecting additional data on program implementation and process. This included interviews and discussions (formal and informal) with key TINP personnel (project coordinator, assistant director [statistics], district project nutrition officer, taluk project nutrition officer, community nutrition instructresses, five community nutrition supervisors, and six community nutrition workers). We also interviewed 5 mothers from each of six CNCs, i.e., a total of 30 mothers. Three of the six CNCs were selected randomly. The other three were purposively selected – one had a food production center attached to the CNC, and two others had been previously classified as the best and the worst. The idea was to get a fairly representative sample. Five mothers were selected randomly from each of these six CNCs. This information was further supplemented with data from brief interviews of 61 of the 68 CNWs during a block-level meeting. Village leaders were also interviewed in each village. Results from these data are presented in the following subsections. But, because of the limited sample sizes, statistical analyses of these qualitative data have been kept to a minimum.

ANALYSES OF PROGRAM IMPACT

Sex and Caste Composition of Beneficiary Children

Table 8 shows the sex and caste distribution. These data indicate that the sex distribution of the beneficiary children is almost even. An equal number of males and females were enrolled both in 1980-1981 and 1986-1987. Further, the sex distribution of sample children did not change over five and one-half years of program operation. Census figures (1981) report a sex ratio of 977 for rural Tamil Nadu and 985 for the rural Madurai district. The sex ratio of the beneficiary population is 995 in 1980-1981 and 976 in 1986-1987. This declining sex ratio parallels the countrywide trend toward declining sex ratios and therefore indicates an approximately equal enrollment of both sexes in the program.

Unpublished data (from this data set) and TINP reports indicate that malnutrition is more prevalent among female children than among male children in project areas. Accordingly, under ideal targeting conditions, one would hope for preferential enrollment of female children – a trend that is not observed in this population.

In the realm of caste issues, two points related to program targeting are important. First, enrollment of the scheduled castes and scheduled tribes (SC/ST, the backward and invariably the poorest communities in India) children has increased with time of program operation. This conclusion is based on statistically significant chi-square tests as reported in Table 8, and it is a positive reflection of targeting efforts since the SC/ST are the most needy group.

The second issue relates to comparison of the caste distribution of the sample population with the census figures. According to the 1981 census figures, 14.4 percent of the population in Kottampatti Panchayat Union (which is the block from which data were collected for this sample), belong to SC/ST. Corresponding values for this sample are 17.37 percent in 1980-1981 and 19.43 percent in 1986-1987. These figures are very similar to those derived from the monthly progress report (program monitoring data) for January 1986 for Kottampatti, i.e., 18.2 percent of all *children* in Kottampatti are in SC/ST (the corresponding figure for *population* of Kottampatti is 14.8 percent), while 18.5 percent of the children weighed are in SC/ST. In each case, the proportion of SC/ST children included in the beneficiary sample are marginally higher than the proportion in the underlying population. SC/ST, however, constitute the bulk of the needy both in terms of a lower SES, and higher prevalence of malnutrition. The TINP monthly progress report for January 1986 shows that among the beneficiaries, 28 percent of those suffering from grades 3 and 4 malnutrition are in SC/ST, which implies an almost twofold prevalence of "severe" malnutrition in this group. Accordingly, one would expect (and hope) this section to be overrepresented among the program beneficiaries. As a rule, villages in Tamil Nadu (as in many other parts of the country) have well demarcated SC/ST areas, which are often markedly segregated from the main village. Movement of the SC/ST population into the main village is often restricted. Despite this well-known restriction, almost all

Table 8 – Tamil Nadu: Sex and Caste Distribution of Sample Children, 1980-1981 versus 1986-1987

	1980-1981 (N=2,452)	1986-1987 (N=2,934)	P-Value Number[b]
Sex[a]			
Male	50.12	50.61	
Female	49.88	49.39	0.72
Caste[a]			
Scheduled castes and tribes	17.37	19.43	
Other castes	82.63	80.57	0.05[c]

[a] Expressed as percent of total for the year.

[b] P value number given is Pearson's chi-square value for difference between sex and caste distributions for 1980-1981 and 1986-1987.

[c] Indicates differences significant at $p < 0.05$ (Pearson's chi-square).

TINP CNCs are located in the main village. This design issue needs further consideration in future programs.

Grades of Malnutrition

For the sake of maintaining some comparability with TINP reports, these data have first been analyzed in a fashion similar to the TINP evaluation reports. Table 9 summarizes results for the percentages of children suffering different grades of malnutrition. Caveats for drawing conclusions about program impact from analyses of "grade" data (as against actual weight data) are mentioned in the next section.

Figure 3 graphically summarizes this information. Without recourse to any statistical tests at this point, these data indicate a probable decline in severe grades of malnutrition and an increase in the percentages of children in the normal and first grades over time of program operation. These preliminary impressions are qualified by the following analyses. However, two points need to be made here: first, the confidence intervals (as Table 9 reports) better estimate the "true" position rather than point estimates alone; second, the results presented here are very similar to the monitoring results presented in Table 6. They do not support the DEAR estimates (Table 5), which show a smaller impact but nevertheless are accorded more credibility in TINP impact reports. The World Bank Project Completion Report (Heaver 1990) recognizes the data and argument presented in an earlier draft of this working paper and reiterates the same, while reinforcing the more conservative lower estimates.[2] A review of all available evidence indicates that overall, TINP reports underestimate the true impact.

Several other indications from these data are summarized below. However, in the absence of more sophisticated analyses at this point, it is important to reiterate that the following are only impressions and indications. They are not based on robust analyses. Many of these issues are probed later in this report.

1. The number of children in grades 3 and 4 malnutrition has declined steadily over time. This decline was relatively small in the first year of program operation, but a dramatic reduction in grades 3 and 4 malnutrition occurred between September 1981 and April 1986.

2. The reduction in the number of children in grade 2 seems small. It is possible that the upward shift of children from grades 3 and 4 into grade 2 masks

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[2] In the evaluation summary, the World Bank project completion report reports only a 10 percent decline in moderate to severe malnutrition among 6 to 36 month old children, as against a 33 percent decline indicated in Table 9. While it is possible that impact was more pronounced in the pilot area for which data are reported here, the fact that DEAR data report much lower impact even for this pilot area indicates underestimation of the total impact by DEAR.

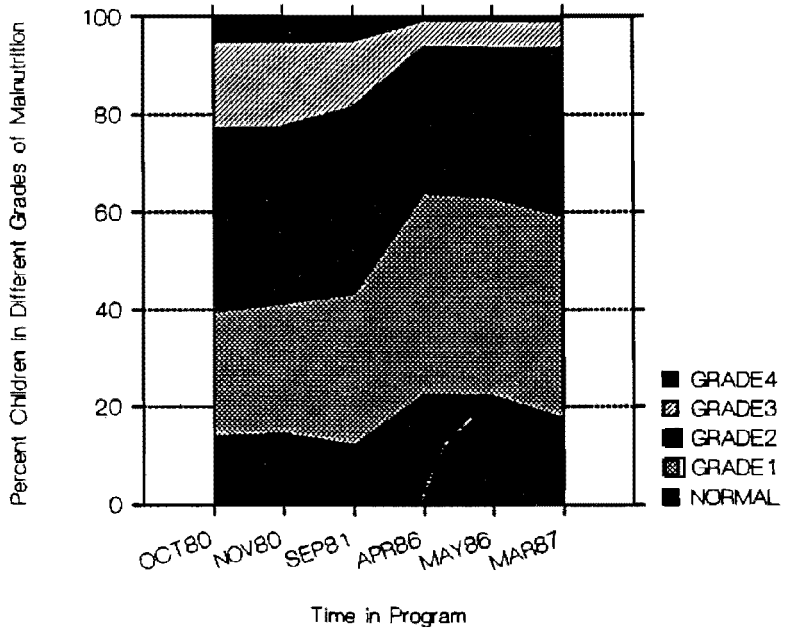
Table 9 – Tamil Nadu: Percentage of Children (6-36 Months) in Different Grades of Malnutrition at Different Periods of Time

Grade[a]	October 1980	November 1980	September 1981	April 1986	May 1986	March 1987
Normal	**14.00**	**14.42**	**11.98**	**22.44**	**22.12**	**17.43**
95% CI	16.22	16.64	14.50	24.92	24.54	19.58
	11.93	12.34	9.69	20.05	19.78	15.39
Grade 1	**25.69**	**27.02**	**31.43**	**41.70**	**41.08**	**41.98**
95% CI	28.42	29.77	34.89	44.55	43.89	44.70
	23.04	24.35	28.04	38.83	38.26	39.26
Grade 2	**37.49**	**36.16**	**38.18**	**29.55**	**30.24**	**33.96**
95% CI	40.48	39.10	41.77	32.24	32.89	36.59
	34.52	33.24	34.61	26.92	27.63	31.37
Grade 3	**17.65**	**17.23**	**13.50**	**5.70**	**5.93**	**5.72**
95% CI	20.07	19.60	16.15	7.16	7.38	7.09
	15.36	14.98	11.08	4.42	4.65	4.51
Grade 4	**5.17**	**5.17**	**4.90**	**0.61**	**0.63**	**0.90**
95% CI	6.66	6.64	6.67	1.20	1.22	1.54
	3.89	3.91	3.43	0.24	0.26	0.45

[a] "Grades" as defined in the TINP growth charts.

[b] 95% CI represents the 95 percent confidence interval.

Figure 3 – Changes in Grades of Malnutrition Over Time in Program



some of the shift from grade 2 into grade 1 and normal. Accordingly, the apparent stability of children in grade 2 is probably false.

3. The increase in the number of children in normal and first grades of malnutrition is small during the first year and more dramatic between the first and fifth year of program operation.

4. The above observations indicate that program impact is likely to be small within the first year of operation. The period of time required for substantial impact is between one year and five and one-half years.

5. These data support the assumption that nutritional status did not change between the first and second month of program operation (October and November 1980).

Seasonal Variations in Weights

Figure 4 shows seasonal variations in mean weights and mean ages of sample children. The figure shows no noticeable seasonal variations in mean weights of children over the twelve reference months in either the 1980-1981 data set or in the 1986-1987 data set. Variations in weight seem to be in consonance with the variations in age, other than a trend towards improvement in mean weight with time. This leads to the conclusion that seasonal variations in nutritional status in Kottampatti, if any, are negligible and are unlikely to confound these analyses.

Mean Weights and Ages of Sample Children: 1980-1981 versus 1986-1987

Figure 5 represents cross-sectional data on mean weights and ages of sample children over the two 12-month reference periods of October 1980 through September 1981 and April 1986 through March 1987.

Mean ages are higher in the 1980-1981 data set than in the 1986-1987 data set. The differences are statistically significant in 11 out of the 12 monthly ages. This indicates that sample children in 1986-1987 were younger. Since the population profile is not expected to have changed in such a short period (sixty-six months), it can be concluded that children were being enrolled at younger ages in 1986-1987 as compared to 1980-1981. This is indicative of improved program implementation over time.[3]

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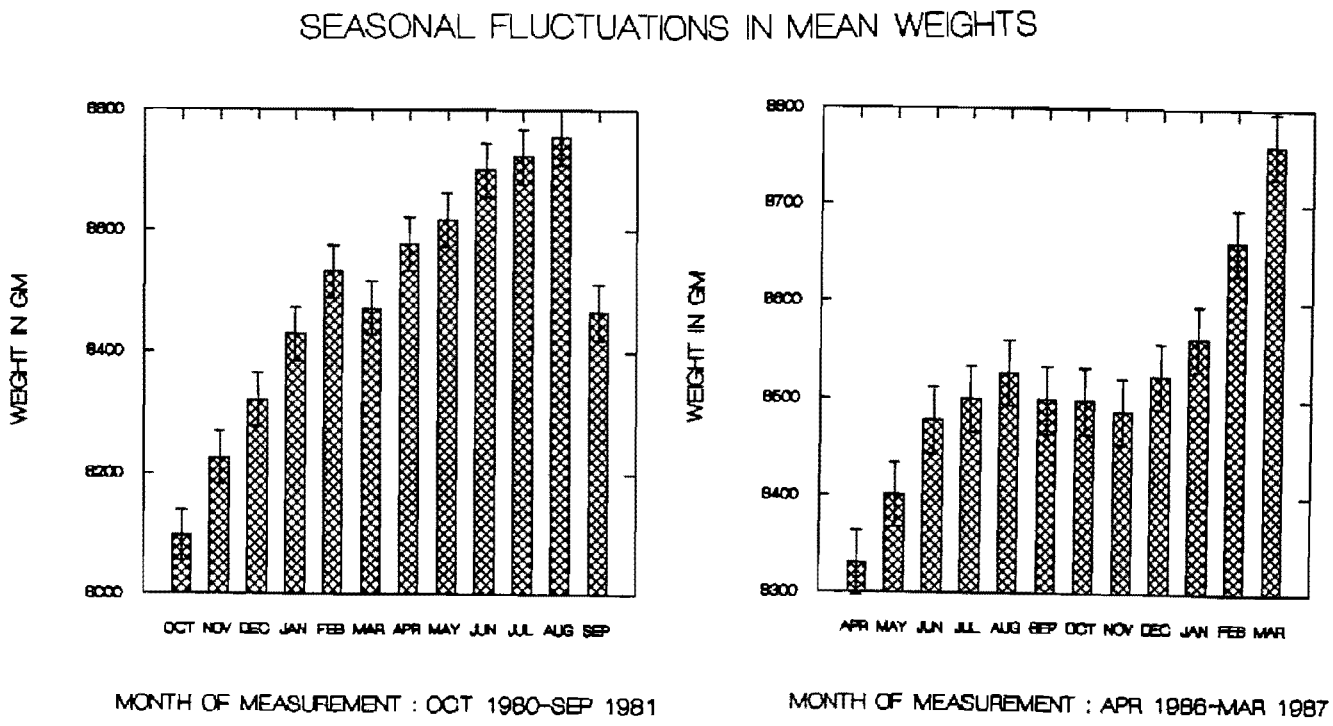
[3] The two "dips" in mean ages in 1980-1981 at six monthly intervals are reflective of six-monthly efforts at enrolling new beneficiaries. Surveys of beneficiary population were conducted every six months, when new children were enrolled into the program. Since many of these children are new births (grown to six months or beyond), this exercise sharply reduces the "mean" age of children, as reflected by the sudden drop in mean age in the graph. This policy

(continued...)

