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CONSULTANCY REPORT

February 3 - March 4, 1989

**FOR USAID ASSISTED INTEGRATED CHILD DEVELOPMENT
SERVICES (ICDS) PROJECT OF INDIA**

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Submitted by:

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PART I: OVERVIEW OF CONSULTANCY

This consultancy had two overall objectives:

- A. To assist M.S. University of Baroda with preparation of a data analysis plan and report format for the USAID assisted Integrated Child Development Services (ICDS) Project's final impact evaluation.
- B. To provide technical guidance to USAID on ways to apply key findings from already completed analyses of the USAID assisted ICDS evaluation survey data in order to:
 - 1) improve implementation and increase impact of the ongoing ICDS Project, and
 - 2) update the ICDS component of the USAID's child health and development strategy (1986).

The scope of work, individuals contacted, and reports reviewed for the consultancy are found in Attachments 1, 2 and 3 respectively. The first and last week of the assignment were spent at USAID/New Delhi with the intervening two weeks spent at M.S. University, Baroda. I was requested by Spencer Silberstein and Samarsh Sen Gupta of USAID to focus on two subject areas in my report, namely: 1) methodological issues concerning the USAID assisted ICDS impact evaluation and recommendations for their resolution, and 2) a summary of the findings of the USAID assisted ICDS impact evaluation to date. These two topics comprise Parts II and III of this report.

A seminar was held at USAID on March 1 in which Drs. Tara Gopaldas and Sunder Gujral of M.S. University of Baroda, Dr. William Drake of Community Systems Foundation and I presented a summary of the findings of the USAID assisted ICDS impact evaluation surveys and recommendations for resolving methodological issues. This was attended by representatives of the USAID offices of HPN, DPP, and PRJ. A meeting was also held at the Ministry of Human Resource Development with the Deputy Secretary (ICDS) to discuss the evaluation findings and he was pleased with the USAID project and the results of the evaluation. He was informed that a detailed presentation of the impact evaluation findings would be held for the Ministry on March 16, 1989 by M.S. University.

During my stay in India I also presented three seminars (2 at USAID and 1 at M.S. University) on the draft findings of my doctoral dissertation for Tufts University, School of

Nutrition, entitled, "The Relationship between Maternal Nutrition and Child Growth in Rural India." The study was based on data from the baseline and first follow-up surveys of the USAID ICDS Impact Evaluation. The results, which highlight the severity of maternal malnutrition and illustrate the beneficial impact of maternal supplementation with food plus iron/folic acid, are relevant to approaches USAID should consider while updating its child survival strategy or planning further assistance to ICDS. The USAID seminar was also attended by representatives of CARE, the Ford Foundation, the Nutrition Foundation of India, and the U.S. Embassy Science Office.

PART II: METHODOLOGY FOR USAID ASSISTED ICDS IMPACT EVALUATION

A. LINK BETWEEN USAID ICDS EVALUATION AND NATIONAL ICDS EVALUATION

In 1982-83 when USAID was negotiating the ICDS Project Agreement with the government of India (GOI) one of the sticking points was USAID's insistence on an independent impact evaluation. The GOI's preference was to use the evaluation mechanism in place since the inception of ICDS through which surveys are carried out annually in a sample of blocks throughout India by the ICDS Central Technical Committee of the All India Institute of Medical Sciences (AIIMS), using local medical colleges. The GOI was reluctant to give a foreign donor permission to organize an impact evaluation. However, because of the role played by AIIMS in the initial design and launching of ICDS and their continuing role in overseeing the health component and providing technical guidance, USAID requested that a truly independent group which had no other implementation responsibility in ICDS do the evaluation. USAID also wanted additional data collected which were not part of the AIIMS evaluation schedules.

After much negotiating, the GOI finally agreed to USAID's request. The only conditions were that: 1) the AIIMS methodology (in terms of sampling and questions) be followed to the extent feasible, with USAID free to add additional questions, and 2) that the Baroda and Nagpur Medical Colleges which collect data for AIIMS be involved in some capacity. The M.S. University of Baroda, Foods and Nutrition Department, was identified by USAID to play the lead role for data collection in Panchmahals district, Gujarat state, and for data analysis and report preparation for both Chandrapur and Panchmahals. The Baroda Medical College was involved in a supporting role to provide medical interns to collect some of the data concerning health services and outcomes. For Chandrapur district, Maharashtra state, the survey teams were drawn from the Nagpur University Department of Home Science and the Nagpur Medical College, with the medical college in the lead. Due to some bookkeeping difficulties, the Nagpur Medical College was replaced in 1986 by the Indira Gandhi Medical College of Nagpur, and the leadership role for the Chandrapur surveys was shifted to the Nagpur University Home Science Department.

The questionnaires were designed jointly by USAID, the Ministry of Human Resource Development and the participating institutions in 1984, starting with the AIIMS' proforma (household, child, pregnant and lactating women's schedules) as the base and adding questions needed to address the inputs, outputs, purpose, sub-goal and goal of the USAID project, with all data coded for computer processing. USAID added an additional schedule which was an interview of the anganwadi worker. The objective was an overall evaluation of the impact of ICDS on the nutritional status of children, with some questions on the delivery of services in each

component and socio-economic status added to shed light on why impact may or may not have been achieved. Given the integrated nature of the ICDS program and the many services which may contribute to improved nutritional status, the intent was not an in-depth study of individual components or an effort to partition impact between the various contributing services, but rather a general impact evaluation of improvements in child nutritional status consistent with the AID project sub-goal.

The sampling method used by AIIMS in their evaluations of ICDS is to randomly pick blocks which are either within their first year of implementation (baseline survey) or several years old (repeat survey) throughout India for the annual survey. The blocks at baseline serve as a temporal comparison group for the repeat survey blocks where ICDS has been underway for several years. The possibility of a more traditional control group was not pursued since the GOI did not feel it was ethical to withhold ICDS services from neighboring matched blocks for the sake of research. The non-existence of truly comparable control blocks in the vicinity of the program blocks in terms of similar socio-economic characteristics also contributed to the GOI's decision to rely on a temporal control group.

Within each of the AIIMS sampled blocks six anganwadis are randomly sampled, after stratification for distance from the health sub-center. In the sampled anganwadis all of the households are surveyed for data on children under six years of age and pregnant and lactating women. The GOI's rationale for surveying all households in the selected anganwadis and not drawing a random sub-sample of households and children in each household at the village level is their concern for accurately assessing the extent to which ICDS services are equitably covering all families with children under six years, pregnant or lactating women. They are as interested in who is not being reached by ICDS in the village as who is, since certain program services (e.g. vitamin A, immunization, growth monitoring, nutrition and health education and antenatal care) are intended to be universally accessible to all children and women. No one is confident that the anganwadi worker's village census can serve as an accurate sampling frame, and due to caste barriers there is a strong likelihood that a random sample drawn at anganwadi level may not be representative.

USAID essentially adopted the sampling method used by AIIMS, with three to seven anganwadis randomly selected in each block covered by the USAID project (depending on population of the block) after stratification for distance from the primary health center. As done by AIIMS, the USAID surveys also included every house in the village and every child under six years of age, and every pregnant or lactating woman, to assure representativeness so that service coverage issues could be addressed.

It was decided by USAID that each block would be re-surveyed three times over the life of the project--at baseline, after 1-2 years of implementation (first follow-up or F1), and finally after 3-4 years of implementation (second follow-up or F2) to provide a temporal control group as done by AIIMS. There was no scope for using blocks without ICDS as a control group, since every block in the USAID districts was scheduled to have ICDS under the USAID project and the GOI did not feel it ethical to delay introduction of services in any block beyond the first year of the USAID project. Instead it was planned to assess changes in important socio-economic characteristics over time to rule out secular trends as a competing explanation of impact. It was also planned to compare the USAID findings to any AIIMS ICDS baseline surveys or National Nutrition Monitoring Bureau (NNMB) Surveys done in the vicinity of the USAID districts at the time of the final round. This comparison has not been possible because the NNMB has not done surveys in the project region's of Gujarat and Maharashtra during the life of the USAID project and it has not been possible to get access to disaggregated AIIMS survey data from baseline blocks in the vicinity of the USAID assisted districts.

The baseline and F2 (final evaluation) anganwadis were to be the same to assure maximum comparability in socio-economic and demographic characteristics, whereas the F1 (interim first follow-up) anganwadis were a freshly drawn sample in the same blocks in order to avoid a Hawthorne or study effect which might result from surveying the same villages too often. At baseline all the anganwadis surveyed in Chandrapur had been implementing ICDS for 4-19 months. However, in Panchmahals, a natural experiment presented itself since at baseline there were three different categories of blocks in terms of ICDS program duration. Namely old blocks (program age 35-56 months) inherited by the USAID project, recent blocks (program age 9-17 months) and proposed blocks (anganwadis yet to be started). The primary advantages to the USAID evaluation of having anganwadis of varying program age in Panchmahals were: 1) being able to see maximum impact over time in true baseline anganwadis in which ICDS had not yet started, and 2) being able to assess whether USAID's additional inputs and innovations resulted in any incremental impact over that already achieved by the usual ICDS program in the old blocks, which had been implementing the usual ICDS for 3-5 years prior to the introduction of any of the special USAID inputs.

Further details of the sampling methodology for the USAID ICDS evaluation may be found in the reports of findings of the baseline, first and second follow-up rounds written by M.S. University.

B. SAMPLING

B.1 Issues

Not having this background in mind, recently involved consultants to USAID have reviewed the ICDS impact evaluation sampling methodology in 1988-89. They have suggested that due to the inclusion of all households in an anganwadi and all children under six years of age in those households in the sample, there is a possibility of a cluster design effect which may bias the statistical significance of the results. As a solution, it has been proposed that either available statistical procedures be used to adjust for any "design effect", or that the sample for the final round be drawn from a greater number of anganwadis and fewer households and children randomly selected within each, in order to avoid possible erroneous elevation of significance levels due to correlation of characteristics within villages and within households.

There are a number of compelling reasons for not changing the sampling methodology for the final round. One is that the "design effect", if any, can be removed by statistical adjustment during data analysis. The rationale for selecting the original sampling methodology, most importantly the concern for accurate assessment of access and coverage of ICDS services, is still valid. Given the lack of existing, complete sampling frames for the rural USAID assisted ICDS anganwadi villages, considerable effort would have to be made to visit all the households in the villages in order to construct an accurate sampling frame from which could then be drawn a **representative**, random sample of all households. It is very probable that as much time as is now spent in the village completing the entire survey (3 days) would have to be spent on preliminary household visits to construct an accurate sampling frame, based on household composition, prior to conducting the actual survey. To assure an adequate sample size, at least twice as many villages as are now surveyed would have to be visited, if only one child per household were selected. It is easy to envision how much more costly this random sampling of households and children would be in terms of time and personnel.

Furthermore, since the design of the evaluation was to compare the baseline and final results from the same villages, the proposed change in sampling method is likely to introduce ~~problems of comparability between the unclustered final sample from a greater number of villages and fewer families and children in each and the clustered baseline sample from fewer villages but all families and children.~~ A new sample of villages drawn for the final round would reduce the similarity in socio-economic and demographic characteristics to the baseline sample and these differences could attenuate any impact seen.

A "quick and dirty" test of the presence of a "design effect" was conducted by this consultant and the staff of M.S. University by drawing random sub-sample #1 of one child per household

from all the households in the baseline (B) and first follow-up survey (F1) and random sub-sample #2 of 50% of the households with one child per each from all those surveyed at baseline and first follow-up. Frequency distributions and means were run on a number of variables in the total sample and on each of the two subsamples for baseline versus first follow-up and within first follow-up for children fed at the anganwadi and not fed. The limitation was of course the reduction in sample size which occurred with each sub-sample, which in turn influenced borderline significance levels (p). However, for nearly all the variables the prevalence or means were essentially the same for the full sample and the two sub-samples and statistically significant differences between B and F1 or between fed and not fed children did not become insignificant.

One variable which appeared to be affected by clustering was the significance of the difference in the percent of children who had measles in the past year for B versus F1. This is not surprising given the communicable nature of measles which would be expected to affect all children in the household who were not immune. Whereas the prevalence of measles was 17% at B in all three samples and 15% at F1 for the total sample versus 16% in sub-sample #1 and sub-sample #2, the major "design effect" was seen in the significance of the difference between B and F1 which dropped from a probability of 0.05 in the total sample to 0.79 in the one child per household sub-sample and 0.81 in the 50% sub-sample of households. Fortunately the prevalence of measles and other communicable diseases is not an important outcome variable for the USAID ICDS evaluation. However, the difference in prevalence of moderate and severe malnutrition and the significance levels for B versus F1, which is the primary impact indicator stated in the ICDS Project Paper, were not affected by the various sub-sampling techniques which can be seen in Tables 1 and 2.

B.2 Recommendations

It is recommended that the sampling method used for the final round continue to be that used for the baseline and first follow-up surveys. Furthermore, no modification of the questionnaires is possible at this late stage in the evaluation. All anganwadis surveyed at baseline (1984-85) should be re-surveyed in the final round between November 1989-March 1990. This would allow four to five years of USAID ICDS implementation to have elapsed and all the major project components to have been introduced between baseline and final round. The Panchmahals sample would include those villages which at baseline had no ICDS infrastructure, which would therefore be expected to show maximum change four years after introduction of ICDS. Furthermore, at the time of the final round, assuming an average monsoon in the summer of 1989, there will have been two years of recovery from the drought which seems to have limited nutritional impact between 1985-87 in Panchmahals, and to lesser extent in Chandrapur.

Returning to the same anganwadis in the final round as surveyed at baseline per the original design will assure maximum comparability in socio-economic and demographic characteristics, which is essential in order to measure impact over time and rule out competing explanations.

Between now and the time for analysis of the final survey round (summer 1990), it is recommended that statistical tests be applied by Community Systems Foundation (CSF) using available data from the earlier survey rounds to see to what extent a "design effect" due to cluster sampling alters the findings in terms of frequency distributions, means and levels of statistical significance. If statistical adjustment to remove the "design effect" is deemed necessary, then CSF should determine the most appropriate techniques to use, keeping the available software and microcomputers at M.S. University in mind, and provide training to the data analysis team at M.S. University of Baroda in the application of these statistical methods.