Figure 4 – Seasonal Fluctuations in Mean Weights and in Mean Ages



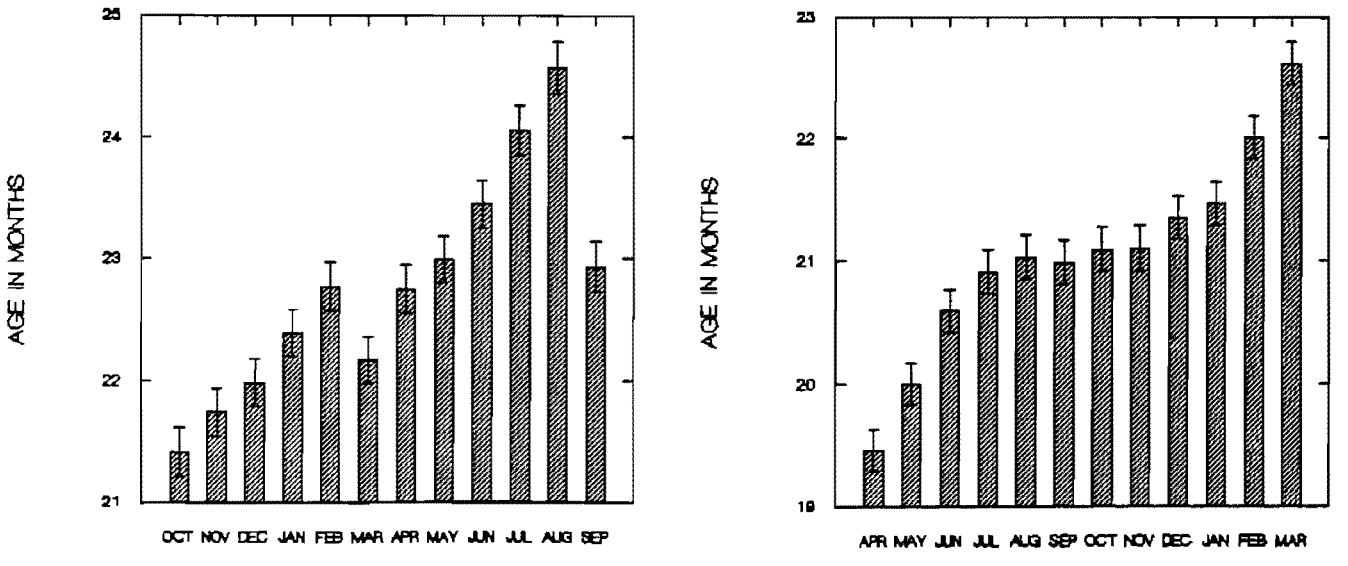
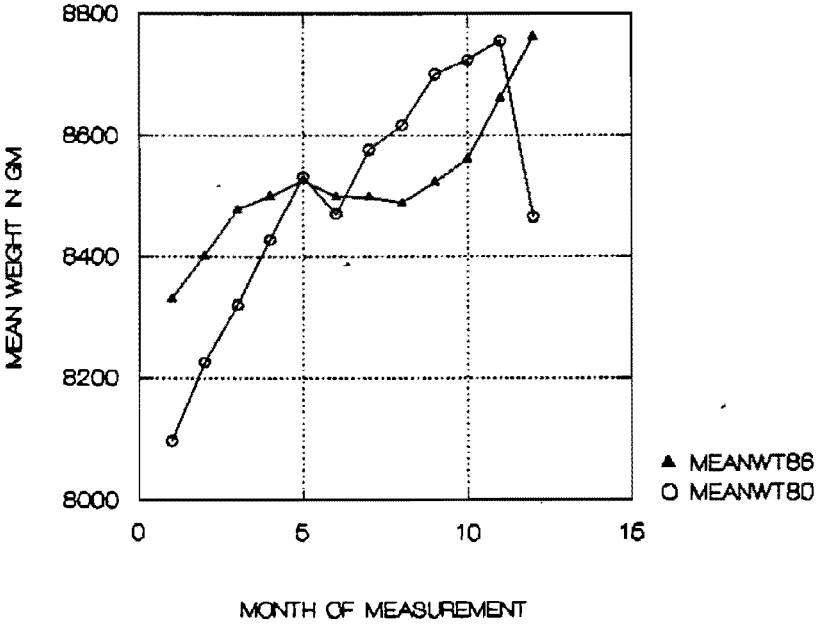
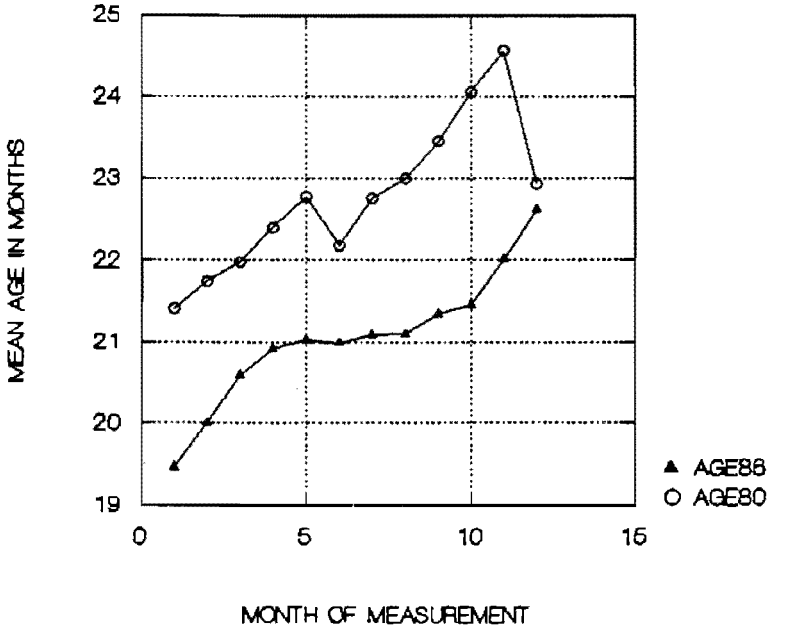


Figure 5 – Mean Weights and Ages: 1980-1981 versus 1986-1987





Interpretations about differences in mean weights from this figure are confounded by the differences in mean ages. This confounding effect can be addressed either by statistically controlling for age or by looking at differences in weight at each monthly age, as is done below.

Mean Weights of Beneficiary Children by Monthly Ages

Tables 10, 11, and 12 present data on the mean weights of children by monthly ages at different points in time over the period of program operation. In the following analyses, measurements for the second month of program operation (November 1980) rather than for the first month (October 1980) have been used as the baseline. This is done on the basis of two assumptions. First, one month of program operation (October to November 1980) is unlikely to produce any impact in terms of weights of children. Second, the advantages of improved data quality (a consequence of training and practice of workers in weighing and recording techniques) in the second month far outweigh any possible disadvantages. Data presented in Table 10, which show meaningful changes in nutritional status observed between October and November 1980, support the first assumption. The second assumption regarding data quality is subject to speculation. A comparison of standard errors around mean weights between October and November 1980 does not indicate any significant reduction in the size of standard errors,[4] so these data cannot support the assumption that worker expertise has improved between the first and the second month of program operation. However, differences in weights between October and November 1980 (Table 10) are not meaningful,[5] so that there

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[3](...continued)
of enrolling new beneficiaries was replaced by one of continuous enrollment of beneficiaries in later years; hence the lack of similar "dips" in the 1986-1987 data set. However, one puzzling feature of these data is the steady increase in mean age between 1986 and 1987. Perhaps this may indicate a decline in efficiency of enrolling new children in 1986-1987. This probably is due to declining worker morale during this period. The future of the TINP project was uncertain – World Bank support was expected to end by 1985, and no governmental commitments had been made about the future. However, more substantive data and analyses are needed to confirm this impression. More discussions on enrollment age follow.

[4] A comparison of the standard errors around the mean weights of children between the 1980-1981 and 1986-1987 data sets indicates that the standard errors are much smaller in the 1986-1987 data. This is explained only partially by the larger sample sizes in the latter data set. Much of the reduction in standard errors is attributed to better training and expertise of workers.

[5] Table 10 shows significant differences in the weights between October and November at 27, 28, 30, 33, and 34 months of age. Three of these differences have a positive sign, while the other two have negative signs. Clearly, such differences are not biologically plausible. Instead, these seem to be an
(continued...)

Table 10 – Tamil Nadu: Differences Between Mean Weights of Children, by Monthly Ages, October 1980 versus November 1980

Age in Months	Mean Weight in GM[a] October 1980			Mean Weight in GM[a] November 1980			Size of Difference[b]	P-Value for Difference
6	5,519	± 126	(77)	5,157	± 238	(20)	-362	0.19
7	5,998	± 258	(27)	5,885	± 129	(76)	-113	0.70
8	5,907	± 130	(77)	6,179	± 276	(28)	272	0.38
9	6,088	± 234	(26)	6,239	± 131	(76)	151	0.58
10	6,380	± 140	(10)	6,271	± 206	(29)	-109	0.66
11	6,671	± 176	(35)	6,597	± 141	(48)	-76	0.74
12	6,730	± 112	(81)	6,906	± 164	(39)	+176	0.38
13	6,706	± 252	(18)	6,982	± 118	(82)	+276	0.33
14	6,898	± 81	(203)	7,160	± 243	(21)	+262	0.32
15	7,111	± 330	(16)	7,082	± 78	(202)	-29	0.93
16	6,840	± 220	(12)	7,198	± 332	(16)	+358	0.38
17	7,246	± 213	(39)	7,302	± 139	(17)	+57	0.83
18	7,767	± 177	(55)	7,452	± 184	(46)	-315	0.22
19	6,850	± 438	(5)	7,796	± 195	(56)	+946	0.10
20	7,682	± 78	(206)	7,441	± 199	(11)	-241	0.28
21	8,084	± 317	(11)	7,934	± 77	(210)	-150	0.66
22	7,186	± 506	(7)	8,127	± 344	(13)	+941	0.15
23	7,994	± 342	(8)	7,544	± 383	(8)	-450	0.40
24	8,259	± 126	(91)	8,189	± 294	(9)	- 70	0.83
25	8,958	± 408	(12)	8,549	± 136	(93)	-409	0.36
26	8,749	± 64	(290)	8,947	± 337	(17)	+200	0.57
27	9,882	± 293	(22)	9,003	± 69	(289)	-879	0.01[c]
28	9,174	± 258	(22)	10,062	± 286	(21)	+887	0.03[d]
29	9,936	± 373	(22)	9,391	± 267	(22)	-545	0.24
30	9,175	± 159	(65)	10,083	± 350	(24)	+908	0.02[d]
31	10,183	± 573	(6)	9,497	± 170	(65)	-686	0.30
32	9,896	± 100	(187)	9,980	± 477	(5)	+84	0.87
33	10,563	± 178	(53)	10,149	± 100	(185)	-414	0.05[c]
34	9,624	± 315	(37)	10,968	± 184	(53)	+1,344	0.00[b]
35	10,506	± 197	(53)	9,931	± 336	(34)	-575	0.15
36	10,405	± 178	(46)	10,768	± 212	(51)	+363	0.19

[a] ± is standard error of mean.
[b] Difference between mean weight in November 1980 and October 1980.
[c] Differences significant at p<.01 (t-test).
[d] Differences significant at p<.05 (t-test).

Note: Numbers in parentheses represent sample sizes.

Table 11 – Tamil Nadu: Differences Between Mean Weights of Children, by Monthly Ages, November 1980 versus September 1981

Age in Months	Mean Weight in GM[a]						Size of Difference[b]	P-Value for Difference
	November 1980			September 1980				
6	5,157	± 238	(20)	5,395	± 212	(10)	+238	0.53
7	5,885	± 129	(76)	5,562	± 319	(8)	-323	0.44
8	6,179	± 276	(28)	6,011	± 231	(14)	-168	0.69
9	6,239	± 131	(76)	6,330	± 145	(23)	+091	0.72
10	6,271	± 206	(29)	6,325	± 135	(24)	+054	0.84
11	6,597	± 141	(48)	6,399	± 105	(41)	-198	0.28
12	6,906	± 164	(39)	6,990	± 210	(21)	+084	0.76
13	6,982	± 118	(82)	6,896	± 236	(23)	-086	0.74
14	7,160	± 243	(21)	6,776	± 261	(25)	-384	0.29
15	7,082	± 78	(202)	7,271	± 169	(40)	+181	0.32
16	7,198	± 332	(16)	7,534	± 211	(35)	+336	0.39
17	7,303	± 139	(17)	7,659	± 130	(67)	+356	0.19
18	7,452	± 184	(46)	7,601	± 166	(37)	+149	0.56
19	7,796	± 195	(56)	7,913	± 129	(80)	+117	0.60
20	7,441	± 199	(11)	8,043	± 234	(29)	+602	0.14
21	7,934	± 77	(210)	8,264	± 166	(48)	+330	0.07
22	8,127	± 344	(13)	8,376	± 178	(44)	+249	0.51
23	7,544	± 383	(8)	8,701	± 151	(70)	+1,157	0.01[c]
24	8,189	± 294	(9)	8,574	± 251	(21)	+385	0.38
25	8,549	± 136	(93)	8,886	± 83	(179)	+337	0.03
26	8,947	± 337	(17)	8,524	± 152	(19)	-423	0.24
27	9,003	± 69	(289)	9,213	± 184	(23)	+210	0.41
28	10,062	± 286	(21)	9,137	± 218	(30)	-925	0.01[c]
29	9,391	± 267	(22)	9,419	± 192	(54)	+028	0.94
30	10,083	± 350	(24)	9,250	± 241	(11)	-833	0.14
31	9,497	± 170	(65)	9,687	± 93	(165)	+190	0.30
32	9,980	± 477	(5)	9,776	± 266	(17)	-204	0.72
33	10,149	± 100	(185)	9,865	± 253	(10)	-284	0.51
34	10,968	± 184	(53)	10,750	± 384	(12)	-218	0.61
35	9,931	± 336	(34)	10,291	± 160	(74)	+360	0.27
36	10,768	± 212	(51)	10,379	± 409	(14)	-389	0.40

[a] ± is standard error of mean.
[b] Difference between mean weight in November 1980 and October 1980.
[c] Differences significant at p<.01 (t-test).
[d] Differences significant at p<.05 (t-test).

Note: Numbers in parentheses represent sample sizes.

Table 12 – Tamil Nadu: Differences Between Mean Weights of Children, by Monthly Ages, November 1980 versus November 1986

Age in Months	Mean Weight in GM[a]						Size of Difference[b]	P-Value for Difference
	November 1980			November 1986				
6	5157	± 238	(20)	5915	± 68	(83)	758	0.006[c]
7	5885	± 129	(76)	6178	± 71	(71)	294	0.049[d]
8	6179	± 276	(27)	6516	± 87	(85)	337	0.252
9	6239	± 131	(76)	6772	± 88	(75)	532	0.001[c]
10	6271	± 206	(29)	6722	± 117	(54)	451	0.063
11	6597	± 141	(48)	7208	± 110	(73)	611	0.001[c]
12	6906	± 164	(39)	7298	± 88	(73)	392	0.039[d]
13	6982	± 118	(82)	7434	± 127	(64)	452	0.010[c]
14	7160	± 243	(21)	7569	± 95	(80)	410	0.128
15	7082	± 78	(202)	7900	± 100	(94)	818	0.000[c]
16	7198	± 332	(16)	7718	± 93	(91)	519	0.150
17	7303	± 139	(17)	7971	± 153	(69)	668	0.002[c]
18	7452	± 184	(46)	8101	± 127	(76)	649	0.005[c]
19	7796	± 195	(56)	8229	± 109	(84)	432	0.056
20	7441	± 199	(11)	8486	± 126	(51)	1045	0.000[c]
21	7934	± 77	(210)	8551	± 112	(63)	617	0.000[c]
22	8127	± 344	(13)	8549	± 111	(69)	422	0.262
23	7544	± 383	(8)	8608	± 117	(73)	1064	0.028[d]
24	8189	± 294	(9)	8853	± 116	(76)	664	0.060
25	8549	± 136	(93)	9031	± 145	(71)	482	0.016[d]
26	8947	± 336	(17)	8894	± 127	(81)	-53	0.884
27	9003	± 69	(289)	9168	± 85	(107)	164	0.134
28	10062	± 286	(21)	9460	± 101	(115)	-608	0.059
29	9391	± 267	(22)	9690	± 110	(99)	299	0.308
30	10083	± 350	(24)	10022	± 105	(105)	-61	0.869
31	9497	± 170	(65)	9927	± 99	(93)	430	0.031[d]
32	9980	± 477	(5)	10125	± 118	(81)	145	0.781
33	10148	± 100	(185)	10114	± 139	(64)	-35	0.840
34	10968	± 184	(53)	10568	± 129	(73)	-399	0.078
35	9931	± 336	(36)	10652	± 148	(53)	721	0.056
36	10768	± 212	(51)	10389	± 182	(36)	-379	0.164

[a] ± is standard error of mean.
[b] Difference between mean weight in November 1980 and October 1980.
[c] Differences significant at p<.01 (t-test).
[d] Differences significant at p<.05 (t-test).

Note: Numbers in parentheses represent sample sizes.

do not seem to be any disadvantages in using the second month of program operation as the baseline.

Table 11 compares mean weights of children between November 1980 and September 1981, stratified by monthly age. It can be seen that, after 11 months of program operation, the differences are rather inconsistent, with 24 of the 36 age groups showing improvements in weight and 12 showing downward changes. Few of these differences are statistically significant, although the overall tendency for improvement in the pooled sample approaches significance ($p = .136$ when tested by analysis of variance controlling for child age and sex). The table and Figure 6 suggest that improvement is most consistent and most marked between the ages of 12 and 25 months. When this same analysis of variance is conducted to compare November 1980 with August 1981 (rather than September 1981), the difference reaches a statistically significant level ($p = .026$). This latter result is taken as a more valid basis for evaluating impact within the first year, because it is not affected by the enrollment of new participants, which took place in September that year.

After six years of program operation (November 1980 through November 1986, Table 12), there are significant and consistent differences between initial and final weights at many of the ages before 25 months. When this difference is tested by analysis of variance for the sample as a whole (controlling for age and sex) the result is highly significant ($p < .001$). This implies that after six years of program operation, target children between 6 and 25 months of age are significantly better nourished than they were at the time of implementation of the program (see Figure 6). Similar trends are also observed in differences in mean weights between November 1980 and May 1986 (after 66 months of program operation).

CONCLUSIONS FROM IMPACT DATA

Data from Tables 10, 11, and 12 suggest several important conclusions:

1. A large and consistent improvement in the weights of beneficiary children is seen after six years of program operation. These changes evidently occurred within the first year of operation, although they are not as large and they are most marked in children between 12 and 25 months. Data from the TINP evaluation reports (based on an independent data source from the DEAR) indicate a minimal improvement in weight between October 1980 and July 1982 among 6 to 36

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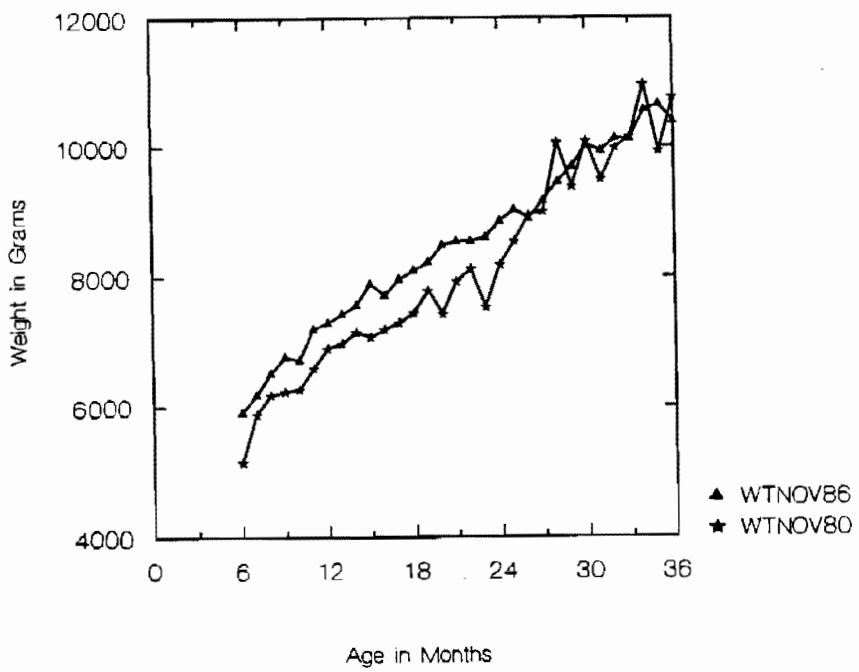
[5](...continued)
artefact of weighing and recording errors. Notably, four of the five observed differences are clustered at or around ages where there is obvious age heaping in the data (287 children at 27 months and 185 at 33 months of age as against 21, 24, and 53 children at 28, 30, and 34 months of age). This may account for the differences seen. Hence the differences observed are meaningless in this context, but do underline the inadequate data quality in early years of program implementation.

Figure 6 – Mean Weights: November 1980 versus September 1981 and November 1980 versus November 1986



month old children (Government of Tamil Nadu 1989). Hence, these data suggest that the program began to have positive effects within the first year, but the time required to see a substantial impact is somewhere between one and five and one-half years of program operation.

2. The improvement in weight is more significant in younger children. This is especially evident from the comparisons in Tables 11 and 12 and Figure 6. This conclusion is contrary to TINP evaluation reports wherein a greater impact was concluded in the older children. These results, however, support the conclusion that the impact is attributable to TINP rather than to the NMP (which often overlaps with the TINP in providing for children), since NMP beneficiaries are older than 24 months of age.

More detailed multivariate analyses could shed some light on specific program inputs that contribute to the improvement in nutritional status. In addition, analyses similar to the ones presented here could be conducted on a broader basis within the TINP areas, to confirm whether the trends in the pilot block can be generalized across the program areas.

PROGRAM INPUTS/PROCESS INFORMATION

Service Delivery

Table 13 lists the delivery of vitamin A, deworming, and immunizations in 1980-1981 and 1986-1987 as calculated from this data set. Provision of each of these services, except BCG immunization, has improved significantly over time. A reduction in the delivery of BCG immunization may be a direct consequence of the controversy regarding the pros and cons of this vaccination in the country.

According to DEAR data, between 18 and 77 percent of the children had received vitamin A prophylaxis at different times, the lowest delivery rates being at midterm evaluation (1984). Deworming coverage rates for the pilot block vary between 17 and 52 percent, according to DEAR, with much higher rates quoted from monitoring data (Government of Tamil Nadu 1989). Immunization coverage rates are low and delivery of health services in TINP has been poor.

Data Quality

Weight data collected in 1980-1981 and 1986-1987 show a rounding off, or heaping, pattern at 250, 500, 750, and 1,000 gram markings. This rounding off is also observed more frequently at 100 gram demarcations as opposed to 50 gram demarcations. In October 1981, 16.45 percent of the weights were found to terminate in 1,000 gram markings, 17.92 percent had 500 gram markings, 5.94 percent had 250 gram markings, and 5.34 percent had 750 gram markings. Corresponding figures for April 1986 were 9.27 percent, 6.63 percent, 3.66 percent, and 4.10 percent, respectively. Under normal probability conditions, the weights should be equally distributed over all digits, so the probability associated with each digit would be 5 percent. These data indicate a tendency

Table 13 – Tamil Nadu: Delivery of Services

Service	1980-1981	1986-1987	P-Value
Number of doses			
Vitamin A	1.44 (± 1.17)	2.82 (± 1.58)	0.000[a]
Deworming	2.79 (± 1.81)	4.35 (± 1.87)	0.000[a]
DPT	1.73 (± 1.40)	2.82 (± 1.01)	0.000[a]
BCG	0.52 (± 0.51)	0.45 (± 0.53)	0.000[a]
OPV	0.66 (± 1.15)	2.80 (± 1.05)	0.000[a]

[a] Differences significant at $p < 0.01$ (t-test).

Note: Figures in parenthesis are standard deviations.

to round off weights to the nearest 1,000 and 500 gram markings. This tendency is much more pronounced in 1980-1981 and much less so in 1986-1987, implying an improvement in data quality, reflecting greater worker expertise with time in program.

Tables 10, 11, and 12 also show evidence of rounding off at six-monthly intervals. In October 1980 (Table 10), this heaping is pronounced at 14 months of age and at all six-monthly intervals thereafter, reflecting the fact that workers initiated community surveys in August 1980 to identify beneficiary children for enrollment. Heaping was probably evident at 12 months of age (and every six months thereafter) in August 1980, which got translated to 14 months age by October 1980 and to 15 months by November 1980. This heaping is slightly less pronounced in September 1981, and nonexistent by November 1986. Again, this reflects improved training and expertise of field workers after six years of program operation.

As a proxy for efficiency of program logistics, 61 workers were asked if their weighing scales were working well or if they were in a state of disrepair. All 61 claimed to have working scales. In the event of temporary damage, scales were borrowed from neighboring centers to ensure uninterrupted weighing.

Age at Enrollment of Beneficiary Children

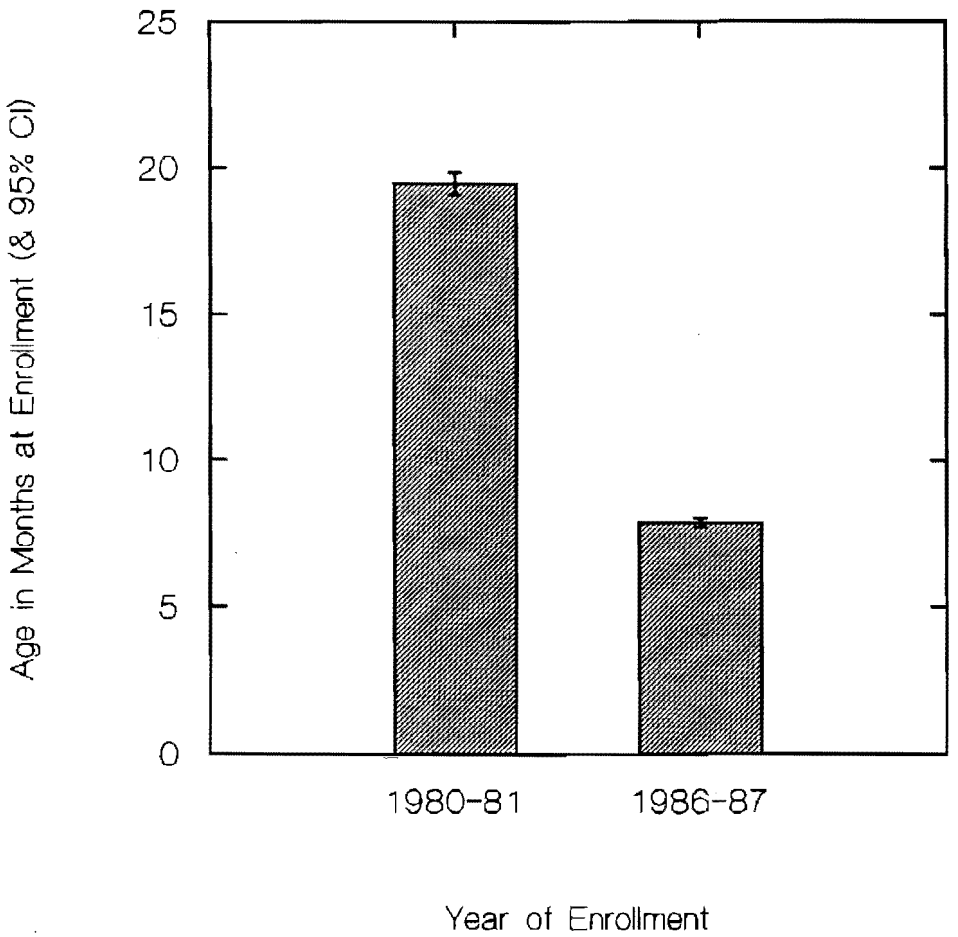
Comparison of the mean age at enrollment of beneficiary children (in the CNC for weighing) between 1980-1981 and 1986-1987 indicates a dramatic and statistically significant change ($p<.000$; Figure 7). Mean age at enrollment was 19.46 months (standard error of mean is 0.19) in 1980 as against 7.87 months (standard error of mean is 0.08). Assuming enrollment age to be a proxy for efficiency in identification and enrollment of beneficiary children, a mean of 7.87 months (where the theoretical minimum can only be 6.0 months, since the target population is 6 to 36 months age) in 1986-1987 implies a very high level of efficiency in identifying and enrolling beneficiary children. Further, the data strongly support the conclusion that there was a statistically significant improvement in enrollment efficiency in 1986-1987 over 1980-1981.

Worker Perception and Competence

All the personnel interviewed felt that the project had successfully achieved its objectives. One improvement or change suggested by some CNWs was universal feeding for all children in order to avoid complaints from mothers of children not eligible for feeding under current criteria. However, other CNWs felt that this was not a problem and that they had taught such mothers to prepare the "energy food" at home. Senior personnel did not perceive this aspect of selective feeding to be a problem.

Another suggestion from field workers was the use of mass media for propagation of better feeding and childcare practices. Workers felt that radio

Figure 7 – Mean Age at Enrollment: 1980-1981 versus 1986-1987



programs could do much toward reinforcing TINP educational messages. Use of mass media in TINP has been limited.

Five out of the six CNWs interviewed had been trained and had found the training useful. The sixth CNW was a new recruit and had undergone 12 days of on-the-job training as a stopgap measure until the commencement of the next training course.

Workers were well versed with program objectives and policies. All 61 CNWs interviewed had seen the project newsletter and claimed to be familiar with its contents. The newsletter was available at the six CNCs visited and CNWs were aware of the contents.

Perception of Beneficiary Mothers

Most of the sample mothers were well aware of the objectives of TINP and the services offered. A subjective scale was used to classify mothers as "aware" or not on a scale of 0 to 1. Scores of 0, 0.5, and 1 were awarded to mothers on the basis of their responses. The mean score for the sample was 0.79 ± 0.06, indicating a high level of awareness. Similar scores for familiarity with the names of village-level workers were 0.81 ± 0.07, 0.87 ± 0.06, and 0.94 ± 0.05 for the CNW, MPHW, and ayah, respectively. Mothers seem to be more familiar with the ayah than are the CNWs. This is probably because the ayah is always a local village person. Scores for familiarity with services offered by TINP were 0.95 ± 0.03 and 0.97 ± 0.02 for the CNWs and MPHWs services, respectively. All found the services "useful" and most (96.8 percent) were satisfied with them. The major complaint from mothers was with regard to a demand for universal feeding. This contradicts the claims made in the TINP report (Government of Tamil Nadu 1989) that "... the rural population have come to accept the principle of selectivity in supplementary feeding ...."

All beneficiary mothers were aware that their children were weighed at the CNC. Most mothers (90.3 percent, ± 5.5 percent) knew about and had seen the weight card maintained for their children at the CNC. However, less than half (43.5 percent, ± 8.1 percent) of the mothers actually had a copy of the card at home, most of which were not kept up-to-date. Understanding of the information and purpose of the weight card was fairly high. On a scale of 0 to 1, the mean score for the sample was 0.73 ± 0.07.

Almost all mothers (96.8 percent) were familiar with the oral rehydration solution (ORS) packets and their use, but knowledge of preparation of the salt-sugar-solution at home was limited to 50 percent (± 9.1 percent) of the mothers.

Colostrum was given to the children of 83.9 percent (± 6.8 percent) of the mothers, and 90.3 percent (± 5.5 percent) of the mothers claimed to have received advice from the CNW regarding feeding of colostrum to young babies.

The women's working groups were familiar to 87.1 percent (± 6.2 percent) of the mothers, and the children's working groups were known to 35.5 percent (± 8.9

percent) of the mothers. These groups are limited, however, to 16.1 percent (± 6.8 percent) and 1.7 percent (± 1.7 percent) of the mothers, respectively.

Community Participation

Fifty-seven out of sixty-one CNCs (93.44 percent) were rented, and only four (6.56 percent) were available free for use. Among those available free were three union office buildings and one old school building. If this variable is used as a proxy for the level of community participation, the results are not very encouraging. Results from the women's working group membership quoted above are more promising. (This aspect is discussed further in a later section.)

HOW MUCH OF THE EFFECT IS ATTRIBUTABLE TO TINP?

Two competing explanations could account for the improvement of nutritional status of TINP beneficiaries. Each of these is discussed here in the light of available evidence.