Table 1									
Comparison of Prevalence of Malnutrition and Significance Levels for Baseline vs. First Follow-up by Sampling Method in Panchmahals, Gujarat for Children 0-36 Months of Age									
	BASELINE (84-85)					FOLLOW-UP (85-87)			
	All ¹	p ²	Sub-sample ₁ ¹	p ²	Sub-sample ₂ ¹	p ²	All	Sub-sample ₁ ¹	Sub-sample ₂ ¹
IAP (Indian Academy of Pediatrics Weight for Age Classification)³									
	N = 2532		N = 1673		N = 793		N = 2427	N = 1493	N = 753
Normal%	25	.0000	24	.0000	25	.001	27	26	27
First%	30		29		29		34	36	34
Second%	30		31		30		27	27	27
Third%	13		13		13		10	10	10
Fourth	3		3		3		3	2	2
WATERLOW (Combined Weight for Height and Height for Age Classification)⁴									
	N = 2769		N = 1627		N = 774		N = 2300	N = 1455	N = 743
Normal%	45	.0000	44	.0000	44	.0002	48	49	50
Stunted%	28		28		30		33	33	32
Wasted%	17		18		16		12	11	10
W + S%	10		10		11		8	7	8
<p>1. ALL - Sample includes all households and all children 0-6 years of age in randomly selected villages. Sub-sample₁: Random sample of 1 child 0-6 years of age per household from all households in randomly selected villages. Sub-sample₂: Random sample of 50% of all households and random sample of 1 child per selected household in randomly selected villages.</p> <p>2. p - values are for statistical significance of difference between baseline and first follow-up.</p> <p>3. IAP - Indian Academy of Pediatrics Weight for Age Classification in which normal is > 80% NCHS reference median weight for age; First - 71-80% of reference; Second - 61-70% reference; Third - 51-60% of reference; and Fourth - < 51% reference</p> <p>4. WATERLOW - Combined Weight for Height and Height for age classification in which normal is Wt for Ht > = 80% and Ht for age > = 90% of reference median; Stunted is Ht for age < 90% of reference; Wasted is Wt for Ht < 80% of reference; and Wasted and Stunted is Wt for Ht < 80% of reference and Ht for age < 90% of reference median.</p>									

Table 2									
Comparison of Prevalence of Malnutrition and Significance Levels for Baseline vs. First Follow-up by Sampling Method in Chandrapur, Maharashtra for Children 0-36 Months of Age									
	BASELINE (84-85)						FOLLOW-UP (85-87)		
	All ¹	p ²	Sub-sample ₁ ¹	p ²	Sub-sample ₂ ¹	p ²	All ¹	Sub-sample ₁ ¹	Sub-sample ₂ ¹
IAP (Indian Academy of Pediatrics Weight for Age Classification) ³									
	N = 2157		N = 1466		N = 732		N = 1726	N = 1219	N = 706
Normal%	20	.555	19	.487	18	.896	20	20	19
First%	31		32		33		32	33	34
Second%	33		32		32		33	33	33
Third%	14		14		14		13	13	12
Fourth	3		3		3		2	2	3
WATERLOW (Combined Weight for Height and Height for Age Classification) ⁴									
	N = 2137		N = 1453		N = 725		N = 1715	N = 1217	N = 606
Normal%	43	.0000	44	.0000	43	.0000	34	49	50
Stunted%	36		34		34		50	51	53
Wasted%	10		10		10		7	8	8
W+S%	11		12		13		9	8	8
<p>1. ALL - Sample includes all households and all children 0-6 years of age in randomly selected villages. Sub-sample₁: Random sample of 1 child 0-6 years of age per household from all households in randomly selected villages. Sub-sample₂: Random sample of 50% of all households and random sample of 1 child per selected household in randomly selected villages.</p> <p>2. p - Values are for statistical significance of difference between baseline and first follow-up.</p> <p>3. IAP - Indian Academy of Pediatrics Weight for Age Classification in which normal is > 80% NCHS reference median weight for age; First - 71-80% of reference; Second - 61-70% reference; Third - 51-60% of reference; and Fourth - < 51% reference</p> <p>4. WATERLOW - Combined Weight for Height and Height for age classification in which normal is WR for Ht > = 80% and Ht for age > = 90% of reference median; Stunted is Ht for age < 90% of reference; Wasted is WR for Ht < 80% of reference; and Wasted and Stunted is WR for Ht < 80% of reference and Ht for age < 90% of reference median.</p>									

C. DATA ANALYSIS PLAN FOR FINAL ROUND

C.1 Issues

It was originally planned that the final round (F2) of data collection for the USAID assisted ICDS evaluation would be done in approximately half the baseline anganwadis between November 1987 and March 1988 and the remaining half between November 1988 and March 1989. While the first half of data collection for F2 was carried out per schedule, it was decided by USAID and the GOI that no more data should be collected until November 1989 due to the delay in introducing important project components, namely mobile in-service training of the workers and nutrition and health education for mothers. Furthermore, the first half of F2 data

that were collected were severely confounded by drought in terms of measuring improvement in nutritional status, since they were collected during the third and worst year of three years running of the worst drought of the century. Therefore the nutritional status findings of the interim B versus F2 report prepared for the half round by the M.S. University of Baroda should be interpreted with extreme caution and further analysis of the drought confounded data to determine nutritional status impact of ICDS is not likely to be fruitful. The Baroda team has recently collected some qualitative data from a few shopkeepers in Panchmahals district and interviewed the Panchmahals District Development Officer to document the severity of the drought which resulted in the steep rise in food prices, the scarcity of milk and the shift of 300,000 workers out of agricultural employment into government relief works.

As stated above, all baseline sample villages should be re-surveyed between November 1989 and March 1990 (including those already revisited once during the earlier F2 half round). USAID should reserve any judgment on the impact of the ICDS project until the findings of the 1989/90 survey are analyzed, because any nutritional status change in currently available data is confounded as a consequence of the drought, which the evaluation did not set out to measure, and is less than expected due to lack of important services which had not yet started at the time of data collection.

In addition to the descriptive analysis done up till now, multivariate analysis needs to be performed for data from the final survey to link services with outcomes. The evaluation team at M.S. University of Baroda have already done some of this kind of analysis for earlier rounds and outlined a data analysis plan which will link services with outcomes (Attachment 4). However, there is an analytical problem of selection bias in participation for a particular service when individuals who receive a service are compared to those who do not within the same villages. Since most, if not all, are eligible to participate depending on the ICDS service, differences in impact seen between participants and non-participants may as likely be due to important socio-economic differences between the groups, which may or may not have been measured and which are both associated with participation and with nutritional status. Caution must be taken while comparing participants to non-participants to statistically adjust for confounding. However, if data on important confounding variables have not been collected, this type of analysis will be misleading or impossible.

An example of the problem of selection bias in impact evaluation analysis is the difference in nutritional status between children who participate in supplementary feeding at the anganwadi and children who do not. Since supplementary feeding is to be targeted to the malnourished, with the USAID ICDS Project having a goal of 85% coverage of malnourished children 6-36 months of age with supplementary feeding, the "fed" group would be expected to have inferior

nutritional status to the "not fed" group, if targeting is effective. This could easily be wrongly interpreted as no impact of supplementary feeding. The opposite erroneous interpretation of positive impact could be made if better nourished children were reached by the program and the malnourished left out. We already know that age of the child is positively associated with participation in supplementary feeding, with older children (above 3 years), being better covered. However, age of the child beyond the first year of life is also positively related to nutritional status, with older preschoolers showing a natural improvement in nutritional status compared to younger ones, even in the absence of any intervention. Age would, therefore, be an obvious confounder in any analysis of the difference in nutritional status between "fed" and "not fed" children.

These problems of selection bias can best be avoided during analysis by adhering primarily to the original evaluation design which compares impact of various services on the whole community (i.e. all children 0-36 months, pregnant and lactating women) over time from baseline versus the final round and not on sub-groups who selectively received services versus groups who did not. This is consistent with the USAID ICDS Project sub-goal of "an average reduction of 50% in the prevalence of severe malnutrition in children 0-36 months of age and of 35% in severe and moderate grades of malnutrition in communities within four years after an anganwadi is established," per the Project Paper.

C.2 Recommendations

It is recommended that the time available between March and September 1989, prior to the final round of data collection, be used by the team at M.S. University to draft a tentative data analysis plan for the final survey in consultation with the USAID ICDS Project Officer, the Mission's Evaluation Specialist and CSF. As a start for this exercise, the Baroda team and I sorted the tables in their last report into the following categories: 1) those important to include in a final report as is or with modification, 2) those which belong in an annex, and 3) those which are no longer needed. Still to be done is the identification of new tables of interest to USAID and the GOL.

Using existing data, the Baroda team should experiment during this interim period with multivariate approaches (regression, ANCOVA) to: 1) link services with outcomes, 2) describe the characteristics of participants versus non-participants, and 3) identify the determinants of malnutrition in various age groups. The results will be helpful for assessing the extent of selection bias and identifying covariates which should be controlled in multivariate analysis. This exploratory data analysis will prove invaluable in narrowing down approaches for final analysis. The preliminary data analysis plan and exploratory analysis conducted by M.S. University in the

next few months will also be useful in identifying topics to be included in the advanced data analysis training to be conducted in India in June 1989 for M.S. University by CSF.

The draft data analysis plan should be seen as a flexible guide to starting ideas for analysis but should not become a straight jacket which inhibits creativity or further exploration. An interactive or recursive approach to analysis for the final survey, evolving from the findings of each run, should be encouraged. One of the limitations of the lengthy reports written to date on the USAID ICDS impact evaluations has been the adherence to pre-determined tables, even if not interesting.

It is also recommended, that part of the final data analysis and report writing be done by a team of 4-5 investigators from M.S. University for two months at Community Systems Foundation/University of Michigan. The most appropriate time for this work to be done at Ann Arbor would be June-August 1989. The collaboration of M.S. University staff and CSF staff on data analysis and report writing in the U.S. is essential to insure that the final impact evaluation report contains the maximum useful information. Given almost daily power outages and the difficulty of maintaining both microcomputers in working order at M.S. University of Baroda which lead to much lost computer time, and the sheer volume of data which will have to be manipulated to compare Baseline to Final Follow-up (at least 15,000 child records), the timeliness of completion of the final report would be greatly enhanced by access to the better computing and library facilities available at CSF and the University of Michigan.

Of equal value will be the interaction of the M.S. University researchers with the staff of CSF as they attempt more sophisticated exploratory and multivariate analysis of the data. The team at M.S. University has been working on the ICDS evaluation for USAID and the GOI for five years, and have successfully handled massive data collection and analysis and met all report deadlines, despite many obstacles as described above. To date they have not gotten any recognition for the yeoman service they have been providing. A working visit by the key investigators to CSF will both serve USAID's desire for production of a high quality report and provide the Indian researchers the opportunity for advancement of their analytical skills which they so deserve. USAID should stress to the Ministry of Human Resource Development that such a working visit is essential for the preparation of the final report and secure GOI approval somehow. The investigators at M.S. University who should be sent to the U.S. to work on analysis and preparation of the final report are: Dr. Sunder Gujral, Ms. Rita Abbi, Mr. Narendra Lele, Ms. Parul Christian and Dr. Tara Gopaldas.

It is also recommended that the due date for the final report be extended to January 1, 1991 to allow the time necessary for in-depth analysis. After submitting the final report, the M.S.

University team will need till June 1991 to close their evaluation office. Therefore their USAID funded agreement with the GOI will need to be extended until June 1991, which overshoots the existing Project Assistance Completion Date (PACD) of September 30, 1990. A method for accommodating this extension for final evaluation of the project will have to be found.

**PART III: SUMMARY OF FINDINGS OF USAID
ASSISTED ICDS IMPACT EVALUATION**

**SECOND FOLLOW-UP SURVEY 1987-88 in
PANCHMAHALS (GUJARAT) and CHANDRAPUR (MAHARASHTRA)**

Summary of Findings of USAID Assisted ICDS Impact Evaluation Second Follow-up Survey - 1987-88

This is a summary of the major findings of the second follow-up (F2) impact evaluation survey of the USAID assisted Integrated Child Development Services Project (ICDS) in 1987-88 compared to the findings of the baseline (B) survey in 1984-85 in the same villages. The Indian term "anganwadi" will be used throughout this report to refer to the village center at which all of the ICDS services are delivered. Each anganwadi in the USAID assisted districts serves an average total village population of 700. Data presented are from 16 anganwadis in 4 blocks (Dahod, Jhalod, Halol and Jambhugoda) of Panchmahals district, Gujarat state and 23 anganwadis in 5 blocks (Bhadrawati, Gondpipri, Mul, Nagbhid and Sindewahi) of Chandrapur district, Maharashtra state.

The results of the second follow-up in this summary should be viewed as an interim assessment of project progress after three years of implementation because: 1) they are from only approximately half the sample of blocks and anganwadis surveyed at baseline, since it is planned to do a final survey round in all of the baseline anganwadis in 1989-90; 2) several essential project inputs had not yet been fully introduced at the time of the survey, namely mobile in-service training of the workers, enhanced nutrition/health education (NHED) for mothers, and full coverage of priority groups with supplementary nutrition; and 3) the data were collected during the third continuous year of India's worst drought of the century.

Sample Size

The data were collected by M.S. University of Baroda, Baroda Medical College, Nagpur University, Nagpur Medical College and Indira Gandhi Medical College. The sample sizes for the baseline and follow-up surveys are shown in Table 1. By design, data were to be collected for every child 0-6 years of age, and every pregnant or nursing woman up to 6 months after delivery. Actual coverage achieved in the surveys was 68-88% of the total population in these groups. Data were collected during the same season (November-March) in both rounds. Further details of sampling, methodology and findings may be found in the 1988 report by M.S. University on the findings of the second follow-up survey.

TABLE 1
SAMPLE SIZE FOR BASELINE (84/85) AND FOLLOW-UP (87/88) IMPACT EVALUATION
SURVEYS OF USAID ASSISTED ICDS PROJECT

GROUP	PANCHMAHALS		CHANDRAPUR	
	Baseline	Follow-up	Baseline	Follow-up
Children 0-36 mos.	859	909	1125	995
Children 37-72 mos.	553	805	912	995
Pregnant Women	88	125	150	134
Nursing Women < 6 mos.	152	155	216	199

Socio-economic and Demographic Characteristics

For the most part, the socio-economic and demographic characteristics were the same for the baseline and follow-up samples. The baseline data collection was done in the year prior to the drought (1984). Subsequently, there was continuous drought in Panchmahals during the three years which elapsed between the baseline and the follow-up, due to failed monsoons in 1985, 1986, and 1987. In contrast Chandrapur was only mildly affected by drought in 1987. The consequences of the drought in Panchmahals are reflected in the significant decline in the percent of families who relied on agriculture for their livelihood between B and F2 (69% vs. 37%). No such shift was observed in Chandrapur where 55% were employed in agriculture at both rounds. This is a clear indicator of the severity of the drought in Panchmahals which made farming impossible and forced families to rely on government relief works for their income. While type of occupation bore no significant relationship to the nutritional status of children at baseline in either district, employment in agriculture became significantly associated with malnutrition in Panchmahals at follow-up but not in Chandrapur.

In Panchmahals, fewer mothers were employed at follow-up than at baseline (39% vs. 51%), probably due to limited agricultural job possibilities during the drought. Although per capita income increased, it did not keep pace with inflation or food prices during the drought, leading to a significant drop in purchasing power in both districts. Thus it may be unequivocally stated that there was a worsening of poverty between the baseline and follow-up which would be expected to be reflected in a deterioration of the nutritional status of children, in the absence of interventions like ICDS and the government of India's (GOI) drought relief works.

The effect of the USAID assisted ICDS Project on improved coverage of essential health and nutrition (child survival) services for children and pregnant and lactating women, which are

not expected to be influenced by drought, will be presented next, followed by the coverage for supplementary nutrition (supplementary feeding). Finally the impact of the project on child nutritional status, which is expected to be affected both negatively by drought and positively by ICDS services, will be reviewed.

Improvements in Health and Nutrition Services for Children

Growth Monitoring

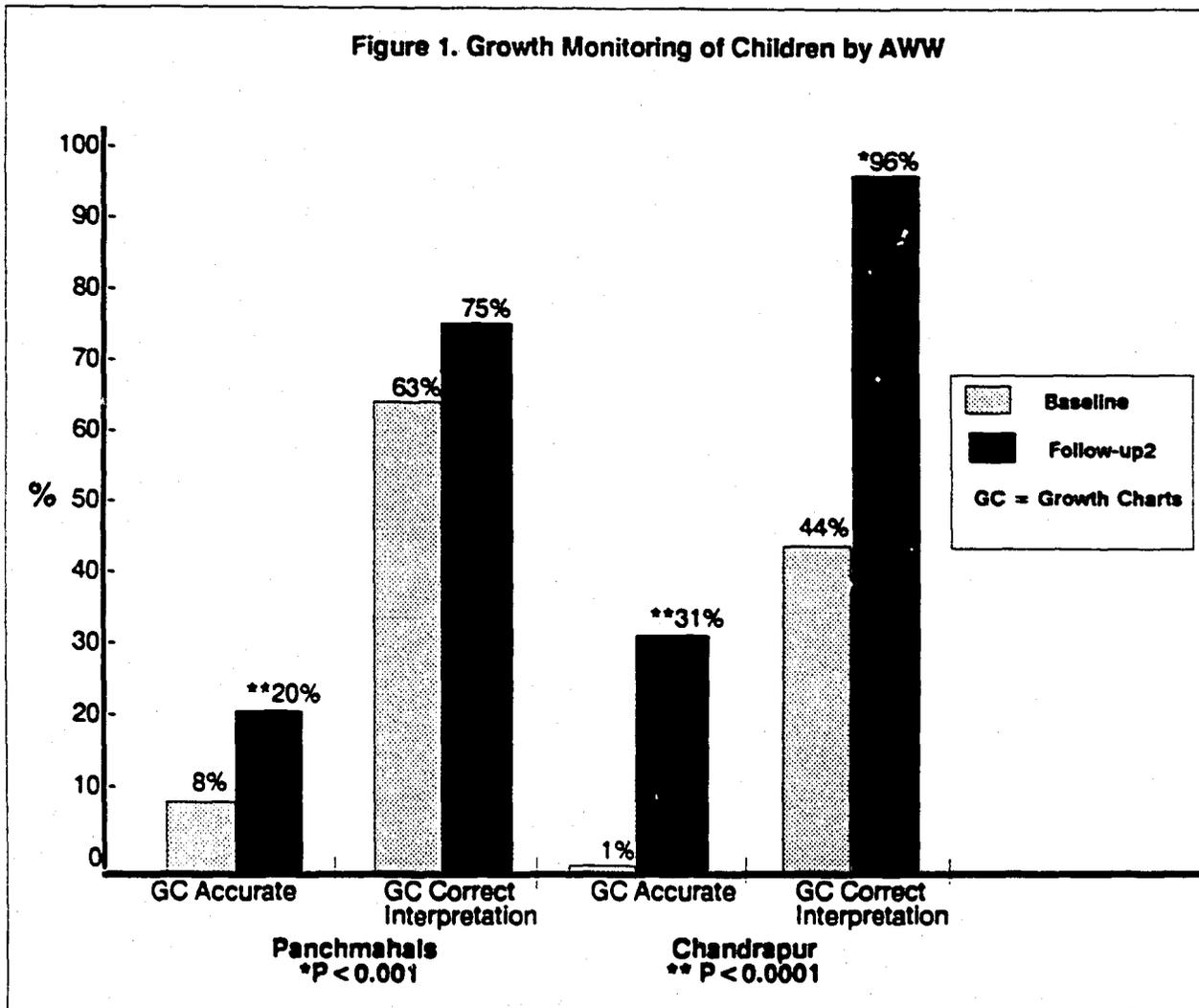
Dramatic improvements in growth monitoring or monthly weighing of children were observed at F2 with an increase in the percent of children with growth charts from 28% at B to 42% at F2 in Panchmahals and from 4% to 63% in Chandrapur. There was a corresponding improvement in the completeness and accuracy of the anganwadi worker's weighing of children and plotting of weight on the charts. Approximately half of all growth charts in both districts at follow-up had weight plotted for the previous three months, with the most recent weight consistent with the weight of the child taken by the survey team. This is in sharp contrast to baseline where in Panchmahals only 28% of the charts had been accurately maintained and in Chandrapur only 18%.