The first explanation would be a dramatic improvement in the SES of the beneficiary population and consequent secular changes in health and nutritional status of the population. Data from the NNMB quoted earlier in this working paper indicate some improvement in nutritional status of young children in Tamil Nadu. However, the improvement in nutritional status noted in TINP project areas far exceeds the secular trends in Tamil Nadu noted in the first section. Furthermore, there is no evidence that the areas under TINP have experienced any dramatic improvement in socioeconomic conditions over and above those in the rest of the state. Therefore, in the absence of TINP (or other interventions), the improvement in nutritional status in program areas should be similar to that observed in the rest of Tamil Nadu. The excess improvement observed is therefore attributable to interventions.

For the implementation of TINP, data from the Tamil Nadu Nutrition Study (Cantor 1973) were used to identify the most nutritionally deficient areas. Consequently, initial levels of malnutrition in TINP areas were much higher than were those for the rest of the state. Yet current malnutrition levels are lower than the averages for the state. Furthermore, the rate of decline in malnutrition in TINP areas has been greater than that observed in earlier years when the program did not exist.

A second possibility is that the effects seen could be attributed to another program: the NMP, which is operating in many of the TINP areas. Many of the beneficiaries for the NMP and TINP are common. However, NMP caters to children between 2 and 14 years of age and does not cover children under 2. Any improvements in nutritional status in children younger than 2 years of age cannot be attributed to NMP. Analyses presented in the fourth section show a much greater effect in children younger than 2. It is therefore concluded that the impact cannot be attributed to the NMP.

In the light of the above considerations, TINP may well be credited with many of the observed improvements in nutritional status.

CONCLUSIONS

In conclusion, the nutritional status of beneficiary children has shown a statistically significant improvement. The impact is more pronounced among younger children, and it is more dramatic than that documented in TINP evaluation reports. Process information supports these conclusions. Further, much of the improvement can quite plausibly be attributed to TINP, over and above secular trends and inputs from other programs.

6. WHY IS TINP SUCCESSFUL?

The fact that TINP has achieved a fair degree of success has been documented and discussed in earlier sections of this report. The following section comments upon factors perceived to be associated with this success (or nonsuccess). Wherever applicable, limitations of the project are also discussed along with suggested modifications.

Two kinds of issues are important here. The first kind refers to "successful design" issues associated with TINP, and the second with "successful implementation" issues. While the two kinds of issues are interlinked and by no means mutually exclusive, they are segregated here in order to facilitate discussion.

DESIGN ISSUES

Successful project design depends on (a) detailed knowledge and understanding of the health and nutritional problems of the target population; (b) an understanding of viable measures to combat the problems identified; and (c) adequate flexibility to allow for design modifications based on feedback from the field. Detailed studies on the health and nutrition situation in Tamil Nadu conducted prior to the launching of the project (Cantor 1973) addressed the first of these issues in the design of TINP.

Design and planning inputs from both national and international health and nutrition experts and from officials from the state bureaucracy ensured due consideration for the second of these issues. While subject experts contributed to the technical viability of the project, state bureaucrats played a major role in assessing and enhancing political viability. Notable in this respect has been the contribution of the TINP Project Coordinators, a team of committed, enthusiastic, and competent officers from the Indian Administrative Services. The only regrettable feature is the relative mobility of these senior personnel: the project saw three new Project Coordinators in as many years, i.e., 1986 to 1989.

The third concern, design flexibility, follows from the first two and contributes heavily to success, as is evident from the numerous modifications made to the original TINP design. For example, feedback from the pilot TINP blocks led to a major change in criteria for identification of beneficiaries for supplementary feeding wherein the "grade-method" was forsaken for the "weight-gain-method." Yet another example of flexibility is evidenced in the experiments with different supervisory ratios (1:12 as against the TINP prescribed 1:10) currently being conducted in some of the older project areas. WWGs and CWGs were

other successful design innovations arising out of project feedback. These are discussed in greater detail in following sections.

Issues associated with successful TINP design are discussed above. Here, an attempt is made to underline specific *features* in project design that seem to contribute to this success. These include the following:

Targeting – precisely defined area targeting coupled with beneficiary targeting allows project inputs to be honed to the most needy groups;

CNW workloads – realistic worker-to-client ratios and well-defined and limited work routines ensure a manageable workload for CNWs;

Recruitment and training of workers – recruitment of fresh cadres of workers with an aptitude for the work required and appropriate training followed by regular in-service training creates strong worker commitment and competence;

Adequate supervisory support – prudently designated worker to supervisor (CNW:CNS) ratios allow for adequate time and energy for supervisory support to grass-roots level workers;

Community participation – project design lays heavy emphasis on eliciting community participation, which has been envisaged as both a means and an objective. (My assessment is that the extent of community cooperation falls short of that envisioned.);

Information generation, management, and use – a well-organized system for the generation, management, flow, and utilization of project information is crucial to the success of the program.

Each of the features outlined above are discussed in detail in the following subsections.

Targeting of Beneficiaries

Much of TINP design efforts and expertise has been devoted to targeting of beneficiaries – an exercise that has yielded promising results. While similar programs in the country, such as ICDS, have come to rely solely on "area targeting," one unique feature of the TINP design was an effort to combine advantages of area targeting with "beneficiary targeting." In the first instance, areas with very high prevalence of malnutrition were selected for project implementation. Superimposed on this concept of area targeting, supplementary feeding was restricted to the most needy group (as described in the first section) for a limited time. This targeting not only increased cost effectiveness, but it also reduced dependence of the target population on project food. Project authorities claim that the cost of feeding is limited to 25 percent of total costs, compared with 70 percent in other programs (Vaidyanathan

1989). Though some have questioned the efficacy of such precise targeting (Gopalan 1986), TINP results clearly indicate the advantages of this technique.

CNW Workloads

The workloads of the CNWs are much more manageable than those of workers in parallel programs. This is achieved by assigning a limited number of activities to the CNW coupled with realistic and manageable worker-to-client ratios. However, observations indicate scope for improvement in areas where target populations are dispersed in many small hamlets. In such pockets, the worker is not expected to feed needy children on a daily basis since such an endeavor is not practical. Weighing of children in these pockets has not been satisfactory, and nutrition education efforts are extremely limited. Perhaps experiments with denser worker to client ratios may prove useful in these areas.

Recruitment and Training of Workers

TINP has evolved from scratch. As a consequence, all field workers have been recruited afresh, thus allowing only those with an aptitude for such work to join. This contrasts sharply with other programs where functionaries are often deputed from various departments or inducted into the program on the basis of departmental promotions. Such workers often have no aptitude for the kind of work they are required to do. Many arrive at these posts at the fag end of their careers and are neither inclined nor motivated to participate. The lessons to be drawn from this contrast are obvious. Furthermore, the training routines of TINP are well-suited to the requirements of the job. Trainees are first exposed to two or three months of concentrated training, which is followed by regular in-service training and supervision in the field. Again, the relevance of the training is enhanced by extended exposure of both the trainee and the trainer to the field situation.

Supervisory Ratios

Supervisory ratios in the project have been designed to allow for at least fortnightly visits by supervisors to each CNC in addition to frequent group meetings at least twice per month. This supervision is facilitated by a clear definition of worker routines so that the CNWs' location is almost always predictable. This frequent interaction eases the flow of project information from the grass roots to the managerial cadres and vice versa. One reason why TINP has been able to afford relatively dense client-to-worker ratios is that CNWs are paid small honorariums of rupees 130 per month instead of regular salaries. In addition, these honoraria are much lower than the honoraria paid to workers in parallel programs. While this feature of TINP has been viewed in favor by sympathetic reviewers (Heaver 1989; Subbarao 1989), it may pose a problem if a proposed merger with ICDS occurs. This feature may also adversely affect the replicability of the project unless due consideration is given.

Community Participation

Community participation has been one critical design feature of TINP that has contributed much to program success. Among the most visible aspects of this is the establishment of the WWGs. More recent additions to this concept are the children's working groups (CWGs) that attempt to increase health and nutrition awareness through children's songs and jingles. While community efforts have contributed much to TINP success, it is in the interests of the project to recognize the shortcomings in this context. Community participation implies that the community is involved in the project to such an extent that all initiatives come from the people, including making proposals for improvement of health, converting these proposals into concrete plans, and participating in implementing and evaluating them (Madan 1987). Within this ideal setup, governmental and nongovernmental agencies would then be expected to assist the people in their endeavors. This is definitely not the case with TINP. Hence the success achieved in this direction can at best be termed as "community cooperation" or "compliance." TINP does not conform to the ideal of "participation" as originally defined by anthropologists. Of crucial importance is that the issue here is not one of semantics, but it is an acknowledgment that although this achievement falls short of the ideal, it is nonetheless a major step in the right direction and hence is not inconsequential.

The Monitoring and Information System

Information generation, management, and use have been key factors in the success of TINP. This is discussed in detail in a later section.

IMPLEMENTATION ISSUES

Attention to the very minutest of details in planning the project is so intense that its contribution to the successful implementation of TINP cannot be overestimated. This has also been commented upon by Heaver (1989). However, what is indeed remarkable is the fact that this kind of detailed planning has not detracted from the built-in flexibility in program implementation. For example, while the CNWs work routine is charted out fairly precisely, it does not prevent her from varying the time of feeding to suit local needs.

Specific features of program implementation contribute toward project success:

Worker-supervisor interaction ensures regular two-way communication;

Recruitment of local CNWs facilitates implementation;

Recruitment of married, poor women with healthy children as CNWs enhances worker credibility;

Community cooperation contributes much toward successful implementation. Special mention is required here of WWGs and CWGs;

Use of a snack-food supplement reduces chances of substitution (however, the lack of variety in food still needs attention);

Growth charts serve as a tool for nutrition education;

Involvement of a foreign donor agency increases answerability and hence increases pressure to perform. At the same time, worker morale has been adversely affected during periods of uncertainty about project extension.

Each of these issues is discussed in greater detail in following subsections.

Worker-Supervisor Interaction

Regular interaction of CNWs with CNSs, CNIs, TPNO, and DPNO by way of in-service training, monthly meetings, group meetings, etc., ensures a constant two-way interaction between the different cadres of workers. This interaction helps clear bottlenecks in implementation and often allows for on-the-spot solution of problems. Furthermore, frequent supervisory visits to the CNC not only ensure adequate supervision, but they also ensure that the supervisor is well-acquainted with problems encountered in the field, thus enhancing her competence.

Recruitment of CNWs

Special attention has been given in implementation of TINP to recruit CNWs from the same villages in which the CNC operates. Within the constraints of terrain and lack of efficient public transport systems, this is a logistic necessity. This assertion is based on a case study of a CNC where the CNW was from a village about five kilometers away. The CNW was expected to come to the CNC six days in a week. Her travel expenses to and from (according to her) were about rupees 4 per day, which means that she spent nearly rupees 100 per month on travel alone for 25 days. Her monthly "salary" (as she calls it) or honorarium (as designated by project designers) was rupees 130. It was no surprise for us to learn (and observe) that the CNW's visits to the village were limited and that the ayah ran the show for the most part. The CNW's lack of familiarity with the village, despite having "worked" in that village for more than two years, was lamentable. Comparison of program operation in this village with that of another village that had a live-in CNW clearly indicates that the former is not just conducive, but is necessary for efficient program implementation. In rare cases when it may be necessary to recruit CNWs from outside the village, an attempt should be made to locate candidates from adjacent villages. This kind of attention to detailed logistics will go far in facilitating program implementation.

Five other advantages of recruiting local CNWs can be identified. First, local workers are much more efficient at overcoming people's initial resistance to new projects than are strangers. Second, for the same reasons, local CNWs are more successful at breaking down social barriers to health-seeking behaviors. Third, local workers can elicit community participation and/or cooperation.[6] Fourth, local workers are more likely to attend to their duties regularly since the workplace is more accessible and the logistics of combining household duties with work-related duties are simpler. This is likely to be especially important when the worker is "honorary" and the compensation for work done is not substantial. The fifth advantage is related to the fourth one. The local worker's commitment to work is likely to be stronger since her efforts are directed toward her own village. Furthermore, she is always available to the community in times of emergencies. Successful handling of an emergency situation can go far in establishing the credibility of the worker among target populations.

Recruitment of Married Women with Healthy Children as CNWs

Project guidelines encourage recruitment of poor, married women with healthy children as CNWs. The assumption is that poor mothers with healthy children are likely to be more competent with regard to childcare practices, which reflects the ethos of the "positive deviance" approach in child growth. Data to support the implementation of this recommendation in practice is scanty. Spot interviews with 61 CNWs indicated that 55 (90.16 percent) were married and 6 (9.84 percent) were unmarried. Project authorities reiterate that efforts are being made to recruit only married women in future. The ethics of recruiting poor women to work almost a full day at current "honorarium" rates (which are much below minimum wages) are debatable in the context of women's rights.

Community Participation

Community participation was an important design feature of the TINP. However, as mentioned earlier, the model of community participation that has emerged in the implementation of TINP is a more realistic and achievable model of "community compliance" and "cooperation." While this falls short of the ideal of "participation," the success achieved in this respect cannot, and should not, be underplayed. The tremendous contribution of WWGs toward reducing initial resistance against project inputs and persuading mothers to bring their children to the CNCs has not been equalled by similar efforts in this direction in parallel interventions. In many TINP areas these working groups have been organized so that one mother "adopts" ten others. In other areas the WWG has set up and taken charge of the food production center for supplying food to local CNCs. Promotion of CWGs in certain CNCs is a step toward increasing children's

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[6] A conscious distinction has been made between community participation and community cooperation. This is discussed in detail in an earlier section.

awareness of health and nutrition. However, this innovation is operational in only a limited number of CNCs.

Project designers visualized community participation in many forms, one of which was the provision of accommodation for the CNC. Very little success seems to have been achieved in this respect, as detailed in an earlier section.

One related aspect that has not received due attention even in future program design and modification is the location of the CNCs. Most villages have clearly demarcated areas for specific caste groups. The scheduled castes (the lowest caste with the poorest socioeconomic status and hence the most needy group with respect to TINP) are as a rule the most segregated group. But CNCs are located in the main village. This point is emphasized by observations in one of the study villages. The village includes a very large proportion of scheduled caste families who live in a separate, clearly demarcated area called the SC area, located about one-half of a kilometer from the main village. The SC area has a separate well for drawing water meant exclusively for scheduled castes' use. This area in fact seems to be totally self-contained, with minimal contacts with the main village. Most SC people avoid going to the village. Even major village functions draw little or no participation from the SC population. These and other observations leave the impression that any services made available in the main village were unlikely to be utilized by any of the SC population – least of all women. Why then is the CNC located in the main village when its primary target group is the SC?

Considering all of the above, it appears that utilization of CNC services by the most needy scheduled caste group is much below optimal. This impression is supported by data on caste distribution of beneficiary children presented earlier. Utilization could perhaps be improved by housing the CNC either inside or close to the SC area. We are a little hesitant about advocating that all CNCs be located in SC areas, because just as SC movement into the main village is limited, other castes have very strong prejudices against free movement in the SC area. Hence, if the CNC is located in the SC area, utilization of services by the non-SC needy would be limited. Two options could be attempted to resolve this dilemma. Either the CNC could be at some place on the outskirts of the main village and close to the SC area, or there could be separate CNCs for the SCs and the other castes. The latter suggestion is contrary to the efforts of many organizations that have been striving for removing caste prejudices, but it is probably more practical for reaching the services to the most needy groups. Perhaps an experiment to try both options is warranted. In either case, the *need for greater attention in selection of CNC locations* is obvious.

Use of a Snack-Food Supplement

Children covered under the feeding component of the TINP are given a food supplement in the form of a snack food at the CNC. Preparation of this snack is easy, involving simply reconstituting the dry mix with water and shaping it into small balls. Each child is given two to four balls of this snack, and each mother is given four balls. Since the supplement does not seem substantial or

bulky and because it does not include rice, most Tamil mothers do not substitute this for a meal, thus facilitating the purpose of the supplement. However, observations in the field indicated that many children (and mothers) would appreciate some variation in this daily snack.