Figure 1 shows the increase in the percentage of all children with accurate growth charts and the improvement in the anganwadi worker's correct interpretation of the growth curve. These improvements in growth monitoring are primarily attributable to the in-service training of the supervisors and anganwadi workers in growth monitoring by CHETNA in 1987 using the instructional materials designed for the USAID assisted ICDS Project by the JSI Training Advisor. The anganwadi workers interviewed also noted that their supervisors, the mukhya sevikas, were spending more time during their visits to the anganwadi overseeing the accuracy of the growth monitoring component at F2 than at B. However, since most children still did not have an accurately plotted growth chart, with poorest coverage of children under one year of age, further improvements in growth monitoring to achieve the intended universal coverage are required. While in Panchmahals all anganwadis had properly functioning weighing scales at F2, only half of the anganwadis in Chandrapur did. Therefore, the lack of reliable weighing scales is one of the main obstacles to be overcome in Chandrapur.

Vitamin A and Iron/Folic Acid Supplementation

There was a notable increase in coverage of children from 12 - 72 months of age with megadose vitamin A supplements at F2 in both districts (Figure 2). As a consequence, the percentage of children with clinical eye signs of vitamin A deficiency fell at follow-up, though

Figure 1. Growth Monitoring of Children by AWW



only significantly so in Chandrapur. One of the reasons why more children received vitamin A supplements at follow-up may be the change in distribution guidelines issued nationally by the Ministry of Human Resource Development between baseline and second follow-up which permitted the anganwadi worker to distribute vitamin A and iron/folic acid. Formerly only the Auxiliary Nurse Midwife (ANM) of the Health Department could distribute these nutritional supplements and due to the distance between the health center and the village, access was limited. Despite the improved distribution system for vitamin A supplements through the anganwadi, most children still had not received this essential protection against nutritional blindness at F2 and the prevalence of deficiency signs remained unacceptably high. Reasons for the poor coverage which may include an inadequate supply of vitamin A, should be investigated and resolved.

There was also a marked decline at F2 in the prevalence of pallor signs of iron deficiency anemia in children (Figure 3). Again, this improvement was probably due to greater accessibility

Figure 2. Vitamin A Receivers

Vitamin A Deficiency Sign Present

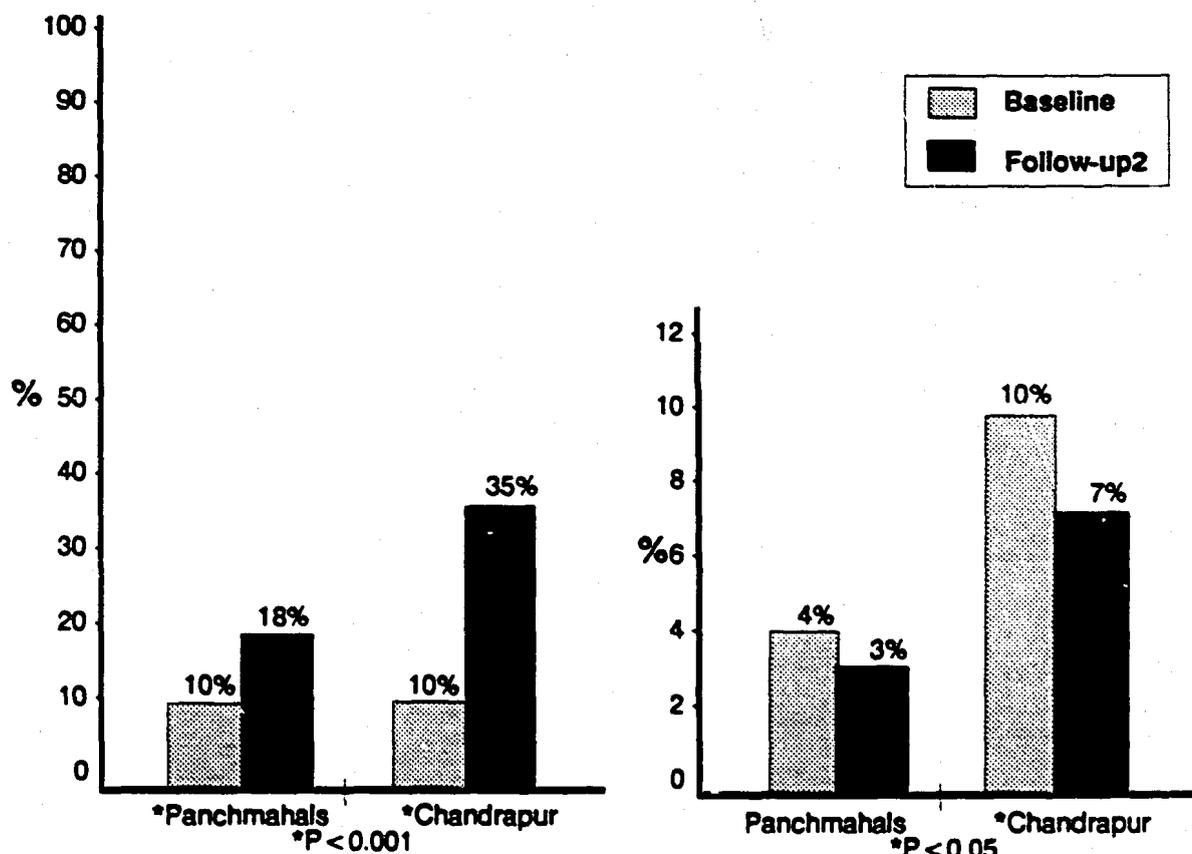
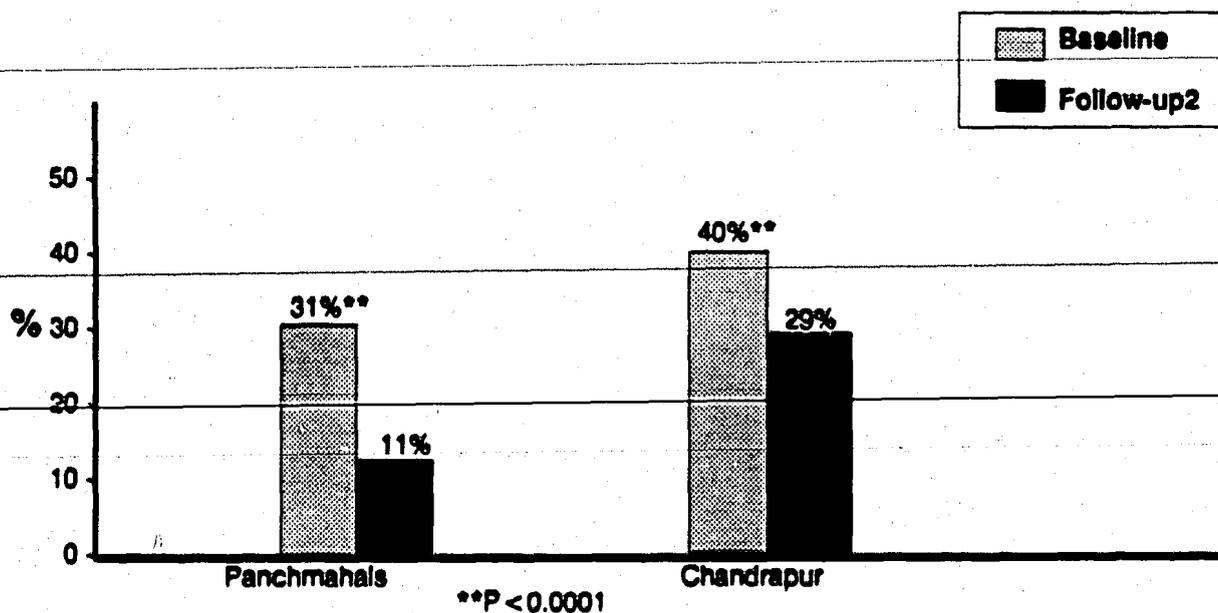
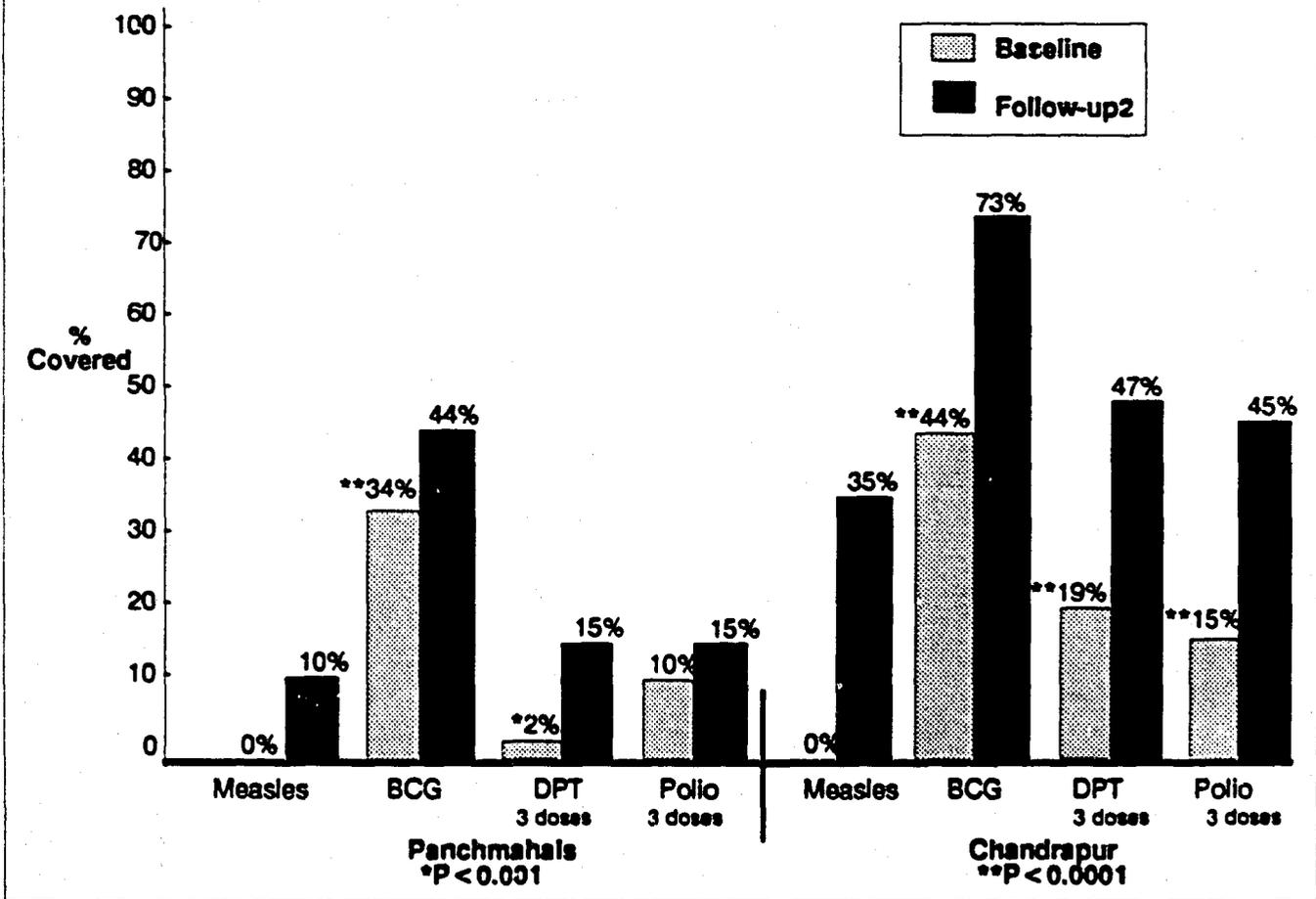


Figure 3. Pallor Signs in Children



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Figure 4. Immunization Coverage of 12-23 Months Old Children

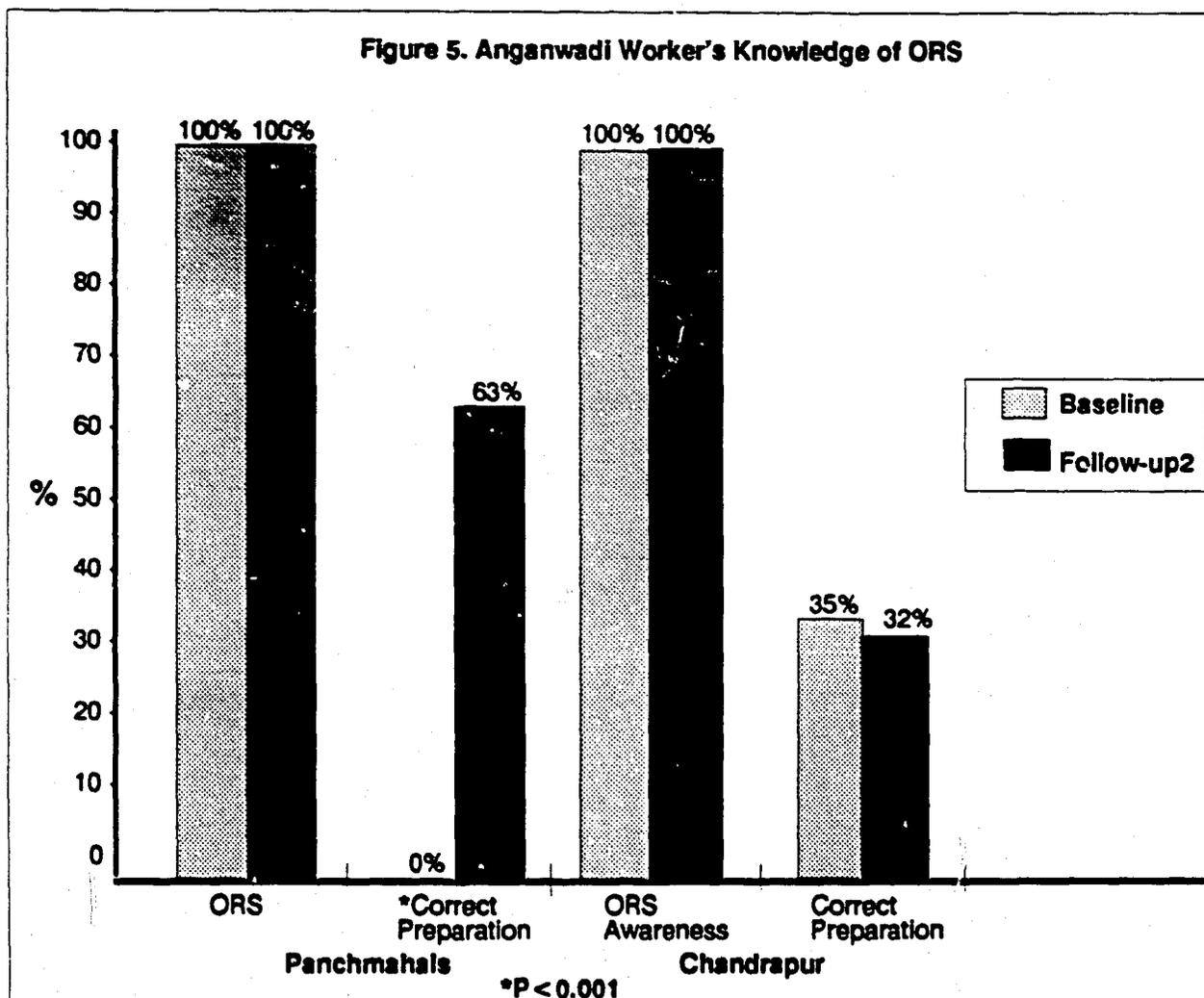


of both pregnant and nursing women and children to iron/folic acid supplements when distributed by the anganwadi worker, instead of the ANM. No data on receipt of iron/folic acid supplements by children were collected. However, there was an increase in the coverage of women with the supplements, which will be discussed later.

Immunization Coverage

The Universal Immunization Programme of the government of India was introduced in Panchmahals district in 1985/86 and in Chandrapur district in 1986/87. This largely explains the substantial improvement in the percentage of fully immunized children (by parent's recall for children 12-23 months of age) between baseline and follow-up in both districts (Figure 4). However, since the majority of children still were not fully immunized at F2, this component needs to be stepped up if the goal of universal immunization coverage is to be attained.

Figure 5. Anganwadi Worker's Knowledge of ORS

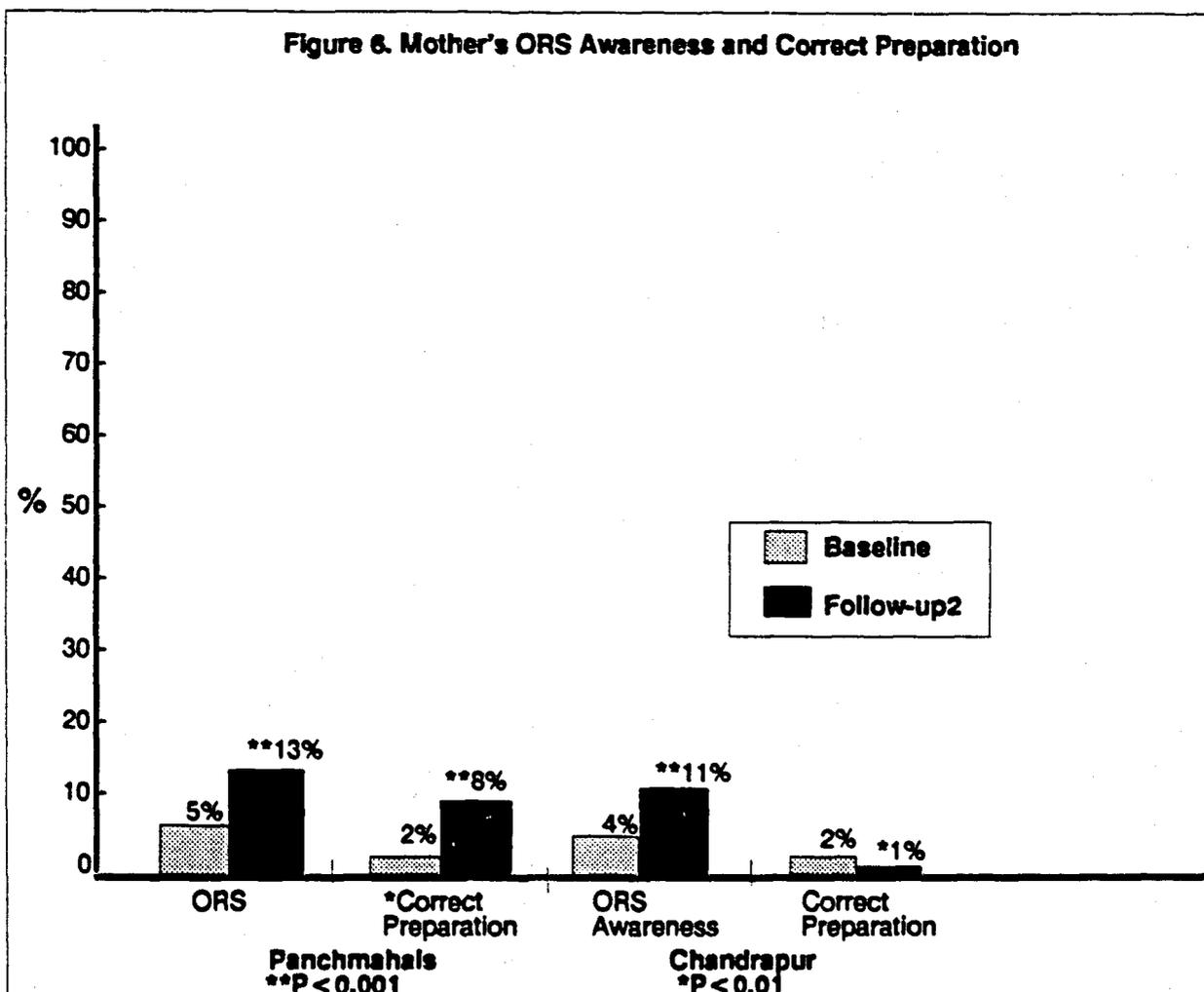


Knowledge of Oral Rehydration Therapy (ORT)

The Ministry of Health and Family Welfare's program for management of diarrheal diseases includes the distribution of oral rehydration salts in packets for severe cases and the promotion of home-made, sugar-salt solution to prevent dehydration. Between B and F2, CARE conducted a special educational campaign under a USAID grant to promote ORT in Panchmahals district but not in Chandrapur. Subsequently, all anganwadi workers nationally received a measuring cup and spoon in their first aid kit for making sugar-salt solution, which was modeled after the one used in the CARE campaign and provided by the Ministry of Human Resource Development. The percent of mothers who had received oral rehydration packets rose sharply from 4% at baseline in both districts to 25% at follow-up in Panchmahals and 16% in Chandrapur.

The positive impact of the CARE campaign can be seen in Figure 5. Although all anganwadi workers in both districts were aware of ORT at baseline, the proportion who could correctly make sugar-salt solution rose from none at baseline to 63% in Panchmahals, whereas there was no improvement in Chandrapur. However, Figure 6 shows that despite the anganwadi

Figure 6. Mother's ORS Awareness and Correct Preparation



worker's awareness of ORT, only a few mothers at F2 spontaneously mentioned sugar-salt solution as something they would use if their child had diarrhea (13% in Panchmahals and 11% in Chandrapur) and even fewer mothers could make the solution correctly. Probably due to the CARE campaign, eight times more mothers in Panchmahals than in Chandrapur could make sugar-salt solution correctly, but the percentages remained very low even in Panchmahals. One campaign is obviously not sufficient to achieve the behavioral changes necessary to get mothers to use ORT and make the solution correctly. Repeated training and reinforcement are required. Provision of the same measuring cup and spoon to the mothers which the anganwadi worker possesses would probably greatly facilitate correct preparation.

Nutrition and Health Education

While nutrition and health education (NHED) for mothers is part of the ICDS package of services, it is one of the weaker components. For this reason the USAID assisted ICDS project includes enhanced nutrition and health education, based on a social marketing approach. However, the improved NHED component had not been introduced at the time of the follow-up

survey. Therefore there was no significant change in mothers' attendance at nutrition and health education classes or mothers' knowledge, attitudes and practices over baseline.

Home Visits and Health Check-ups for Malnourished Children under Three Years

Figure 7 illustrates the very encouraging rise in the percent of malnourished children under three years of age who had received a home visit by the anganwadi worker in the past three months at F2 in both districts. Such visits are essential to assure the attendance of this priority group at the anganwadi and to monitor weight gain during recuperation from malnutrition.

Figure 8 shows that there was also a doubling of the percentage of malnourished under threes who had received a health check-up by the ANM or other health staff at F2 versus B. Health check-ups are critical since malnourished children often have other underlying medical problems which need treatment.

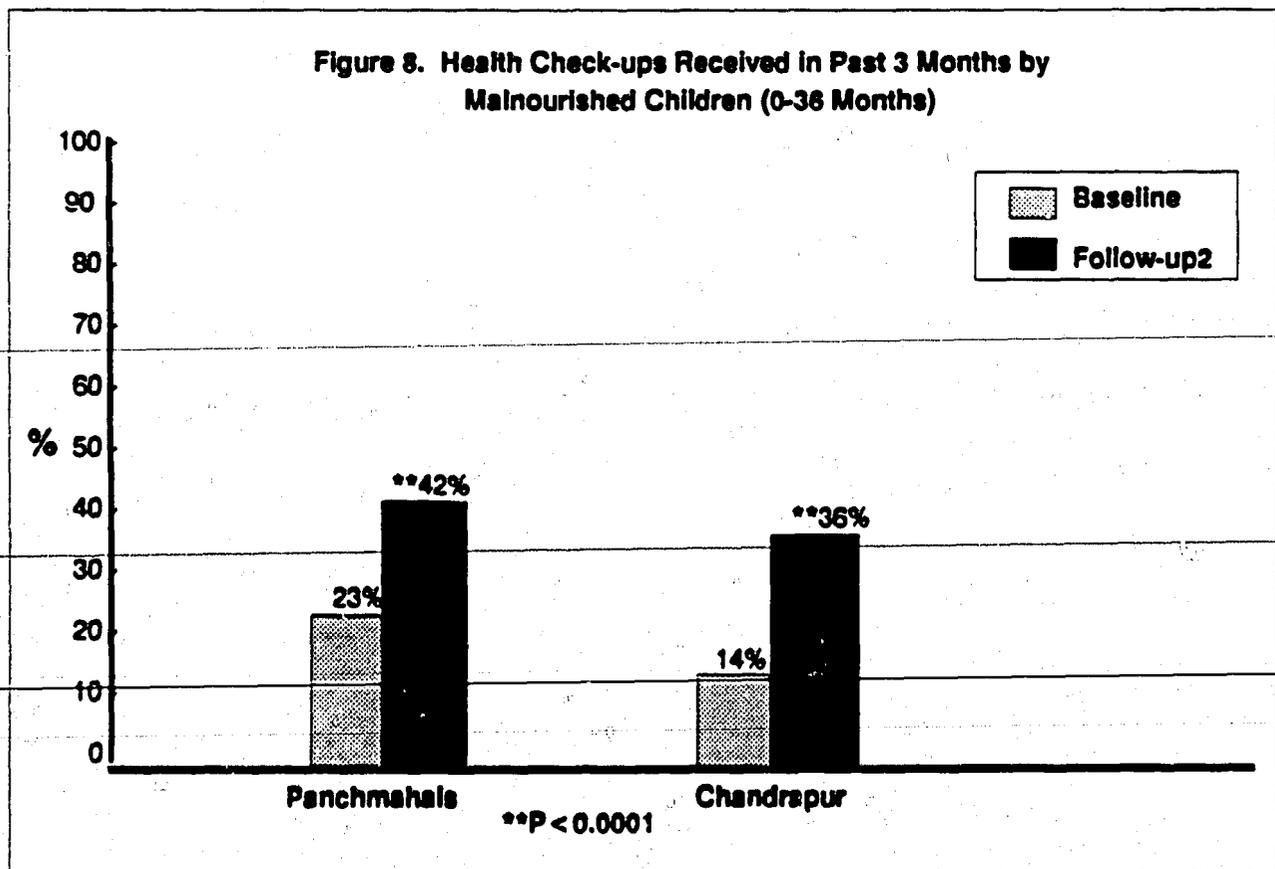
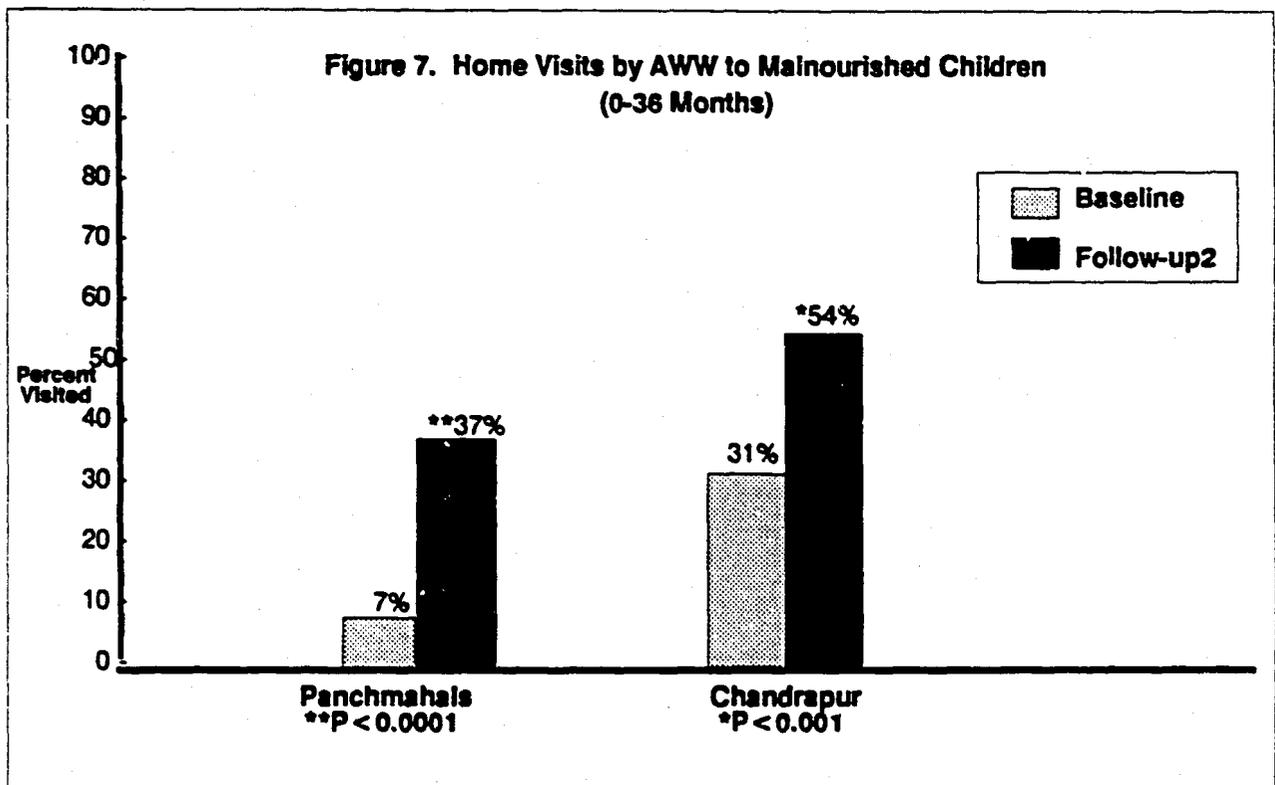
Improvement in Health and Nutrition Services for Pregnant and Nursing Women