Growth Charts for Nutrition Education and Counseling

Original project design required that for all children weighed at the CNC, duplicate weight cards be maintained: one at the CNC and the second with the mother. While theoretically this could be a major breakthrough in increasing maternal participation in weighing the children and interpreting the weight chart, in practice this objective has met with very limited success. Data indicate that out of the 30 mothers interviewed, only 43.5 percent had a weight card with them at home. During a brief socio-ethnographic study in two of the villages we discovered that most mothers did not have the weight cards and the few that did had preserved and stashed it away in some remote corner of the house so that it was serving no practical purpose. Similar observations have been made by others (Bhan and Ghosh 1986). While workers claimed to have given weight cards to each mother, few mothers could produce their cards. In the few cases that it was produced, only initial weights for the first few months of weighing were plotted. We suspect that the CNW makes the effort in the beginning to maintain the duplicate card with the mother, but this effort is abandoned thereafter either because the worker does not deem it important enough, or because the mother fails to bring the card to the CNC. Ethnographic observations on the "horoscope book" of each child offer a potential solution to this problem. Each child in the village had a horoscope prepared by the village fortuneteller at the time of his or her birth. This horoscope was noted in a small hardcover notebook, which was preserved by the mother for many years to come and brought to the fortuneteller at the time of each consultation. The CNW has met with very limited success in getting the mothers to preserve the weight card and to make it available when required. Yet the mothers seem to have no problem in safeguarding the horoscope notebooks. Perhaps there is a valuable lesson here. Alternately, could the weight cards invade the traditional bastions of the horoscope? Could growth curves be made a part of the horoscope? An operations research experiment might be worth the effort!

Role of Donor Agency

The role of the donor agency, i.e., the World Bank, in TINP operations cannot (and should not) be underestimated, notwithstanding Heaver's (1989) claim that the Bank does not aim to create "resource-rich project islands in impoverished national programs," and "... involvement of the World Bank in these programs (TINP included) has had a significant influence on manager's commitment and program success, but not one so great as to make the programs exceptional and non-comparable to the domestically financed efforts." Financially, these claims are not unjustified, as evidenced by comparison of TINP with other interventions (Subbarao 1989). However, the technical assistance from national and international consultants in the design of the project has been substantial.

Their technical contribution and attention to detail have been commented upon elsewhere. In addition, the contributions of periodic World Bank review missions provided continual inputs in design modifications and guidance during project implementation. Furthermore, having an external donor agency (and its review missions) has increased project accountability. The requirement to produce regular reports for the external agencies increased the pressure to perform.

DESIGN AND IMPLEMENTATION LESSONS FROM TINP EXPERIENCE

Governmental concern and commitment, enhanced program accountability, precisely targeted service delivery, realistic workloads and worker-to-client ratios, planned job-oriented training, quality supervisory support, and a well-designed monitoring and information system are some of the successful design features of the TINP. Implementation features that reinforced the design features include attention to detail in task specification, pragmatic worker selection criteria, quality of training, and some midproject design modifications based on program management data. While many of these features are retained in the second generation TINP-II in Tamil Nadu, unfortunately, many others (including selective short-term feeding, field workers' loads) are not to be replicated. Further, some of the weaknesses of TINP (such as the location of CNCs and the program evaluation system) may be unwittingly repeated in the follow-up project.

7. THE MONITORING AND INFORMATION SYSTEM IN TINP

Project designers aimed to set up an ongoing monitoring and information system (MIS) that would "assist (project) management and policy makers in adapting the project to changing objectives and circumstances, based on newly-gained insights or more realistic perceptions ...." It would "... monitor and measure project benefits in terms of reduced malnutrition, morbidity and mortality, and document the process through which these gains would (or would not) be achieved" (World Bank 1980, 233). The system, once in place, was expected to monitor project activities, progress, and impact. Information was to be collected on delivery and utilization of project inputs, project outputs, and on issues crucial for project management. The philosophy behind the MIS (as envisaged by project designers) is implicit in the three basic principles: collect what is needed, not what is available; devolve to the lowest possible level the responsibility for data interpretation and remedial action; and manage by exception.

It was hoped that only information necessary for decisionmaking at the management level would be sought, thereby keeping volume, frequency, and detail to a minimum. The decentralized design of the system would allow the analysis and use of data at numerous levels: the village (by CNW), the group (by CNS), the block (by CNI), the taluk (by TPNO) and so on up to the project coordination office by the project coordinator.

As is to be expected, the reality of the MIS scenario in TINP varies a little from the original design. The descriptions that follow pertain to the real situation, with references to deviations from design where applicable.

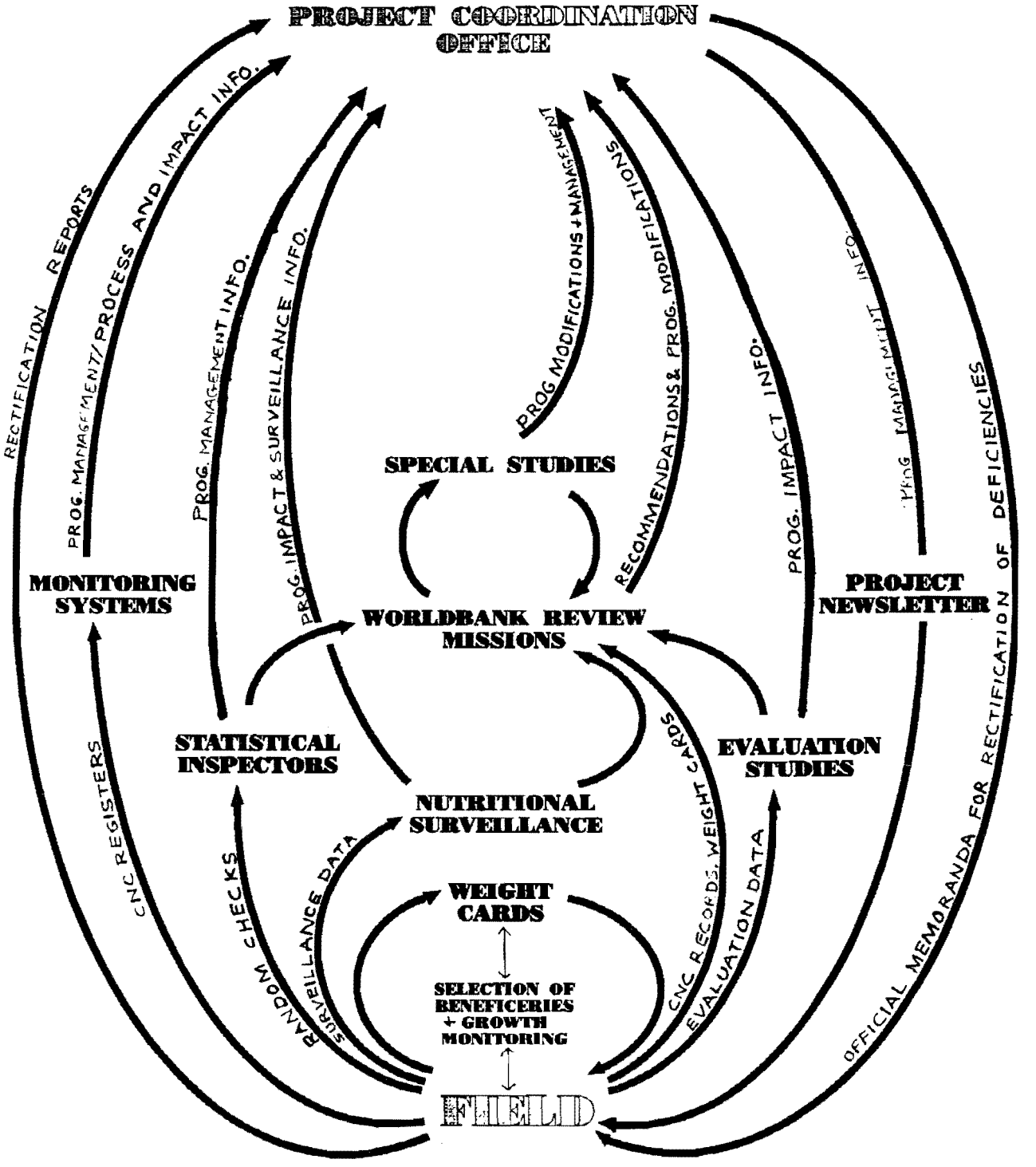
The seven formal channels of information flow within the MIS in TINP include the *monitoring system* setup under the TINP monitoring wing; *nutritional surveillance* in selected areas under the monitoring wing; formal *evaluation studies* conducted by DEAR; the role played by *statistical inspectors* under the aegis of the monitoring wing; *special studies* on specific aspects of the program; *project newsletter*, which would aim to carry information from project management back to field workers; and World Bank *review missions*.

Figure 8 outlines the scope of each of these channels (as operational) in the generation, management, and use of project information. Each of these is discussed in detail in the following subsections.

THE MONITORING SYSTEM

The monitoring system in TINP is among the best designed and implemented systems among projects worldwide. The generation, management, and flow of

Figure 8 – The MIS: An Operational Overview



information, with meager investments in hardware, as well as the use of this information for program management, is unparalleled. The two major weaknesses of the MIS, as discussed later, are the generation of more information than is necessary, and a scope for a greater utilization of this information, especially for program evaluation.

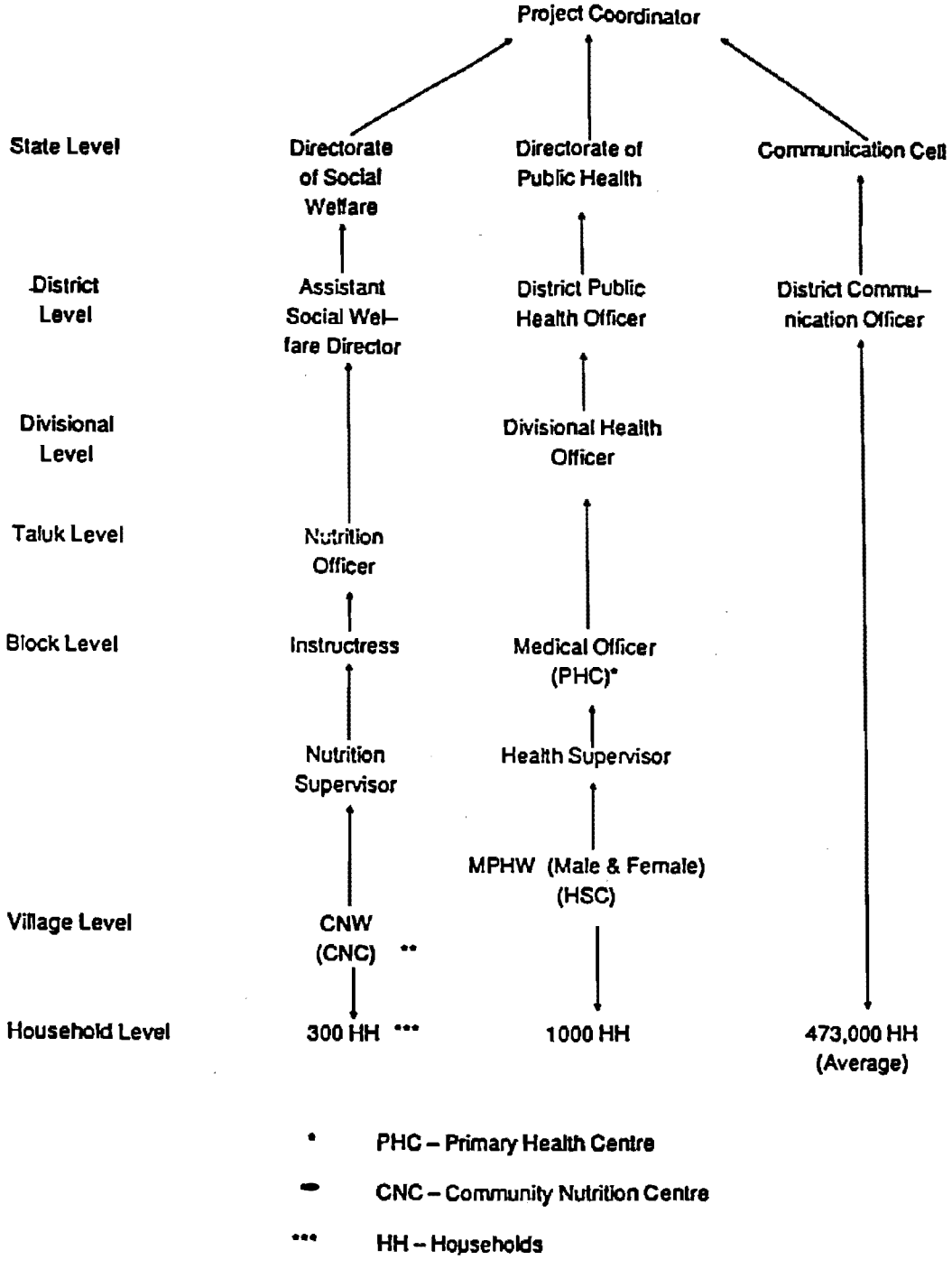
The monitoring system encompasses the two major components of the program: nutrition and health (see Figure 9). Independent channels of information generation and management setup for these two components are detailed in the following sections. (Perhaps wisely, program designers were not overly optimistic vis-à-vis coordination between the two sectors of health and nutrition!) The monitoring system has been designed with great attention to detail. Flow of information from the grass-roots level worker to project headquarters has been well streamlined. Workers at all levels are given specific formats for all information to be collected. Information collected by grass-roots level workers is collated by subsequent cadres at various levels, used as and when deemed necessary to initiate action at each level, and transmitted to the TINP Project Coordinator's office. At this point, feedback about project operations is recycled back to the grass roots through appropriate channels. The following discussions pertain to the generation, management, flow, and use of information at all levels within the MIS.

Monitoring of Nutritional Services

Generation of Nutritional Information. Information generation is initiated at the grass-roots level. No fewer than 30 registers are maintained (very meticulously) by each community nutrition worker. These contain information ranging from the weights of beneficiary children, to delivery of services, to stocks of food and furniture at the CNC. In addition, the registers maintain individual weight cards for all children. A complete list of registers maintained by CNWs is detailed in Appendix A. These registers are the source of data for monitoring reports. However, as discussed later, much of the information collected in the registers is neither submitted for scrutiny or supervision, nor used for program management or evaluation. Thus, there is a tremendous scope for a reduction in the amount of information generated in the field.

A related point is worth noting here. Original plans required the supply of standard-format printed registers to each worker. However, this requirement has not been followed. Instead, most centers simply follow the prescribed format of the register, entering the headers by hand. While this means that considerable worker time is lost in the mechanics of this exercise, it also allows the worker some flexibility in recording. The advantages of this flexibility need to be weighed against the disadvantage of substantial worker time expended in maintaining the voluminous records and the introduction of nonstandardized recording formats. This is especially so when the semiliterate worker is expected to follow formats that are sometimes fairly complicated, causing some confusion and occasional misrecording.

Figure 9 – Flow of Monitoring Data



Source: The World Bank (1980).

A similar situation exists in the reporting of information where community nutrition instructresses (CNIs) and supervisors (CNSs) are expected to follow prescribed formats; but tighter restrictions in format copy do not allow for much flexibility at this stage.

Monitoring data is collated at a number of levels. Workers and supervisors meet monthly expressly to collate and check records. A schedule of the meetings is outlined in Table 14.

The kind of information collected is reflected in the list of reports submitted each month (Appendix B). In the initial phases of the project a set of 16 indicators of project inputs, outputs, and impact were identified. Information generation within the project is designed around these indicators (whose numbers have, during the course of program operation, swelled to 27 from the original 16). The 27 indicators are listed in Appendix C. These pertain to many facets of program management and progress. The use of this information is discussed later.