Anemia Prophylaxis

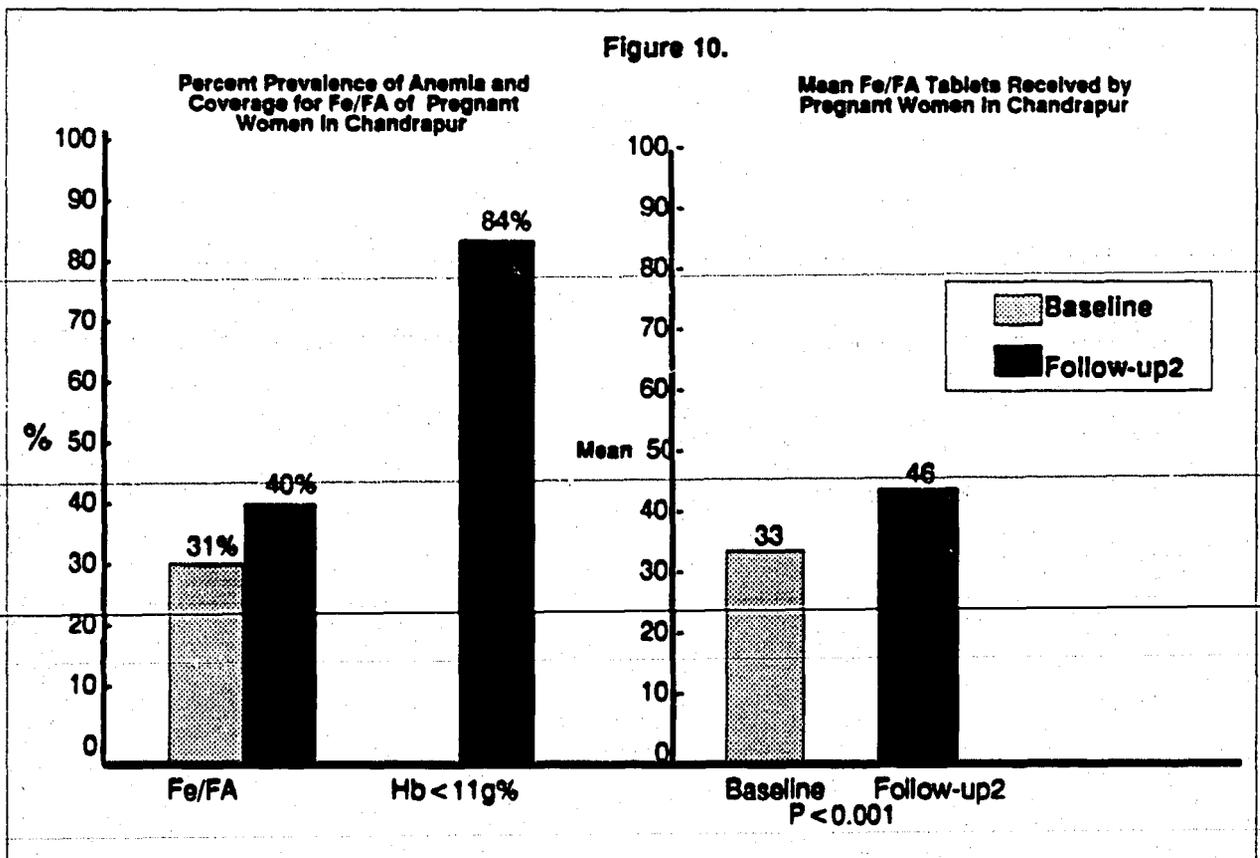
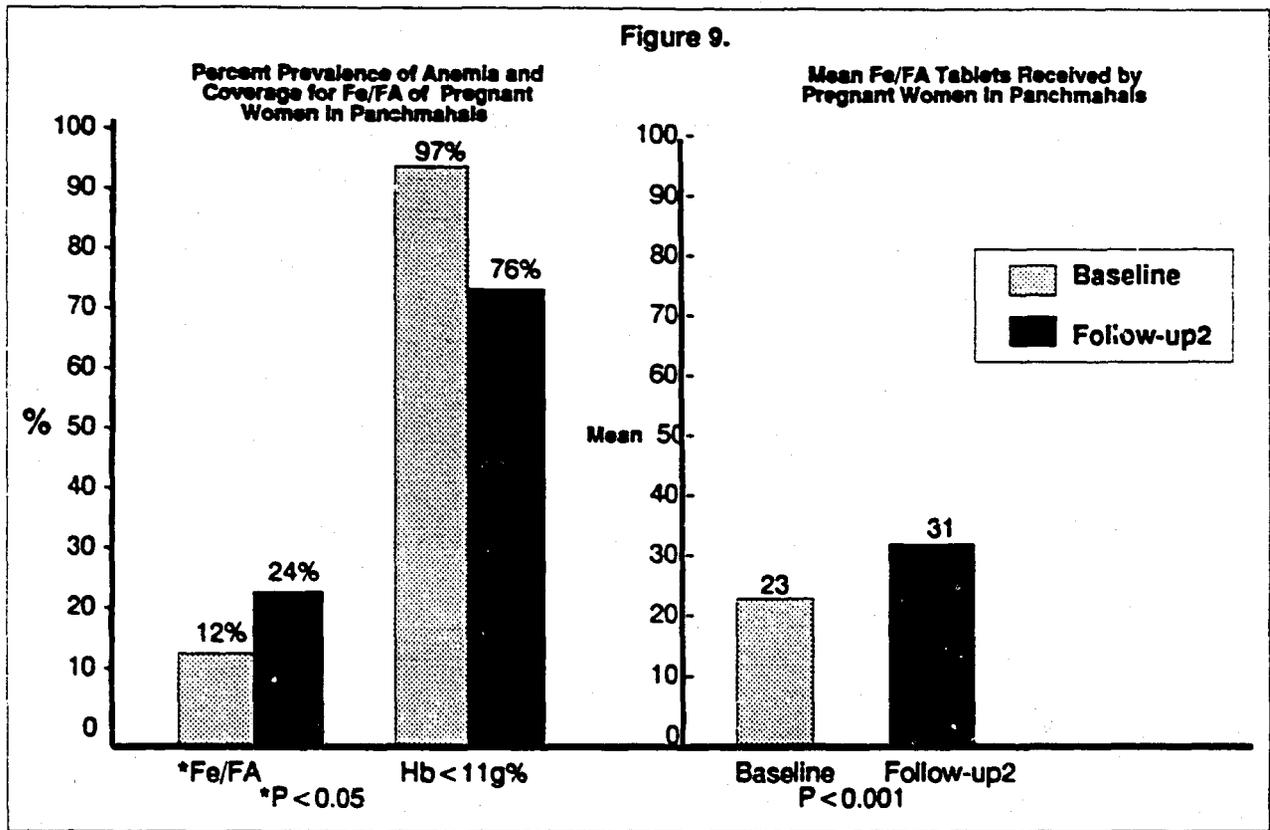
As mentioned earlier, there was a substantial increase in the percentage of pregnant women who received iron/folic acid supplements between B and F2 (Figures 9 and 10). The improved coverage was reflected both in the greater number of women who received tablets and in the increased average number of tablets received by each woman. As a result of the improved distribution of iron/folic acid supplements at F2, there were fewer pregnant women with anemia as measured by hemoglobin less than 11 g/dl. For nursing women, as well, the percentage who received iron/folic acid supplements nearly doubled between B and F2 from 22% to 37% in Panchmahals, and from 41% to 72% in Chandrapur, with a corresponding increase in the average number of tablets received. Though the progress in the anemia prophylaxis component of ICDS is commendable, still most pregnant women were not receiving iron/folic acid tablets and more than three-fourths of them remained anemic. Given the risks which anemia poses for mother and infant, iron/folic acid supplementation needs more emphasis so that supply and distribution problems can be overcome and all pregnant and nursing women protected.

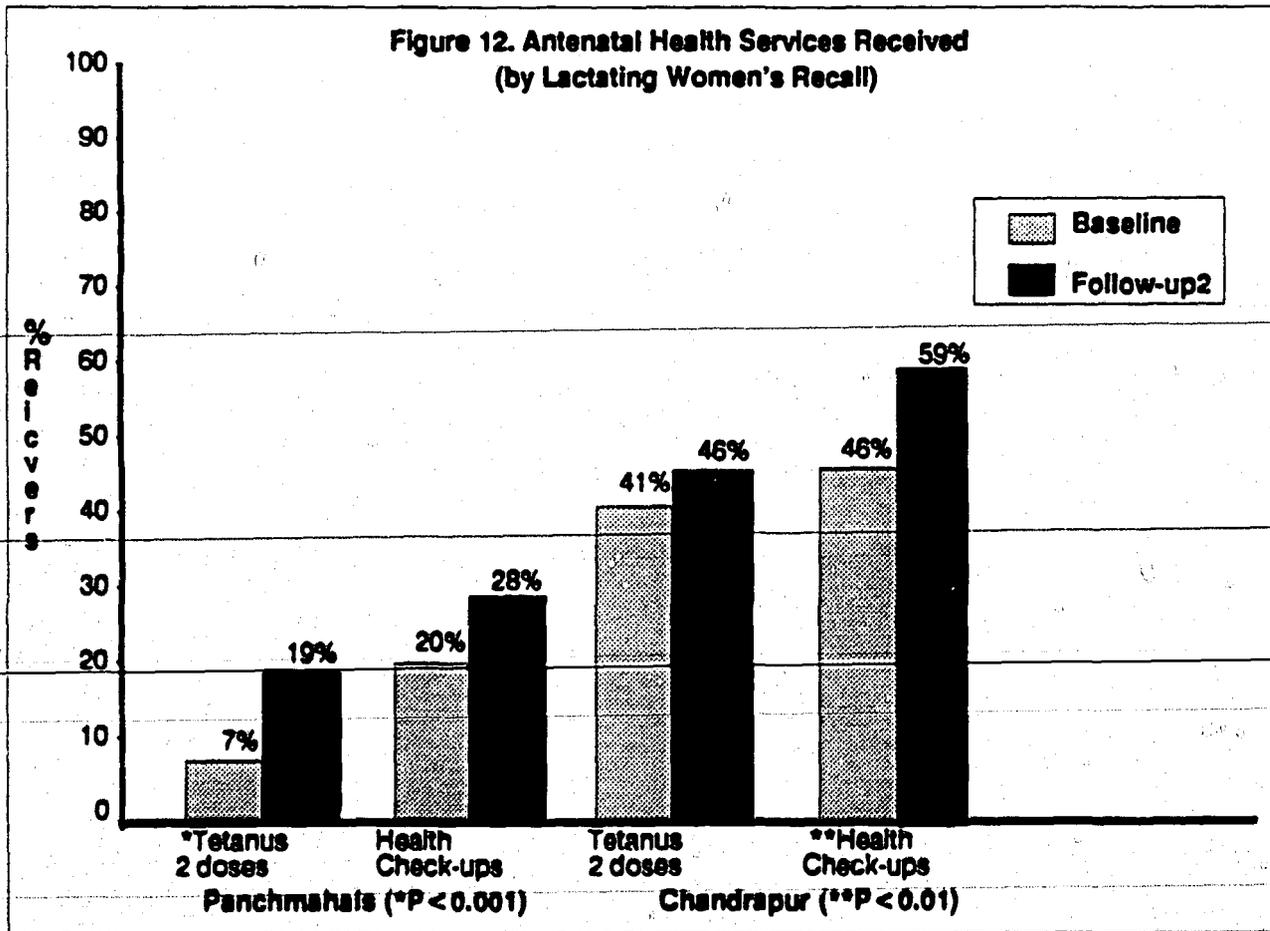
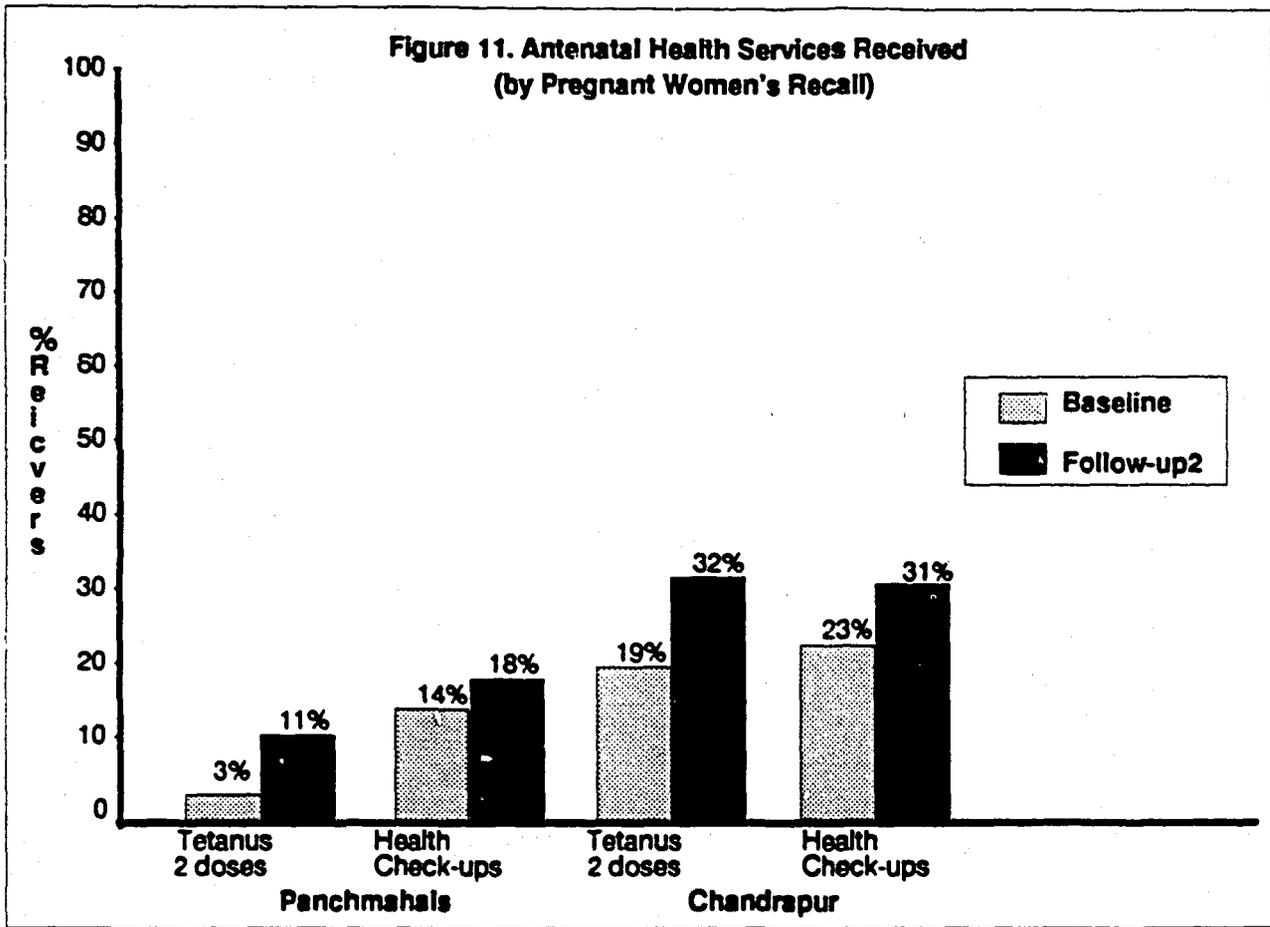
Antenatal Health Services and Tetanus Immunization

There were improvements in the provision of tetanus toxoid immunization and antenatal health check-ups to pregnant women as seen in Figure 11 by pregnant women's recall and in Figure 12 by lactating women's recall. Nevertheless most women still were not receiving these essential prenatal health services.



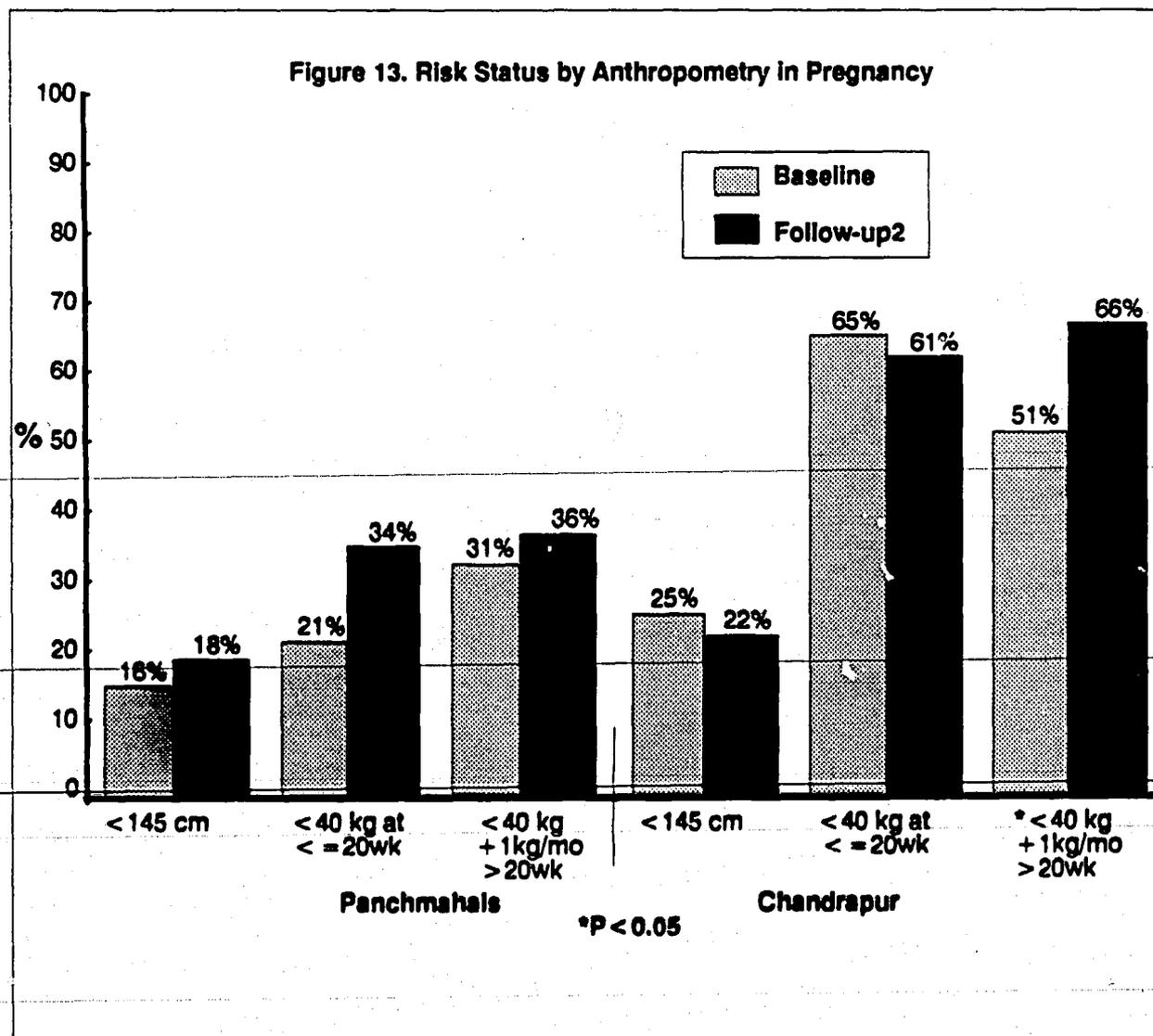
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Risk Status of Pregnant Women by Weight and Height

The ICDS program uses well established risk factors to identify women who are more likely to deliver low birth weight babies, and attempts to enroll as many of these high risk women as possible for antenatal services. There was little change in the proportion of pregnant women at-risk between B and F2. Nearly all pregnant women had one or more of the risk factors (79% in Panchmahals and 84% in Chandrapur at F2). Three of the risk factors pertain to maternal weight and height; the prevalence of women affected by these is shown in Figure 13. In Chandrapur, there was a significant increase at F2 in the percentage of women with inadequate weight gain after 20 weeks of pregnancy, which is disturbing. In general, more women were underweight in Chandrapur than in Panchmahals. However, when all nutrition risk factors are considered, there is an acute need for prenatal maternal dietary supplementation in both districts in order to prevent low birth weight.



Visits to Anganwadi by the Mukhya Sevika (Supervisor) and Auxiliary Nurse Midwife (ANM)

Essential support services to the village based anganwadi worker include regular visits by her supervisor--the Mukhya Sevika (MS). Supervisors are expected to visit each anganwadi in their circle once a month. However, this is difficult and seldom achieved given the fact that each MS is normally responsible for 17 anganwadis in tribal areas, and the distances to be covered by her on foot or by bus are very long. As a possible solution to the problem of infrequent supervisory visits, the USAID project has experimented with reducing the supervisor to anganwadi worker ratio to 1:10 in Panchmahals district, but not in Chandrapur. The results of the experiment as seen in Figure 14 are striking. As a consequence of doubling the number of supervisors in Panchmahals at follow-up, 94% of the anganwadis had received 10 or more visits by the Mukhya Sevika in the past year versus only 44% at baseline. While there was also an improvement in Chandrapur between B and F2 from 4% to 36% of the anganwadis receiving 10 or more visits, it lagged far behind Panchmahals, probably due to the inadequate supervisory ratio.

Delivery of health services to ICDS beneficiaries is contingent on regular visits, preferably weekly, by the Auxiliary Nurse Midwife from the sub-health center. Figure 15 shows no significant improvement between B and F2 in the mean number of ANM visits received by anganwadis in Panchmahals, which averaged approximately one visit per month. However, in Chandrapur, there was an eight-fold increase in mean number of ANM visits from 1 to 8 in the past three months. The reasons for the better performance in Chandrapur are not clear, but one factor which may have contributed was the decision by the Chief Executive Officer of Chandrapur district, between B and F2, to make the ANM's and MS' circle one and the same which has greatly facilitated coordination between the ICDS and health workers.

Supplementary Nutrition Coverage of Priority Groups

The provision of PL 480 Title II food supplements through CARE to women and children in ICDS is referred to as supplementary nutrition which is synonymous with supplementary feeding. On the positive side, at follow-up, food was available at the anganwadis for an average of 93% of the feeding days in the past three months in Panchmahals and 96% in Chandrapur. This was a major improvement over the early years of the project when the supply of food to the anganwadis was irregular, particularly in Chandrapur. The USAID Project Paper had set a target of a food Supply Efficiency Ratio of 90% or more, which had been achieved. One problem noted at F2, in Panchmahals only, was that double rations were not being given to severely malnourished children and pregnant and nursing women, as intended.

Figure 14. MS Visits at Anganwadi in Past One Year
 (Percent of anganwadis receiving 10 or more visits)

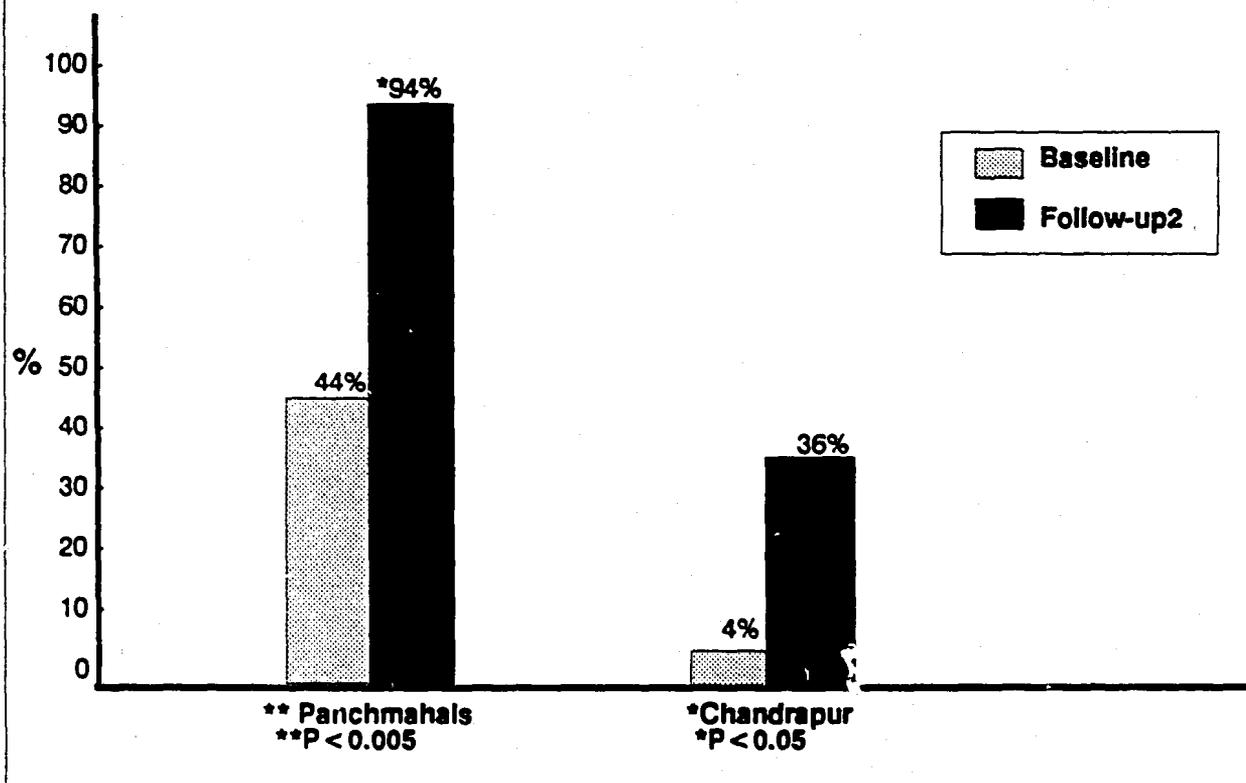
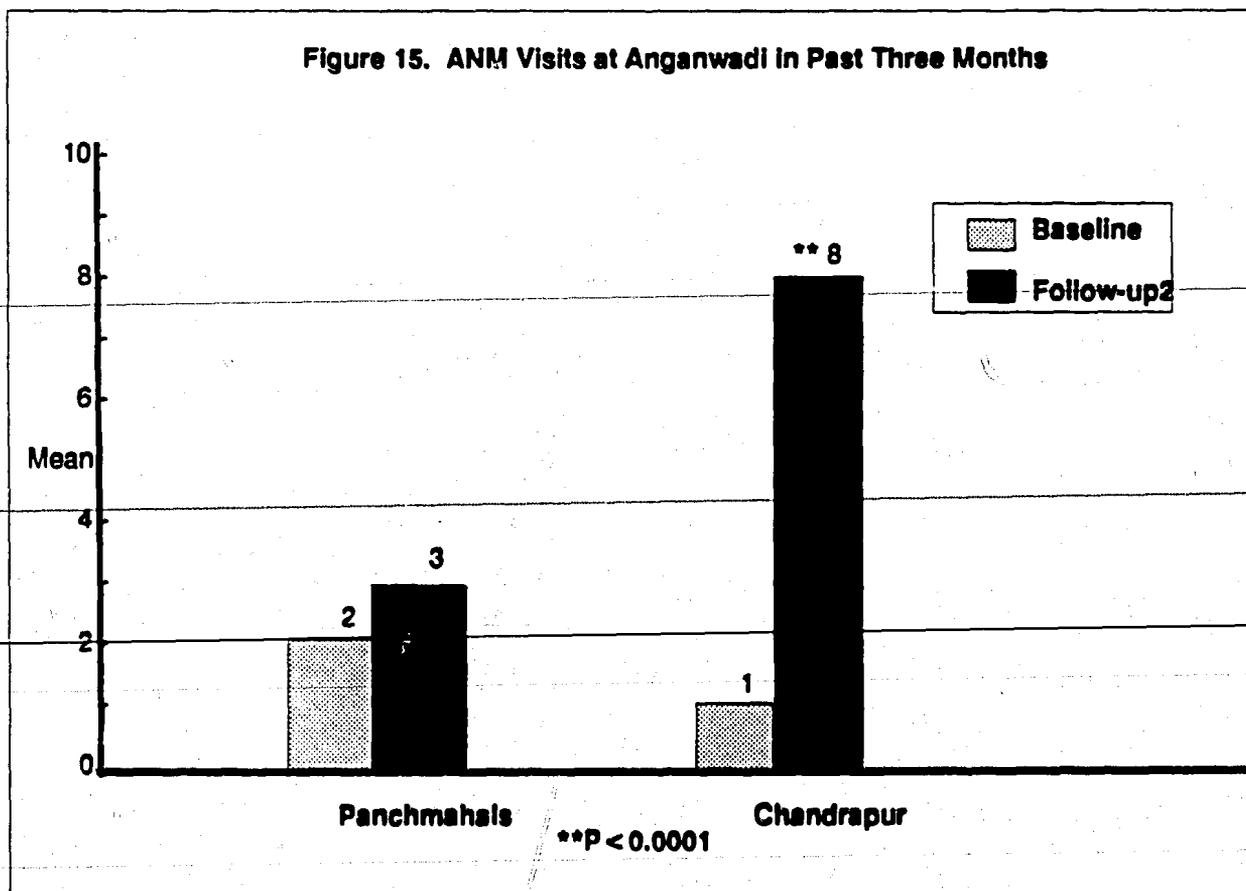
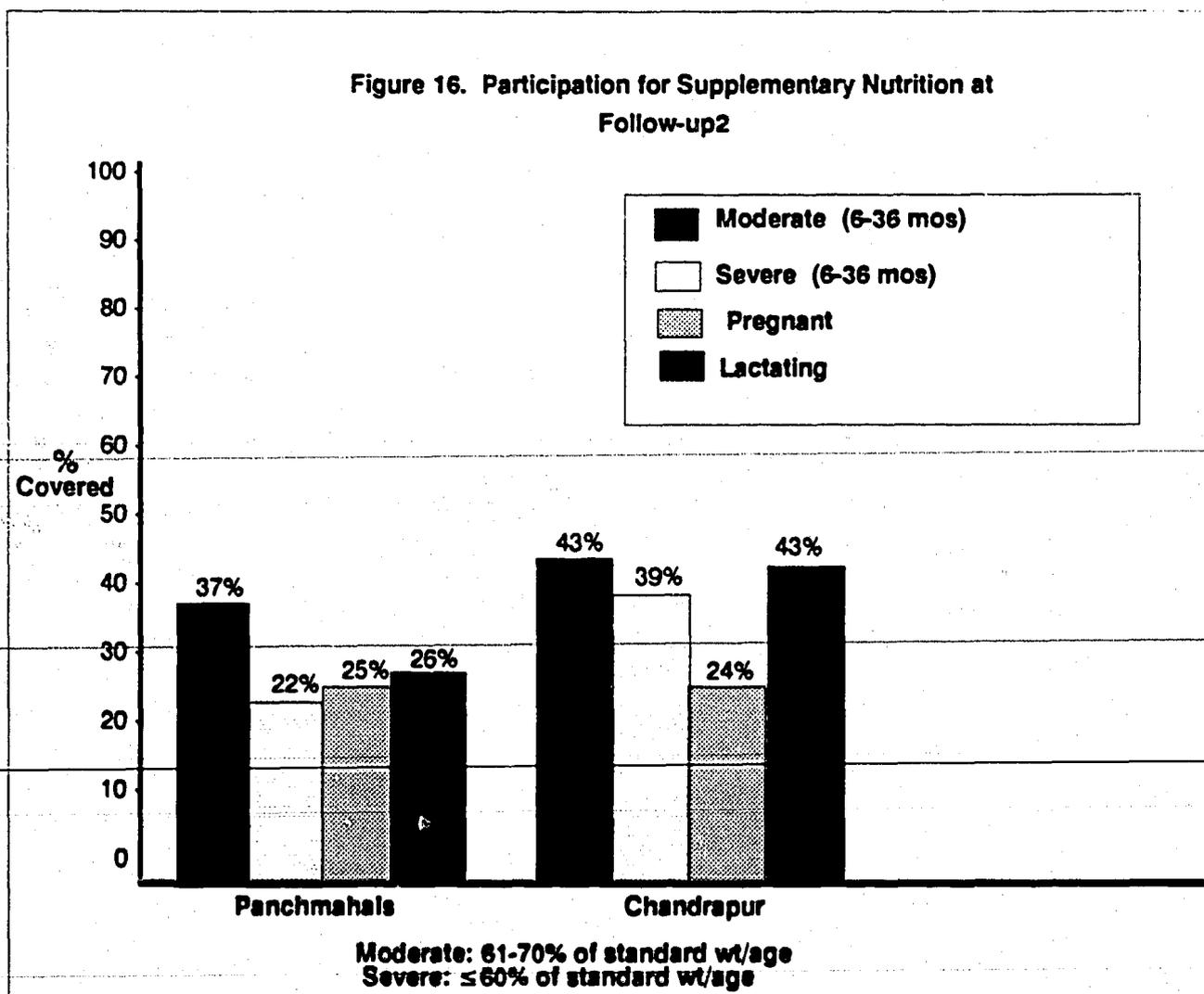


Figure 15. ANM Visits at Anganwadi in Past Three Months



It is evident that if the USAID assisted ICDS Project's sub-goal of reducing malnutrition in children under three years of age is to be met, then near universal supplementary nutrition coverage of moderately and severely malnourished children from 6-36 months of age and pregnant and nursing women (up to 6 months after delivery) will first have to be achieved. With this objective in mind, USAID and the government of India fixed a target of 85% supplementary nutrition coverage of these priority groups to be reached in the USAID assisted ICDS Project.