Apart from information generation through the registers maintained at the centers, the growth charts for individual children represent a wealth of information. However, this potentially rich source has not been appropriately exploited. Information from these cards is generated and used only at the grass-roots level, i.e., for growth monitoring and selection of individual children for supplementary feeding. Raw data on weights of individual children are not reported in any progress report. Instead, a proxy measure of nutritional status, i.e., the number of children suffering various grades of malnutrition at different points of time, is reported. This measure, though adequate for ongoing program management, is inadequate and too imprecise to address the issue of program impact. Use of such a gross measure (especially for program evaluation and research) is justified only in situations where access to actual weight data is limited.

Management and Flow of Nutritional Information. Figure 9 details the original design for the flow of nutrition-related monitoring information in TINP. This basic design has been adhered to in the implementation with minor modifications. In the current pattern, the taluk-level nutrition information flows from the TPNO to the DPNO and then to the assistant director and project coordinator (Figure 10). Well-defined channels have been developed to ensure a two-way flow of information from the field to the project office and vice versa. The pattern of information management and flow forms a pyramid. The large masses of information generated at the field level is summarized first at the level of individual CNCs and then collated at group (by CNS), block (by CNI), taluk (by TPNO office), and district levels (by DPNO office), and ultimately for the entire project (by the Department of Social Welfare).

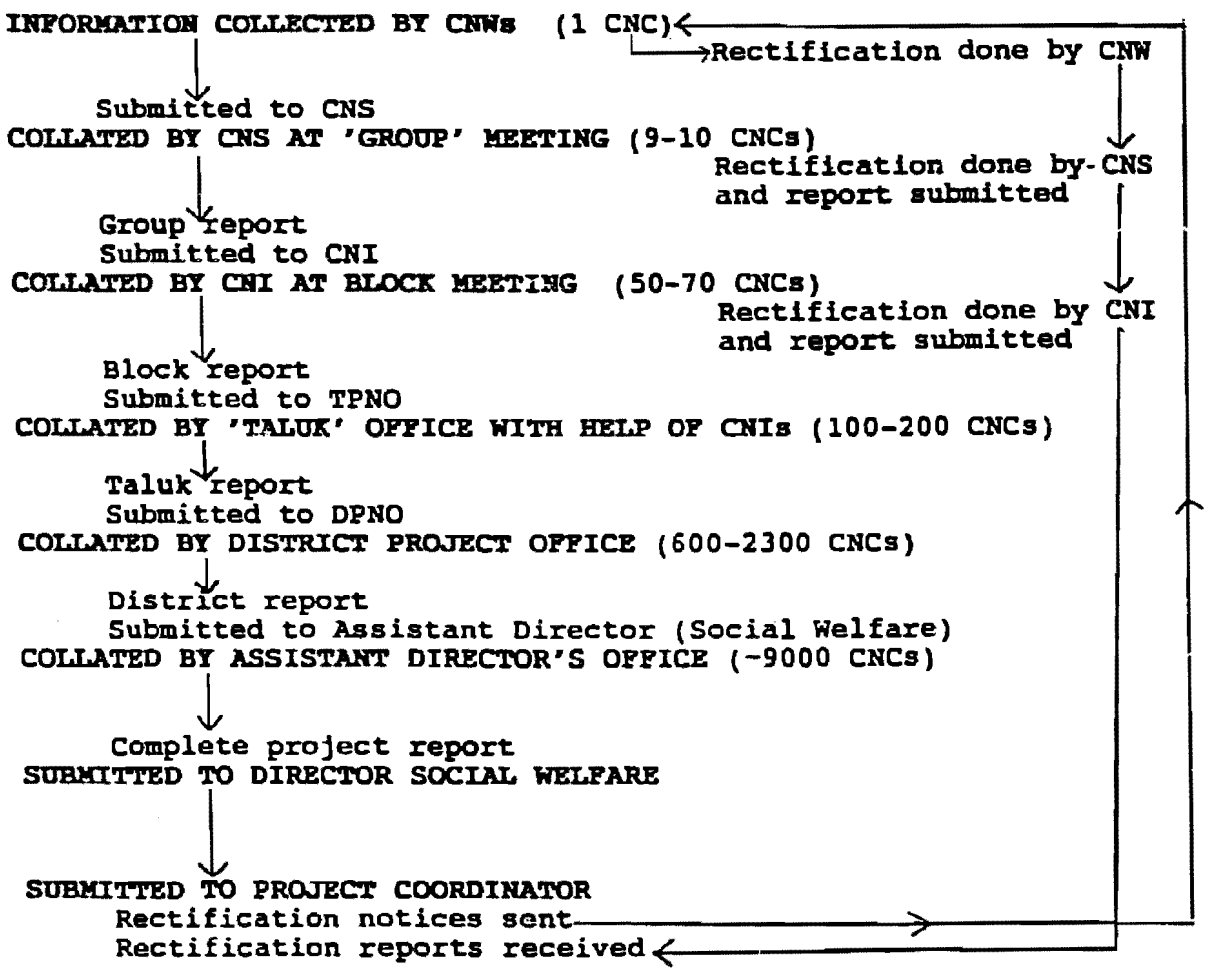
Utilization of Nutritional Information. At the project coordination office, all the information received is converted into prescribed "key indicators" (Appendix C). A review of these indicators gives a relatively quick overview of project operation. Unsatisfactory performance calls for remedial action. Notices for

Table 14 – Schedule of Meetings at Field Level

Meeting	When	Attended By	Purpose
Group meeting (1st)	2nd week[a]	CNW, CNS	Review of CNC work
Group meeting (2nd)	4th week[a]	CNW, CNS	Collation of info for MPR
CNW review meeting (1st)	1st week[a]	CNW, CNS CNI, TPNO	Salary, collation of info for MPR
CNW review meeting (2nd)	3rd week[a]	CNW, CNS CNI, TPNO	CNC review, instructions and rectifications
CNS/CNI review meeting		CNS, CNI TPNO, DPNO?	Collate MPR, discuss and implement rectifications
Coordination meeting		CNI, MPHW PHC doctor TPNO?	Coordinate with health staff

[a] Each month.

Figure 10 – Flow of MIS Information on Nutrition



rectification of deficiencies in project implementation are issued regularly to defaulting CNCs. Reasons for these deficiencies and corrective action taken are then reported back in the form of "rectification reports." Copies of all rectification notices and reports are routed through concerned taluk and district offices. Sample formats for rectification notices and reports are included in Appendix F. A review of these reports indicates the kind of attention to detail that is the hallmark of TINP, especially the MIS.

Not documented in this formal chart are the additional implicit channels of information use. For example, when a report is submitted to a CNI, she looks for deficiencies in implementation and issues corrective notices to concerned CNSs and CNWs, without waiting for instructions from higher authorities. This kind of monitoring is routinely done at every level, but by definition, it is subject to workers' personal biases, interests, and motivations.

As illustrated above, project managers at many levels subject the nutrition information generated in the field to a fair degree of scrutiny, and they use it for monitoring and supervision (to ensure coverage and quality of service delivery), for program management (for example, information on stocks and supplies is used to ensure timely supply of consumables), and for intensified attention to problem areas.

Tables 15 and 16 show some uses to which information from the field is put. The sources of information listed are the various registers maintained at the CNC. As mentioned earlier, information from the Monthly Progress Report is converted into "key indicators," which are used by project managers for monitoring the quality of project inputs and outputs (Appendix E). Table 16 summarizes the use of key indicators by project managers for initiating remedial action. Specific "trigger points" detailed in Table 16 are used to identify situations that warrant special attention.

A review of Tables 15 and 16 underscores the massive scope for a reduction in the quantity of information generated. Clearly, a rationalization and reduction in the number of registers maintained at the CNC is warranted. While program designers and implementers have acknowledged this fact, this passive acknowledgment now needs to be substituted with active support for this exercise. Such an exercise, if done prudently, is unlikely to compromise on the information requirements for project management or evaluation. On the other hand, it could go far in reducing CNW workload. While current data quality is acceptable, a reduced workload could help in improving this further.

A discussion about the key indicators is in order here. A review of the list of key indicators (Appendix C) with reference to Tables 15 and 16 above indicates that more information is generated in terms of key indicators than is used or required. Clearly, a review and rationalization of these indicators will help in further reducing the bulk of information required.

There seems to be some confusion related to the development and use of key indicators. Some of the issues addressed by these indicators lend themselves to quick and obvious conclusions (e.g., coverage of weighing), and hence, seem to

Table 15 – Use of MIS Information for Program Management

Information Source	Who Uses and For What?	
	CNW/CNS/CNI	Project Managers
Weight register (D 3,4,21,32)	CNW: selection and graduation	No
Survey/enumeration register	CNW: identification of target households	Identification and definition of target population (M)
Beneficiary selection register (D 1,4,21,32)	CNW: identification of beneficiaries	(M)
Feeding register (D 1,3,21,32)	CNW: management of whom to feed, how much, and how long	Identification and definition of beneficiaries; food indents and utilization patterns
ANC/PNC register	CNW: management of whom to feed, how much, and how long	Identification and definition of beneficiaries; food indents and utilization patterns
Food stock register (stocks) (D 8)	CNW: calculation of stocks at hand (V)	No
Food stock register (receipts)	(V), (R&R), (M)	No
Food indent register (D 6)	CNW: calculation of food indents	No
Immunization register (D 32)	(R&R)	No
Medicine register Volume 1, vitamin A (D 32)	CNW: vitamin A dosing	Monitor coverage
Medicine register Volme 2, deworming (D 32)	CNW: deworm doses	Monitor coverage
Referral register (D 13)	(R&R)	No
Referral book (to issue referral slip) (D 12)	CNW: initiate referral	No
Birth and death register	CNW: identify new beneficiaries	Continuous redefinition of target population
Women's working group register	(R&R)	No
Children's working group register	(R&R)	No
Demonstration register (D 27)	(R&R)	Monitor number of demos (M)
Educational materials register	(R&R)	Monitor use of materials (M)
House visit register (D 27)	(R&R)	Monitor number of visits (M)

Table 15 (continued)

Information Source	Who Uses and For What? CNW/CNS/CNI	Project Managers
Visitor's notebook	(R&R)	No
Children's attendance register for feeding (D 1,3,4,32)	(V), (R&R)	No
Mother's attendance register	(V)	No
CNW and ayah attendance register	(V)	No
Contingencies/other expense register	(V)	No
Permanent stock register	(V), (R&R)	No
36 months age-completed children's register (D 28)	(R&R)	No
Daily diary (D 17,19)	(R&R)	No
Weight cards hand-over/ take-over register (D 26)	(R&R)	No
Stock of papaya plants register	(R&R)	No
Monthly reports register (information collated from many registers)	(R&R)	Source of all "key indicators"
In-service training register	(R&R)	No
Weight cards	CNW: selection and graduation, beneficiary profile	No

Notes: (V) = used for verification by supervisory staff (usually CNS/CNI) to monitor worker efficiency; (R&R) = used for records and reporting only; (M) = marginal use, most information available from other sources; (D) = duplicate information available in specified register/s.

Table 16 – Trigger Points for Use of Key Indicators

Information Reported	**Action Initiated**
Quality of project inputs	Remedial action notices issued if percentage is < or > the following:
Coverage for weighing (6-36 months)	< 80 percent
Coverage for feeding (6-36 months)	< 20 percent
Coverage of pregnant/lactating (feeding)	< 10 percent
Number of pregnant/lactating enter feeding/month	< 1 percent
Vitamin A prophylaxis (last 6 months)	< 30 percent
Deworming drug (last month)	< 40 percent
Quality of project outputs	
Number of grades 3 and 4 (6-36 months)	> 10 percent
Number entering feeding/month	< 2 percent
Number fed > 3 months	> 40 percent
Number fed > 6 months	> 20 percent
Number graduated in 90 days	< 50 percent
Total number graduated	< 30 percent
Number of relapsed in last month/ number graduated in last 6 months	> 3 percent

be geared directly toward better program management. Other indicators would require more detailed analyses before they could be translated into action (e.g., number of children in different grades of malnutrition at different ages). Hence, such indicators are more suited to research (and thereafter to program management) rather than as a direct feedback into program management. There is clearly a need for recognizing the different data needs for research and management. Accordingly, information generation (as well as management and use) for the two purposes needs to be addressed separately. This issue is relevant not only to the design of TINP, but for all programs worldwide.

Some of the indicators as defined are abstruse and would do well to be either modified or eliminated. Once again, the example of the number of children in different grades of malnutrition is useful. Shifts in grades is an arbitrary measure and can often portray an incorrect picture. In a hypothetical condition where the population mean tracks just *below* the cutoff for grade 2 malnutrition, a slight increase in the weights of these children (even as little as 50-100 grams) would move them up into grade 1. As per current TINP reporting procedures, this would be interpreted as a major achievement of program output and impact, i.e., a very large percentage of children moved from grade 2 to grade 1. On the other hand, if the population mean had originally been tracking just *above* the cutoff for grade 2, even a 500-gram improvement for younger ages and more than a 1,000 grams improvement for older ages may not be reflected in the grade shifts!

When information on actual weights of children is available, there is no reason to rely on such abstruse measures – especially for research and evaluation purposes (data from which would ultimately flow into program design and modification). Perhaps a compromise between the two methods could be made, such as monthly grade shifts complemented with quarterly or half-yearly data on actual weights of children (reported by monthly age).

Another point relevant to the indicators is that some of the key indicators as defined are not good proxies for what they are supposed to measure. For example, program participation would be better represented by the regularity of weighing (or absence from weighing) than by the currently used proxy of absence from feeding. Confusion in the identification and definition of key indicators seems to have crept in not only at the implementation stage, but at the design stages as well. In the project implementation document, three such indices have been defined:

A measure of coverage – number of children under three weighed/total number of under three children;

A measure of incidence – number of children under three not gaining adequate weight/number of children under three weighed; and

A measure of impact – number of children under three in the feeding program/number under three not gaining adequate weight.

The measure of impact as defined above is, in fact, an imprecise measure of adequacy of program targeting (i.e., how many of those faltering are actually included in feeding). A true impact proxy would attempt to determine how many of those targeted actually benefited from the program, i.e., true impact needs to be assessed in terms of a net improvement in nutritional status. All of this points toward a need for a review of currently used key indicators to make them more meaningful.

Examination of Nutrition Monitoring in the Field

The operation of the monitoring system was studied in detail at the field level. Personnel at all levels were interviewed to assess their role in the system and to understand the strengths and weaknesses of the system as it operates in the field.

Six CNCs were selected out of a total of 68 operating in one block of the TINP (three selected randomly, one selected purposively since it had a food production center run by the local WWG, and the two others selected because these had been judged as examples of the best and the worst CNCs in the block based on prior research). Records were examined in these CNCs, and the six CNWs were interviewed. Further, five CNSs, one CNI, the TPNO, DPNO, Assistant Director (Monitoring), and Project Coordinator of TINP provided additional information. Additional information was collected from a spot interview of 61 CNWs.

A list of all registers maintained at the CNCs is appended in Appendix A. In five of the six CNCs surveyed, all of the registers were available and were completely updated as of the previous month. In one CNC (in which, incidently, the worker did not live in the same village), 15 out of 27 registers were up to date; 10 of them included data up to the previous month; one register was two months behind; and one had not been updated for six months. Impressions from 42 other CNCs (visited as part of a larger epidemiological study) also support the conclusion that registers are usually available, meticulously maintained (despite the heavy workload and semiliterate workers), and up to date. Monthly progress reports for the previous months were available for review at block headquarters.

The system for organization of meetings for collation of information is well streamlined, and meetings are on schedule. All workers are aware of the time and place of meetings. In a spot check of a block-level meeting, 61 out of 68 CNWs were present, and the remaining 7 had legitimate reasons for their absence. This ensures an environment conducive to the regular flow of information.