Figure 16 illustrates that the 85% supplementary nutrition coverage target was far from being fulfilled at F2 for either malnourished children under three years or pregnant and lactating women. Baseline data are not presented because there was no supplementary feeding at baseline in Chandrapur. However, in Panchmahals, the percentage of each of the priority groups covered at follow-up was essentially the same as at baseline. Most children who received food at the anganwadi had attended for 15 or more days in the past month, so the problem was more due to lack of enrollment of the right groups than due to irregular attendance once enrolled.



It is well known that these priority groups are the most difficult to reach and that supplementary nutrition coverage in ICDS improves with age of the preschool child, with children from 3 - 6 years of age being the predominant group in attendance. This relationship between age of the child and supplementary nutrition coverage is clearly displayed in Figures 17 and 18. These two figures also show the proportion of the supplementary nutrition beneficiaries in each age group who are moderately or severely malnourished (grades 2, 3 or 4 by weight for age) versus those who are not. It is apparent that there was no priority given in either district to targeting the food resource to malnourished children.

If a decision were made to pursue in earnest the 85% coverage target for malnourished children under three years of age and pregnant and nursing women, it could only be achieved with existing food resources by removing some of the well-nourished children from the program, particularly those over three years who are least nutritionally vulnerable. Table 2 presents the number and percent of children fed per anganwadi at F2 in the various age and nutritional status categories relative to the total number in the village. It can be seen that 45% of all preschool children and pregnant and lactating women were being supplemented in Panchmahals and 60% in Chandrapur at F2.

BENEFIC'ARY CATEGORY	PANCHMAHALS			CHANDRAPUR		
	No. Fed	Percent	Total No.	No. Fed	Percent	Total No.
Malnourished Children**						
Children 0-36 mos.	7	32	22	7	44	16
Children 37-72 mos.	10	53	19	13	76	17
Not Malnourished Children						
Children 0-36 mos.	11	44	25	8	44	18
Children 37-72 mos.	20	65	31	24	92	26
Pregnant Women	2	20	10	1	11	9
Nursing Women	3	30	10	4	44	9
TOTAL	53	45	117	57	60	95
* USAID Project Target = 85% coverage of all malnourished children 6-36 mos. of age, and pregnant or nursing women.						
** Malnourished = Grades 2, 3 or 4 or weight for age < 71% of reference median.						

Figure 17. Agewise the Coverage of Children for Supplementary Feeding at Follow-up2 in Panchmahals

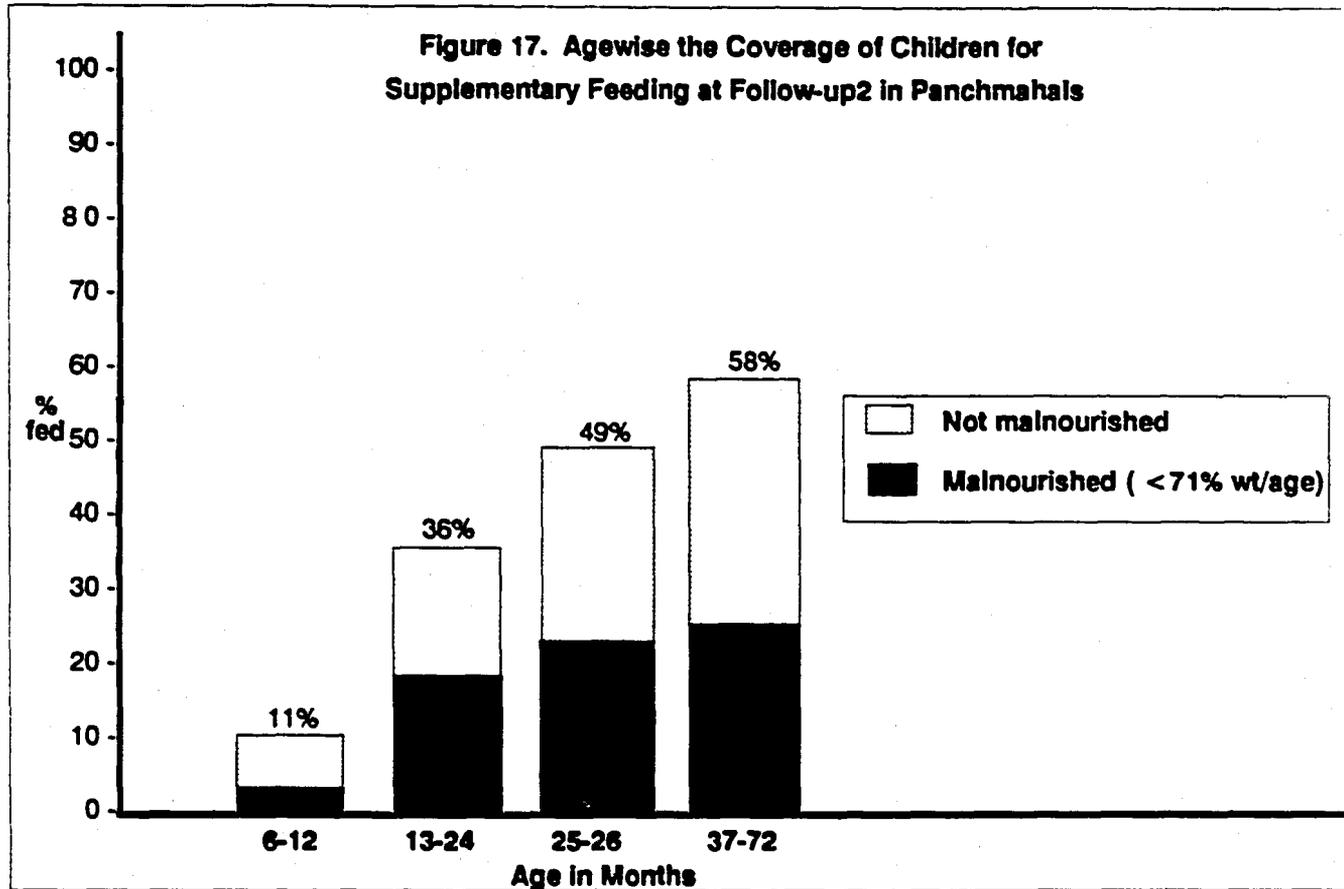
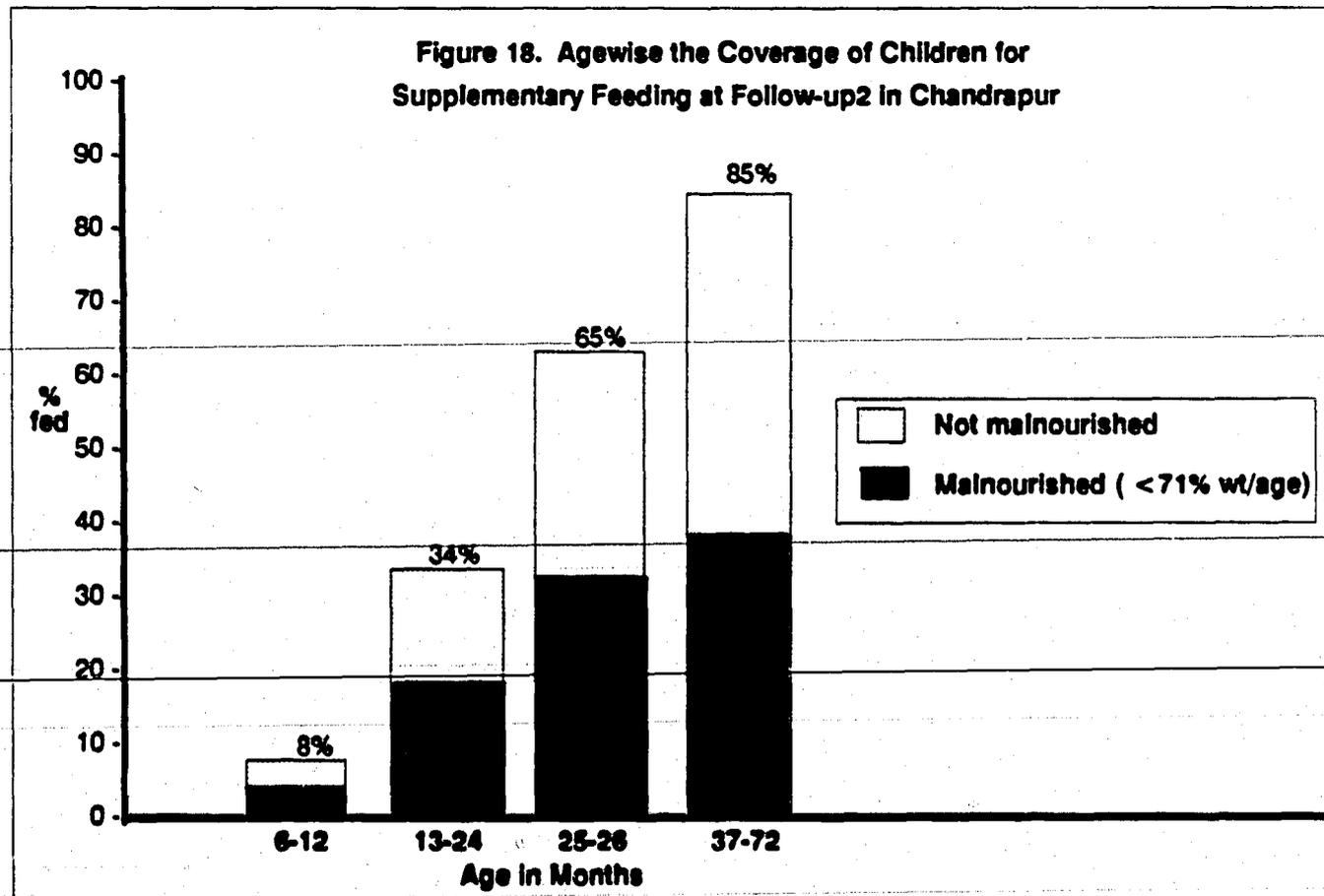


Figure 18. Agewise the Coverage of Children for Supplementary Feeding at Follow-up2 in Chandrapur



The highest percent supplementary feeding coverage relative to the total number in that category in the village was for not malnourished children 37-72 months of age, 65% of whom were receiving food in Panchmahals and 92% of whom were receiving food in Chandrapur. The least covered were the priority groups of pregnant women, nursing women and malnourished children under three years, in that order.

Some innovative approaches will be required to overcome the difficulties of reaching very young children and women, most importantly a shift to a more convenient, weekly, take-home distribution for these groups instead of the daily, on-site approach now in place. Serious consideration should be given to the proposal to reduce the preschool component of ICDS to five days per week instead of six and to use the sixth day for delivery of MCH services and take-home food distribution to pregnant and nursing women and mothers of children under three years of age.

Certain socio-economic characteristics were significantly associated with supplementary nutrition participation by children under three years of age. Among participants, there were fewer landless families and more agricultural laborers in both districts. In Panchmahals, participating families tended to have better quality housing, whereas in Chandrapur the reverse was true. In Chandrapur, a greater proportion of mothers of the supplemented children were illiterate and gainfully employed, and fewer of the supplemented children had short birth intervals (24 months). In Panchmahals, there was a higher percentage of scheduled caste and a lower percentage of scheduled tribe children among participants versus non-participants. However, in Chandrapur, there was a lower representation of scheduled caste children in the supplemented group and more tribals and other castes participated. In general, it appears that the supplementary nutrition component was reaching poorer families, since the per capita income of the participants was lower than that of the non-participants in both districts.

There was an obvious convergence between participation of children 6 - 36 months of age in supplementary nutrition and receipt of other ICDS health and nutrition services. Children who received supplementary nutrition were much more likely to receive an integrated package with other beneficial services. Whereas the children left out for supplementary nutrition were neglected for other health and nutrition services as well. This is not surprising since supplemented children, who come to the anganwadi daily to eat, are a captive audience for conveniently delivering other services at the same time. Furthermore, it is probable that the food supplement serves as an attractive incentive to families to participate for other services.

In both districts, a greater proportion of the children who received supplementary nutrition had also received vitamin A supplements, health check-ups, oral rehydration packets and home

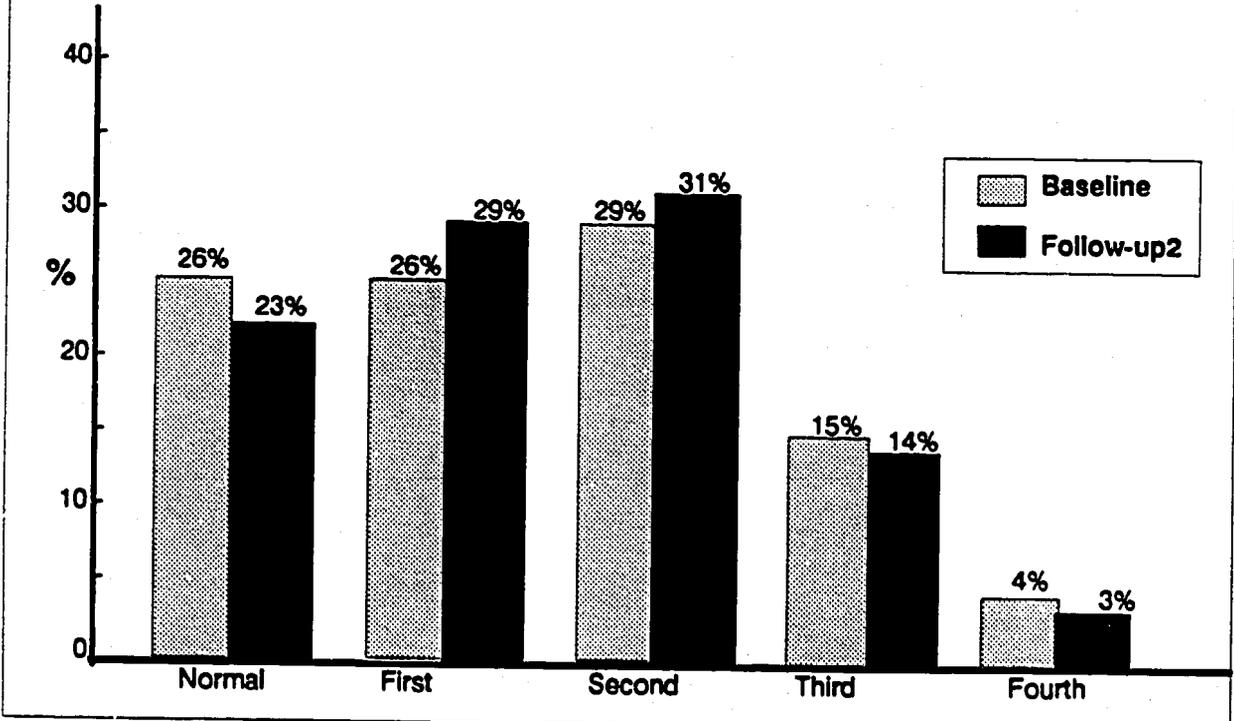
visits by the anganwadi worker. More of the supplemented children also had growth charts which were up to date and accurate, and the number of nutrition and health education classes attended by their mothers was also significantly greater compared to the not supplemented group. The immunization coverage of supplemented children was significantly better in Panchmahals, though in Chandrapur this improved coverage of supplemented children was observed only for BCG. The difference in the relationship between supplementary feeding and immunization in the two districts may be attributable to a conscious decision by district officials in Panchmahals to make the anganwadi the focal point for the Universal Immunization Programme.