Workers' perceptions of TINP objectives and services are quite clear. Workers know exactly which reports need to be supplied and how the required information is to be extracted from the various registers. All of them claim to have been trained in collecting and reporting information, among other things. When asked the purpose of collecting the information, they mention that "... it is useful for correcting mistakes/shortcomings in the project." Workers at all levels are supervised by higher-level cadres, who check efficiency of service delivery. A "best worker" award has been instituted for CNWs based on such

supervisory reports. Supervisory information is thus actively used both to assess worker efficiency and to support efficient service delivery.

All the twelve field-level workers interviewed had seen the project newsletter and were familiar with the kind of information contained in it. This indicates that the objective of recirculating project information back to field workers was being met through the newsletter.

A quick survey of 61 CNWs revealed that they spent a mean of 1.47 (± .07) hours writing up their registers daily (range = 1 to 3 hours). All 61 claimed to fill in registers daily rather than weekly or biweekly. Information from the six CNWs interviewed in detail indicates that in addition to the 1.47 hours spent daily on recording information, an additional two days of worker time is spent on collating and reporting each month. All of this amounts to about 27 percent of total worker time spent on monitoring activities.

Scope for Future Use of TINP Data for Research

The quantity and detail of information readily available at the block headquarters (a two-room semipermanent tenement) is remarkable. Reports for all previous years are available and accessible, including in the community nutrition centers. Registers dating back to program initiation are available in most village-based centers. These data represent an unexploited wealth for research (including evaluation research), which needs to be preserved in an accessible form. Longitudinal growth data on such large numbers of children over such prolonged periods of time are unheard of in any other part of the world.

However, over the years, the paper on which these records are maintained has deteriorated, probably creating a major bottleneck in retrieving and analyzing this wealth of data, especially the disaggregated child-level data currently available in the CNC records. It is strongly recommended that efforts be made now to retrieve and computerize these data in order to avoid losing them altogether. Once again, passive cognizance (by both the recipient and the donor agency) needs to be translated into active support for this activity, before it is too late.

Monitoring of Health Services

Generation of Health Information. Health-related information is collected by the Multi-Purpose Health Workers (MPHWs) stationed at Health Sub-Centers (HSCs). The MPHW both records and reports information through MPRs. The registers maintained at the HSC and at the Primary Health Center (PHC) are listed in Appendix D. As mentioned earlier, the health component of the TINP project has been superimposed on the existing health system. The original registers that were part of the existing health system have been retained, with the rationale that these meet the information requirements of the TINP health component.

Consequently, much of the information that is generated is not tailored to any needs assessment.

Management and Flow of Health Information. Information generated by the health worker is reported through monthly, quarterly, and half-yearly progress reports overseen by Health Visitors (HVs) from the PHC. The Medical Officer (MO) at the PHC oversees the consolidation of reports at the PHC, which then go through the District Health Officer (DHO) and the Department of Public Health to the TINP project coordination office. Samples of the format for monthly progress reports for health are attached in Appendix D.

Use of Health Information. The system for the use of health-related data in TINP is very similar to that for nutrition. The list of key indicators for health is appended in Appendix G. These are reviewed regularly, and discrepancies and shortcomings are communicated to the erring officials. However, impressions and observations in the field indicate that this aspect of the health system leaves scope for improvement. Review of the key indicators in health indicates that "estimated" numbers are used for calculation of many of the indices. The reason for using an "estimate" is obscure when more precise information is available. Health-related information is rarely used for program management, and most of the information seems to be generated more as a matter of routine, rather than arising out of a need for program management.

ROLE OF STATISTICAL INSPECTORS IN MIS

An assistant director heads the monitoring wing of the project coordination office, which includes one Statistical Inspector (SI) and one Assistant Statistical Inspector (ASI) per health unit district (HUD). The responsibility of this team is essentially limited to "inspection" of records and reporting from CNCs. Random surprise visits by SIs and ASIs to CNCs are timed to coincide with visits scheduled by community nutrition instructresses (CNIs) so as to serve the dual purpose of inspection of CNC records and supervision of CNI performance. The assistant director reviews the inspection reports and issues rectification notices to defaulting CNCs through appropriate channels. While the work done by these inspectors is commendable and is a major means of ensuring information quality checks (as well as program implementation quality checks), it is relevant to point out that the role of statistical inspectors is limited to that of "inspection" and "supervision" per se and that they do not play a supportive role like the community nutrition supervisors.

NUTRITIONAL SURVEILLANCE AS A TOOL FOR MIS

The original project document states that nutritional surveillance "... would generate and analyze nutrition surveillance information that would provide early warning of impending or sudden nutritional deterioration ... enable the government to respond in a timely and flexible fashion to avert nutritional disasters beyond the control of the proposed project interventions." A dual

surveillance system was visualized to address these objectives. The first would be a built-in surveillance system based on the growth monitoring data generated continuously from all project areas. This concept overlaps somewhat with the MIS as discussed above and it completely overlaps in practice.

The second complementary system was proposed as a sample surveillance system in project and nonproject (control) areas. In practice, since program operation in different districts was initiated in a phased manner, an initial nonprogram area was considered a "control" block. Nutritional surveillance was started in the "control" and in one "program" block. All children from 6 to 36 months old in the control block were weighed monthly by staff from the DEAR. In the program areas, weighing was done by DEAR staff for the first year of program operation, after which CNC records were used for the purpose.

The use of the project monitoring information for program management has been discussed in detail above. With reference to sample surveillance, it is generally understood that the data generated from this exercise have been used very sparingly to assess program impact, to document health and nutrition trends, or to manage the program. The major potential of these rich data remains unexploited (TINP 1984 and 1989). These data were intended "... to enable project authorities to isolate favorable nutrition effects attributable to project actions." This objective has not been addressed in any analyses. The contribution of the TINP surveillance system toward early warning of impending nutritional disasters is also questionable. No data on this aspect have been released by the project authorities to date. This system's failure to predict and/or manage the severe deterioration in nutritional status in Tamil Nadu in the early years of TINP implementation, i.e., during the 1982 drought and then again the 1987 drought, fuel the doubts. In order to operationalize this objective in the future, it will be essential to integrate the nutritional surveillance information with aggregate data from other sources, e.g., agricultural data and food prices. In addition, program design must also include enough flexibility (such as reallocation of resources) to respond to trends predicted by early warning systems. Without such an effort, data generation alone is unlikely to provide early warning.

The concept of nutritional surveillance has been defined as "... keeping watch over nutrition in order to make decisions that will lead to improvement in nutrition in populations." Surveillance includes health and development planning, program management and evaluation, and timely warning and intervention among its purposes (Mason et al. 1984).

Discussions above indicate that within the TINP system, surveillance has been used with remarkable success for program management. To a much more limited extent, surveillance has also provided data for state-level development planning. It has failed woefully in program evaluation and timely warning and intervention. It failed in this goal mainly because of inadequate planning and visualization, vis-à-vis timely warning, and inadequate attention to institutional capacity building, vis-à-vis program evaluation.

PROGRAM EVALUATION

An ongoing evaluation plan was built into the design of TINP. This included four surveys during different phases of program operation: *baseline survey* (BLS) in October 1980 in pilot and control blocks; *first round of evaluation* in July 1982; *midterm evaluation survey* in March 1984 (impact assessment in the pilot block and only process evaluation in extended blocks); and *terminal evaluation* in October 1986.

The BLS was expected to generate information about nutritional conditions at the beginning of the program, while the following surveys were designed to provide program impact and process data.

Differences in sample selection procedures between the BLS and the following surveys detract from the strength of the conclusions. These and other relevant issues are discussed in detail elsewhere in this paper. All the surveys were designed to be cross-sectional. These data were to be supplemented with longitudinal growth data from nutritional surveillance, which, as discussed earlier, was inadequately effected.

Elaborate evaluation plans could not ensure that all the information flowing from these evaluations was fed back in the form of programmatic modifications. Little effort was made to use the results from midterm evaluation to effect midproject design modifications. For example, early process and impact data clearly indicated the need for enrolling children in the CNC at birth (or soon after birth), as opposed to the prescribed six-month enrollment age. Yet no efforts seem to have been made in this direction during the course of the project. In fact, the role of evaluations was limited to one of looking for project impact. This limited role may sometimes be justified when evaluations are conducted at the end of a project with the sole purpose of looking for impact. But it is definitely not justified in the case of "built-in, ongoing evaluations." In fact, the entire purpose of "ongoing" is lost when the results are used for such a limited purpose.

Another implicit issue in ongoing evaluations is that of quality. The fact that the studies must rest on sound principles of research design, sound data quality, and sound analyses cannot be overemphasized in the light of the fact that results from the studies are expected to feed back into midproject modifications. TINP evaluation reports are limited to a very cursory and superficial analysis of data. Lack of evaluation expertise and computing facilities can largely explain this deficiency. Any policy implications from these data must necessarily flow from much more detailed and rigorous analyses. Future program designs must lay strong emphasis on local institutional capacity building to ensure adequate attention to evaluation quality.

ROLE OF SPECIAL STUDIES IN MIS

Special studies on issues of direct relevance to program design were planned for in the initial phases of the project. These studies allowed for operational

research geared toward better program design. More than sixty special studies were conducted during the course of the project. Among the more useful of these is the study on grade versus weight gain criteria for selection of children for supplementary feeding. Results from this study supported the World Bank's plans to introduce the weight gain criteria experimented within the Indonesian program. Other studies, such as the one on worker job satisfaction, increased understanding of worker morale. However, many of these studies were conducted with little attention to issues of research design, methodology, and analyses. Further, attempts to use the results from these studies have been very tenuous. Most of these studies lie buried in bureaucratic offices and, in many cases, even the reports are untraceable. While these studies represent a very useful potential resource for information on project feedback, both the generation and use of this information leave much to be desired in the TINP context. It would perhaps be wise to set up a competent research cell within such projects. Depending on the situation, this cell could either help build institutional capacity to conduct such studies or at least be sufficiently discriminating in appointing consultants or research groups to conduct the required studies. Such a cell, it is hoped, would also be able to use lessons from these studies in project operation, thus ensuring adequate use of good quality information.

PROJECT NEWSLETTER

The TINP project newsletter is evident in almost all the CNCs visited. It was envisaged as a tool for circulating information from project headquarters back to the actual data generators, i.e., the CNWs. This objective seems to have been achieved quite successfully. The newsletter is named "Chittukurvai" (a little bird), and its contents were familiar to all 61 CNWs interviewed in the field. Supervisors were also familiar with it.

WORLD BANK REVIEW MISSIONS

The role of the World Bank review missions in the TINP MIS has been outlined in Figure 8. These biannual (and later annual) missions were among the prime users of all the information generated by the system. Mission recommendations spurred many of the midprogram modifications. Further, the frequent mission visits were a major driving force in timely and meticulous reporting of information. Here the reference is to the increased accountability of project personnel to external donor agencies. Perhaps data generators and processors could also see this very tangible utilizer of their efforts – a reality that could well have added to the motivation behind the superior quality of the information systems. Furthermore, these missions served yet another purpose: that of orienting project staff to the possible uses of data generated in the field. This was particularly valuable in view of inadequate in-country guidance on this score.

CONCLUSIONS

General Conclusions

The TINP MIS is well-designed. The MIS allows for efficient generation and flow of information in the nutrition component but not in the health component. Nevertheless, in both the nutrition and health components, there is an urgent need for a reduction in the quantity of data generated and a review and revision of the key indicators used for summarizing these data. Despite this, the management, flow, and utilization of information through this channel (especially through the nutrition component) is among the most efficient of its kind and undocumented among similar projects all over the world.

One attribute of a good monitoring system is that information must be presented in a politically acceptable form, while being usable. This often creates a dilemma: should politically controversial information be released? If so, how much, how, and when? TINP has had its share of such dilemmas. Perhaps this is one explanation for the low profile of TINP until now. It is hoped that information from this very successful project, which has only now started to be made public, will continue to be so. Much needs to be done toward informing international nutrition and health professionals about the TINP experience.

The statistical inspectors play a useful supervisory role in data generation – especially in monitoring data quality.

The surveillance system, as operational, is generating large masses of data, but does not seem to be serving a very useful role in the utilization of this information.

The special studies commissioned by the project to answer key issues are an attractive innovation in terms of the design of the MIS. But inadequate attention to research quality means that many of these studies are not useful. Further, efforts to use this information have once again been minimal.

Evaluation data were well-planned and fairly well-executed, but they have not been subjected to the rigorous analyses that they deserve. The lack of evaluation expertise and computing facilities are among the major reasons for this lacuna. Consequently, little useful information has followed from this long, drawn-out exercise. More rigorous analyses of existing data even now could increase the usefulness of this endeavor.

The project newsletter has been used as a successful tool for reaching information to the grass roots.

World Bank review missions seem to have served their purpose – that of midproject review and increased project accountability.

One glaring shortfall in the entire MIS reviewed above was the lack of any organized feedback on the communication component or on the training of field

staff. It is hoped that this will be made good in future MIS designs for this and other similar programs.

Use of MIS Information

Any MIS is expected to cater to data needs for four major purposes, i.e., project design, midproject design modifications, evaluation of the existing project, and project expansion to new areas based on lessons drawn from experience. While many of these issues have been discussed in earlier sections, they are summarized below.

Use of Information for Project Design. Design of the TINP was based on information from the Tamil Nadu Nutrition Study conducted in the 1970s. This data was supplemented with experience from similar intervention projects in Indonesia. Some of the design issues were pretested and polished during the initial phase of the project in pilot areas. One of the best examples of this is the trial of the "grade versus weight gain" method for selective feeding.

Use of Information for Midproject Design Modifications. The MIS design in TINP provided an ideal situation for midproject modifications – the ongoing and continuous evaluation and surveillance, the special studies, and the expert help from the review missions. However, this opportunity does not seem to have been utilized optimally. For example, even a preliminary review of the data emanating from the project in the early phases would have indicated the need for enrolling children into the CNCs' growth-monitoring program at birth. But this was not done. Other such examples abound. Areas where this was attempted were in the modification of key indicators to suit perceived data needs; the attempted experimental mergers with the Integrated Child Development Services Scheme and the NMP to accommodate the changing sociopolitical climate; the efforts to recruit only married and local workers in the later phases of the project; the use of the more practical "single weighing" as against the originally prescribed method of taking an average of three successive weights for all children; etc.

Use of Information for Project Management. Information use for the logistics of project management, i.e., indent and supply of materials (food, growth cards, drugs, communication materials, etc.) seems to be well-instituted and efficient, as it is for supervision of work and service delivery (especially the nutrition component), as previously discussed.

Use of Information for Evaluation. The use of evaluation information leaves much to be desired. It is recommended that efforts in this direction be increased in the future. Information from ongoing evaluation must be fed back into the project and not used as an entity in itself. There is also an urgent need for institutional capacity building to add to the quality of analyses of these data.

Use of Information for Expansion. TINP experiments in the pilot block were used as a basis for expansion of the project to other districts in the state.

Information from the entire project is being used for designing the next project to be funded by the World Bank, which would be operational in Tamil Nadu and four other states in India: Orissa, Bihar, Madhya Pradesh, and Andhra Pradesh. The extent to which this is actually done will be evident after project proposals for these are finalized. Experience from TINP has only recently started to be disseminated to the international health and nutrition community at large, and it is hoped that some of the lessons learned from TINP will flow into the design of programs in other parts of the globe.

Lessons for MIS Design from TINP

1. An independent and strong infrastructure is needed for information generation, management, and utilization. This must include facilities for training of special cadres of personnel for each of these tasks, and provision of adequate computing and other facilities.

2. The design of MIS should be decentralized to allow for information collection, analysis, and use at many levels, thus facilitating appropriate use of information.

3. Information generation must necessarily start at the grass-roots level and flow upwards. Accordingly, field personnel must be well-trained in recording and reporting procedures.

4. Even when the program itself offers integrated services (e.g., both health and nutritional services), a "disintegrated" generation and flow of information allows for greater efficiency. Such an independent system also allows for greater accountability when there are bottlenecks in information flow. For example, the TINP system clearly indicates that the nutrition component of the MIS functioned much more efficiently than the health component. It has been easier to pin the responsibility only because the two were independent of each other.

5. Many different approaches to data generation (e.g., component monitoring, surveillance, evaluation, etc.) can be integrated, as has been done in TINP.

6. Surveillance information must be integrated with other relevant data sources to make it sensitive to the objectives of an early warning system.

7. The development and use of standardized recording and reporting procedures would substantially increase the efficiency of an MIS design.

8. Efforts should be made to include some processes that allow for the recirculation of project information to the grass roots. The TINP experience with a newsletter is one successful example.

9. The quantity of information generated in the field must be reasonable. Generation of large masses of detailed information (all of which is not

necessarily used) puts unnecessary strain on grass-roots workers and could detract from data quality.

10. Careful development of a relevant set of "key indicators" of program operation is a useful method of facilitating information use by project managers.

11. When ongoing evaluation is a part of project design, special efforts must be made to ensure that information from this source is regularly fed back in the form of appropriate midproject modifications.

12. Commissioning of special studies catering to operational problems could substantially add to the strength of an MIS. However, such studies must be based on sound research principles, and results from these must flow into project design and implementation.

13. MIS information must be presented in a politically acceptable fashion, without compromising the utilization of the information generated.

14. Project experience must be shared with other agencies and with the larger professional community so that each can benefit from the experiences and strengths of the other.

15. MIS design must include strong mechanisms for enhancing project accountability. This may be in the form of a strong supervision component for data quality, along with the setting up of some "body" (which in the case of TINP was the donor agency and review missions) to whom project management is directly accountable.

16. All MIS information (including monitoring, evaluation, etc.) must be stored on computer tapes or disks so that they are accessible for later reviews and reanalyses.

APPENDIX A

LIST OF REGISTERS/RECORDS MAINTAINED AT EACH CNC

1. Weight register
2. Survey/Enumeration register
3. Beneficiary selection register
4. Feeding register
5. ANC/PNC register
6. Food stock register (a)
7. Food stock register (b)
8. Food indent register
9. Immunization register
10. Medicine register - Volume 1 (vitamin A)
11. Medicine register - Volume 2 (deworming)
12. Referral register
13. Referral book (Printed)
14. Birth & death register
15. Women's working group register
16. Children's working group register
17. Demonstration register
18. Educational tools register
19. House visit register
20. Visitor's notebook
21. Children's attendance at feeding register
22. Mother's attendance register
23. CNW & Ayah attendance register
24. Contingencies/other expense register
25. Permanent stock register
26. 36 months age-completed children's register
27. Daily diary
28. Weight cards handed over, taken over register
29. Stock of papaya plants register
30. Monthly reports register

APPENDIX B

LIST OF NUTRITION REPORTS SUBMITTED EACH MONTH

CNW --> CNS --> CNI --> TPNO --> DPNO

MONTHLY PROGRESS REPORT (MPR)

The MPR covers a range of detailed information including enrollment particulars, grades of malnutrition, numbers eligible and in receipt of feeding, numbers graduated from feeding, etc. Much of the information required for calculating key indicators is included here.

PERCENTAGE CHART

This chart reports on the following:

Total number of children, numbers weighed, number weighed as percentage of total, numbers and percentages for the 6 to 12, 13 to 24, and 25 to 36 month-age groups, numbers and percentages of SC children, and children in various grades of malnutrition, those graduated and those relapsed.

INFORMATION CHART

The information chart lists the following:

Total population, SC population, total and SC child population, number weighed (total and SC), number selected for feeding (total and SC) and number actually fed, number in various grades and those with inadequate/no weight gain, number graduated and relapsed, number of referrals, and number of antenatal/postnatal women enrolled.

FOOD INDENT

The indent for food supplies is accompanied by the following information detailed separately for each of the three age groups: 6 to 12, 13 to 24, and 25 to 36 months:

Children in Grades 3 and 4:

No. of Children	Gms Food/Head	No. Days Feeding	Total Food Required

Appendix B (continued)

This format is repeated for the children with loss or maintenance of weight, those with inadequate weight gain, those who move from grade 3 to 2, and the antenatal and postnatal mothers. The total food indent is calculated on the basis of this information at the end of the report.

DRUG POSITION REPORT

The drug report includes information on supplies of piprazine citrate for deworming and ORS packets. Supplies at hand and amounts used in the previous month are listed.

HEALTH CARDS PARTICULARS

This reports on the number of weight cards of 6 month-old children handed over by the MPHW to the CNW, the numbers of 6 month-old children enrolled independently by the CNW, and the number of cards of children older than 36 months handed over by the CNW to the MPHW.

VITAMIN A REPORT

Number of children covered in the last vitamin A campaign and the number that need to be covered in the next campaign are listed here.

SC/ST BENEFICIARIES REPORT

This report highlights the total numbers of SC/ST beneficiaries in each category, i.e., by age group, and antenatal and postnatal mothers.

COOKING DEMONSTRATION REPORT

This lists the date on which the demonstration is held and the expenses incurred.

MEDICAL OFFICERS MEETING REPORT

The date of the meeting, persons who attended it, and issues discussed are mentioned in very brief.

Appendix B (continued)

IN-SERVICE TRAINING REPORT

Details about in-service training of field workers.

IMMUNIZATION PARTICULARS

Immunization information is submitted for DPT and polio, which includes the total number of children and those given the first, second, and third doses.

FOOD PRODUCTION PARTICULARS

Details of the total amount of food produced at the food production centers, costs, etc. are included here.

USE OF COMMUNICATION MATERIALS

This reports on the use of flip charts, books, etc.

KEY-INDICATOR REPORT

As discussed in Appendix C.

APPENDIX C

KEY INDICATORS (NUTRITION)

INDICATOR	OBJECTIVE
1. a) No. children (6 to 36 months)/ Total population	(Profile of target population)
b) No. of children (6 to 36 months) newly entered the program/No. of children (6 to 36 months)	(Measure of coverage)
2.* No. of children (6 to 36 months) weighed/ No. of children (6 to 36 months)	Measure of coverage
3.* No. children eligible for feeding/ No. children weighed (6 to 36 months)	Measure of eligibility
4. a) No. children (6 to 24 months) in Normal & 1st grade of malnutrition/Total no. (6 to 24 months) program weighed	(Measure of program output?)
b) No. children (25 to 36 months) in Normal & 1st grade of malnutrition/Total no. (25 to 36 months) weighed	
c) No. children (6 to 36 months) in Normal & 1st grade of malnutrition/Total no. (6 to 36 months) weighed	
d) No. children (6 to 24 months) in grade 2 of malnutrition/Total no. (6 to 24 months) weighed	
e) No. children (25 to 36 months) in grade 2 of malnutrition/Total no. (25 to 36 months) weighed	
f) No. children (6 to 36 months) in grade 2 of malnutrition/Total no. (6 to 36 months) weighed	

Appendix C (continued)

g)	No. children (6 to 24 months) in grades 3 & 4 of malnutrition/Total no. (6 to 24 months) weighed	
h)	No. children (25 to 36 months) in grades 3 & 4 of malnutrition/Total no. (25 to 36 months) weighed	
i)	No. children (6 to 36 months) in grades 3 & 4 of malnutrition/Total no. (6 to 36 months) weighed	
5.*	No. children receiving food supplement/ No. children 6 to 36 months	Measure of program input
6.*	No. children receiving supplement in current month/number of children eligible for supplement in previous month	Measure of participation
7.	No. children entering feeding first time/ total no. children weighed	(Measure of program input)
8.*	No. children under feeding for >3 months/ Total no. children under feeding	Measure of nutrition intervention level?
9.	No. children under feeding for >6 months/ Total no. children under feeding	(Measure of nutrition intervention level?)
10.*	No. children graduated in 90 days/ No. children fed in last 3 months	Measure of adequacy of 90-day feeding
11.	No. children graduated in 120 days/ No. children fed in last 4 months	(Measure of adequacy of 120-day feeding)
12.	No. children graduated in 150 days/ No. children fed in last 5 months	(Measure of adequacy of 150-day feeding)
13.	No. children graduated in 180 days/ No. children fed in last 6 months	(Measure of adequacy of 180-day feeding)
14.*	Total no. children graduated/ Total no. children in feeding minus No. children under feeding in 1st & 2nd month	Measure of program output

Appendix C (continued)

15.	No. cases of first relapse/ No. cases graduated during past 6 months	(Measure of relapse rate)
16.	No. cases of second relapse/ No. cases graduated during last 6 months	(Measure of relapse rate)
17.*	No. total cases of relapse/ No. cases graduated during last 6 months	Measure of relapse rate
18.*	No. children absent for 5 days or more/ No. children receiving food supplement	Measure of absence
19.	No. pregnant women entering feeding in 3rd trimester/No. pregnant women in 3rd trimester + No. lactating (up to 4 months postnatal)	(Measure of program input)
20.*	No. pregnant & nursing women receiving supplement/No. pregnant women in 3rd trimester & nursing women in first 4 months	Measure of program output (input?)
21.*	No. women absent for 5 days or more/ No. women receiving food supplement	Measure of program participation (absence?)
22.*	No. children < 3 yrs old given Vit A/ No. children < 3 yrs	Measure of Vit A coverage
23.*	No. children < 3 yrs old dewormed/ No. children < 3 yrs	Measure of deworming coverage
24.*	No. diarrhea cases treated by CNW/ No. children affected by diarrhea	Measure of coverage of diarrhea treatment by CNW
25.	No. children affected by diarrhea/ No. children 6 to 36 months old	(Measure of incidence or prevalence of diarrhea)
26.*	No. diarrhea cases referred to MPHW/ No. cases treated by CNW	Measure of adequacy of CNWs for diarrhea treatment
27.*	No. dropout cases/No. children under feeding during the quarter	Measure of dropout rate

Appendix C (continued)

Source: TINP, Key Indicators on Nutrition Delivery Services, Inception-January 1987 and February 1987 through April 1989.

Notes:

Indicators marked with an * were identified and looked at from the beginning of the program until January 1987. Others have been included in the list since February 1987.

Objectives in parentheses have been attributed to the project by the author of this document. These are not listed in the project documents.

Question marks indicate unclear measures.

The slash indicates mathematical division.

APPENDIX D

LIST OF REGISTERS MAINTAINED AT THE HEALTH SUBCENTER AND PRIMARY HEALTH CENTER

AT THE HEALTH SUBCENTER

1. Family register
2. Treatment of minor ailments
3. Antenatal register
4. Childcare register
5. Program register
6. Children's referral slips
7. Mothers referral slips
8. Diary for health worker
9. Monthly stock register
10. Stock issue register

AT THE PRIMARY HEALTH CENTER

1. Birth and death register
2. Family welfare register
3. Prevention of food adulteration register
4. Epidemic stock register
5. Drugs stock register
6. Blood smear collection register
7. Indent register
8. TB sputum test register
9. Delivery register
10. Register of surgical appliances

APPENDIX E

KEY INDICATORS (HEALTH)

MONTHLY INDICATORS		OBJECTIVE
1.	No. pregnant women treated with iron & folic acid tablets/Expected No. pregnant mothers in 3rd trimester	Measure of coverage of iron & folic acid in pregnancy
2.	No. children (3 to 5 years) given Vitamin A/Estimated No. children (3 to 5 years)	Measure of coverage of vitamin A
3.	No. women in 13 to 16 weeks pregnancy/ No. antenatal cases registered	Measure of registration of early pregnancies
4.	No. antenatal cases registered on record/No. expected pregnancies	Measure of antenatal registration
5.	No. pregnant women administered 2nd TT dose/ No. expectant pregnant women to be covered under 2nd dose	Measure of coverage of TT 2nd dose
6.	No. deliveries attended by trained staff/Estimated live births	Measure of intranatal services
7.	No. babies weighed at birth/ Estimated live births	Measure of coverage of birth weight recording
8.	No. deliveries reported/ Estimated live births	Measure of completeness of birth reporting
9.	No. babies with birth weight <2.5 kg/ No. babies weighed	Measure of coverage of babies with birth wt < 2.5 kg
10.	No. children doubling weight in 4th month/No. children weighed at 4 months	Measure of program output
11.	No. deaths registered of children 0 to 5 yrs/Total deaths registered	Measure of proportional preschool mortality
12.	No. cases referred to MO by MPHW/ No. cases treated by MPHW	Measure of adequacy of diarrhea cases referred to MO

Appendix E (continued)

	QUARTERLY INDICATORS	**OBJECTIVE**
13.	No. children (3 to 5yrs) weighed/ Estimated No. of children (3 to 5yrs)	Measure of coverage of weighing
	HALF-YEARLY INDICATORS	
14.	No. children 0 to 2 yrs given 3rd dose DPT/Estimated No. children (0 to 2 yrs)	Measure of DPT coverage
15.	No. children given 1st dose DPT minus No. given 3rd dose/No. given 1st dose	Measure of dropout rate
16.	No. children (0 to 2yrs) given 3rd dose polio vaccine/Estimated No. children (0 to 2yrs)	Measure of polio coverage
17.	No. children (3 to 5 yrs) given 2nd dose DT/Estimated No. children (3 to 5 yrs)	Measure of DT 2nd dose coverage

APPENDIX F

FORMAT FOR RECTIFICATION NOTICES

From: Project Coordinator, TINP.

To: Director, Social Welfare.

Sub: TINP - Communication of summary reports received from Statistical Inspector ..... District to the component managers -- follow-up action requested.

Ref: Letter No....

I send herewith, a copy of the Summary reports received from the monitoring staff of ..... district based on the inspections carried out by them in certain community nutrition centers during the month of ..... 19..

The major defects observed in each of the CNCs requiring immediate follow-up action are furnished below:

TALUK	BLOCK	CNC	MAJOR DEFECTS/REMARKS
1. 2. 3. 4.	XYZ XYZ XYZ XYZ	XYZ XYZ XYZ XYZ	The particulars furnished in some columns of the Monthly Progress Report were found to be incorrect. The CNWs should be strictly instructed by the CNS to fill up the data correctly. The CNW should take special care while filling up the Monthly Progress Report.
1. 2.	XYZ XYZ	XYZ XYZ	The CNWs concerned should take special care while taking the weights of children. Effective supervision should be undertaken by CNS on weighments.
1. 2.	XYZ XYZ	XYZ XYZ	The percentage of antenatal and postnatal mothers selected for feeding is found to be poor.
1. 2. 3.	XYZ XYZ XYZ	XYZ XYZ XYZ	It is observed that a death that occurred not registered in the CNC. Steps should be taken to make necessary entries in the registers.

Appendix F (continued)

1.	XYZ	XYZ	It is noted that parents of 14 children refused to let their children be weighed. The CNW, CNS, and CNI concerned should approach the parents and educate them about the usefulness of weighing children every month.
2.	XYZ	XYZ	
3.	XYZ	XYZ	
4.	XYZ	XYZ	
1.	XYZ	XYZ	No children were dewormed after January 1988. Similarly, vitamin A has also not been given during the last one year. Efforts should be made by the CNW to cover all the children in the CNC.
2.	XYZ	XYZ	
3.	XYZ	XYZ	

Further, it is observed from the summary reports that the following Community Nutrition Supervisors have not visited the Community Nutrition Centers listed below on the proposed dates as specified in the advance tour program.

TALUK	BLOCK	CNC	PROPOSED DATES OF VISITS NOT COMPLETED BY CNS
1.	XYZ	XYZ	
2.	XYZ	XYZ	
3.	XYZ	XYZ	
4.	XYZ	XYZ	

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