Impact of ICDS and Drought on Nutritional Status of Children

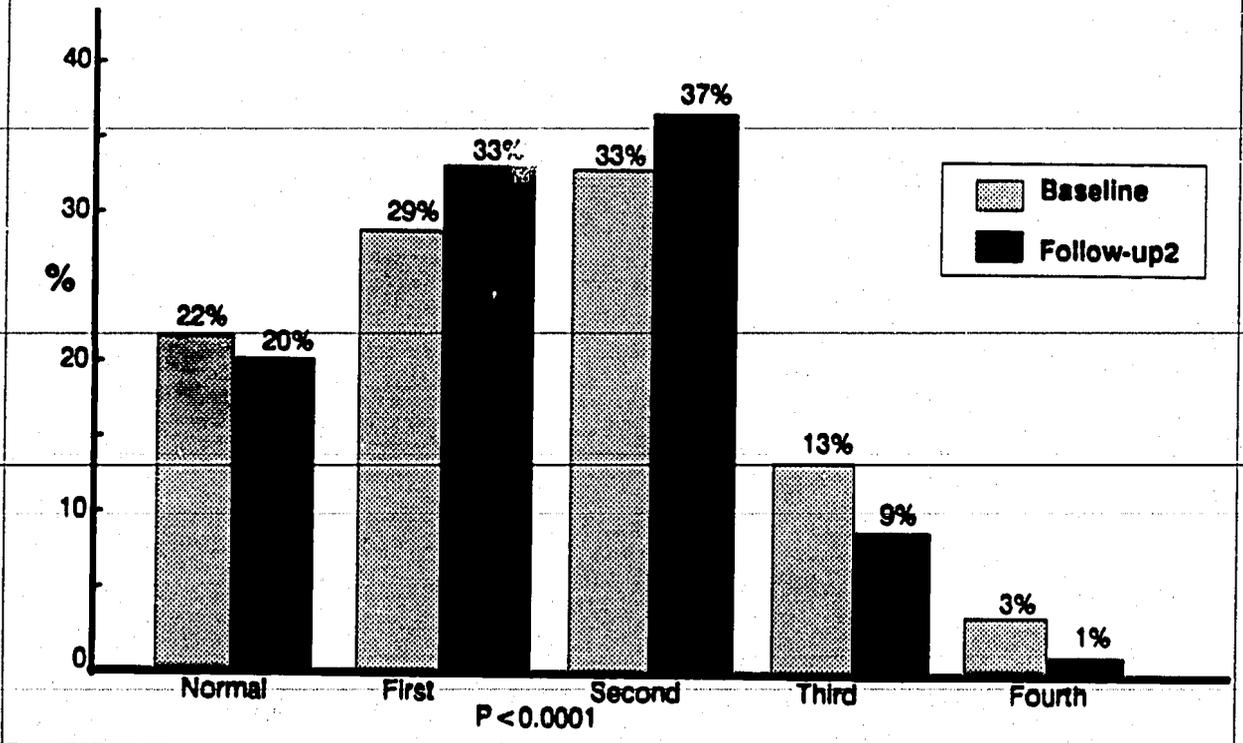
The USAID assisted ICDS Project has as its sub-goal "an average reduction of 50% in the prevalence of severe malnutrition (defined as <61% of reference median weight for age or grades 3 and 4) in children 0-36 months of age, and of 35% in severe plus moderate malnutrition (defined as <71% of reference median weight for age or grades 2, 3 and 4) in communities within four years after an anganwadi is established." The overall goal of the project, or broader objective to which the services are expected to contribute, is a reduction in mortality of infants (<12 months) and children 12-36 months. Although information was collected in the evaluation surveys on parent's recall of deaths of children under three years of age during the past year, the impact of the project on mortality cannot be accurately assessed from these data because: 1) there are many other factors which contribute to child survival beyond the ICDS services and attribution of impact is difficult, 2) an accurate vital events registration system which is essential for recording all births and deaths is non-existent in the project villages, and 3) due to the rareness of infant deaths, a much larger sample than covered by the evaluation surveys is required to reliably assess the statistical significance of changes in rates. Therefore, by design, the primary impact indicator of the USAID assisted ICDS Project is improvement in nutritional status of children which was quoted in the sub-goal above.

Figures 19 and 20 compare the nutritional status by weight for age of children from 0 - 36 months of age between B and F2 according to the Indian Academy of Pediatrics (IAP) classification. Severe malnutrition (third and fourth grades) declined by only 5% in Panchmahals during the three year period. This lower than expected change is probably due to the negative nutritional consequences of the drought, which reduced agricultural income and increased food prices and scarcity during the same time period. It is very likely that due to ICDS there was actually a slight decline in severe malnutrition and not the increase expected after three years of continuous, severe drought. By contrast, in Chandrapur, which was less affected by the drought, severe malnutrition was reduced by 37% over the three year period which statistically was a very

**Figure 19. Nutritional Status of Children (0-36 Months)
In Panchmahals IAP Classification**



**Figure 20. Nutritional Status of Children (0-36 Months)
In Chandrapur IAP Classification**



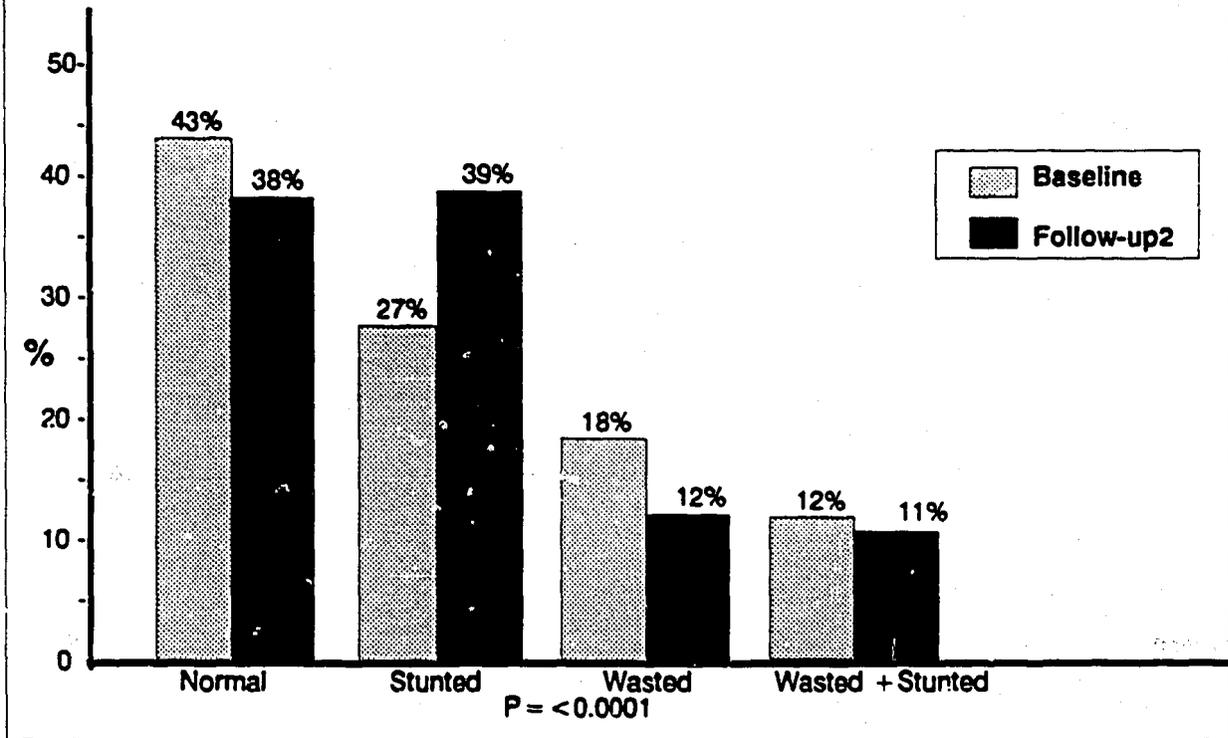
significant improvement. When moderate and severe malnutrition (second, third and fourth grades) are viewed together there was no significant change over the three years in either district. However, there was a disturbing decline in the percent of children in the normal category in both districts which may be attributed to drought.

Since some blocks within Panchmahals were worse affected by drought (i.e. Dahod and Jhalod) than others (i.e. Jambhugoda and Halol), it is useful to review the changes in nutritional status blockwise. When this is done for the hardest hit blocks, it is seen that severe malnutrition actually increased by 16% in Jhalod but declined by 9% in Dahod. In contrast, in the better off blocks, severe malnutrition was reduced by 46% in Jambhugoda and by 36% in Halol, which is likely attributable to the ICDS project. In Chandrapur, severe malnutrition was greatly reduced in all five blocks surveyed with the decline ranging from 31% to 49%, probably because the less severe drought situation was not able to negate the impact of ICDS.

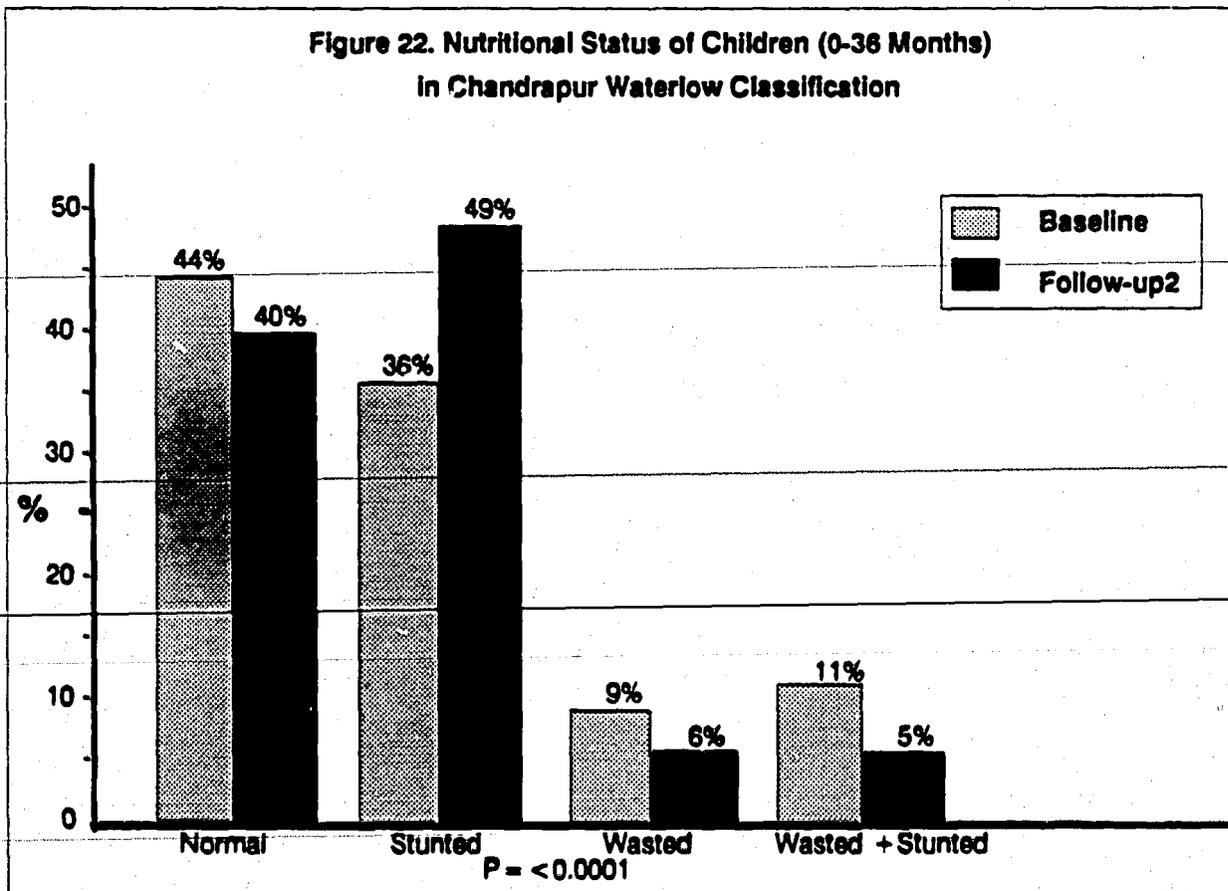
Nutritional status can also be looked at in terms of chronic malnutrition (low height for age or stunting) and current acute malnutrition (low weight for height or wasting) using the Waterlow classification as shown in Figures 21 and 22. The relevant definitions are: 1) normal is weight for height $\geq 80\%$ of reference median and height for age $\geq 90\%$ of reference median, 2) stunted is weight for height $\geq 80\%$ of reference median and height for age $< 90\%$ of reference median, 3) wasted is weight for height $< 80\%$ of reference median and height for age $\geq 90\%$ of reference median, and 4) wasted and stunted is weight for height $< 80\%$ of reference median and height for age $< 90\%$ of reference median.

The drought seems to have taken the biggest toll on children's height, with the rates of stunting having increased significantly in every block in both districts during the three year period. As depicted in Figures 21 and 22 there was an overall 44% increase in children in the stunted category in Panchmahals and a 36% increase in Chandrapur. This negative impact on linear growth is most likely the result of a decline in the quantity and quality of protein rich foods consumed during the drought, such as milk and pulses, which the ICDS supplementary nutrition component could not combat. Milk became scarce because of lack of fodder and water for dairy cattle, and the price of pulses, which are expensive relative to cereals even in normal times, soared. Food relief provided by the government was primarily cereals. The shift toward greater consumption of cereals and millets and reduced intake of milk and pulses during the drought has been documented by the National Institute of Nutrition in a 1987 study in five states including Gujarat. As seen in Figures 21 and 22, there was a decline in wasting or current acute malnutrition in both districts between B and F2, but since the achievement of proportional weight for height in the children was a corollary to the concurrent shortening of stature, it should not necessarily be seen as a favorable outcome.

**Figure 21. Nutritional Status of Children (0-36 Months)
In Panchmahals Waterlow Classification**



**Figure 22. Nutritional Status of Children (0-36 Months)
In Chandrapur Waterlow Classification**



Conclusions and Recommendations

- 1. The impact of services must be viewed against the backdrop of severe and continuous drought during the three years between B and F2 in Panchmahals, and less severe drought in 1987 in Chandrapur.
- 2. There were very impressive improvements in delivery of essential health and nutrition services, such as immunization, health check-ups, vitamin A and iron/folic acid supplementation and growth monitoring between B and F2. However, receipt of these services is still far from universal and more effort should be invested to solve any remaining obstacles in order to increase coverage.
- 3. Despite some improvement between B and F2, the coverage for all the antenatal services including maternal dietary supplementation, provision of iron/folic acid tablets, tetanus toxoid immunization and health check-ups remained very low. Nearly all women were found to be at high risk of delivering low birth weight babies. This component needs much more attention in order to improve maternal nutritional status and to prevent low birth weight with its sequelae of high mortality and lasting growth retardation.
- 4. Mothers and anganwadi workers need more training in the correct preparation of oral rehydration solution.
- 5. There was no increase between B and F2 in the supplementary nutrition coverage of malnourished children 6-36 months of age and pregnant and nursing women. The USAID project's explicit target of 85% coverage of these priority groups was far from being achieved. Therefore, it is doubtful that the project's sub-goal of reducing malnutrition can be met unless an all out effort is made to increase participation of these priority groups. This will require a change of the food delivery system to a more convenient, take-home approach plus other innovative strategies.
- 6. The enhanced nutrition and health education component must get started in the anganwadis immediately, if any positive change in mothers' nutrition knowledge, attitudes and practices is to be measurable by the end of the USAID assistance.
- 7. All services, not subject to the negative consequences of the drought, showed a major increase in coverage and a positive outcome between B and F2, and severe malnutrition was reduced substantially despite the drought. Therefore, assuming two years of post-drought recovery, it is probable that a greater improvement in nutritional status,

including a reduction in moderate malnutrition in addition to severe, will be observed in the final evaluation.

- 8. The positive impact of project components introduced after F2, such as mobile in-service training of the workers and enhanced NHED, plus any additional increases in coverage of key services, should also be reflected in greater nutritional status impact by the end of the USAID assistance.
- 9. The USAID assisted ICDS Project serves as a model of an effective, integrated approach to delivering all of the essential child survival interventions, and should be expanded.

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TASK ORDER FOR MARY ANN ANDERSON

COMMUNITY SYSTEMS FOUNDATION
February 3 - March 4, 1989

I. OBJECTIVES

- A. To assist M.S. University of Baroda with preparation of a data analysis plan and report format for the USAID assisted Integrated Child Development Services (ICDS) Project's final impact evaluation.
- B. To provide technical guidance to USAID on ways to apply key findings from already completed analyses of the USAID assisted ICDS evaluation survey data in order to:
 - 1) improve implementation and increase impact of the ongoing ICDS Project, and
 - 2) update the ICDS component of the USAID's child health and development strategy (1986).

II. SPECIFIC TASKS

- A. Read all USAID assisted ICDS impact evaluation survey reports and ancillary research papers written to date.

- B. Assess the usefulness of the available USAID ICDS impact evaluation reports and collect suggestions for the final report by consulting USAID and the Ministry of Human Resource Development.

- C. Work with ICDS evaluation staff at M.S. University, Baroda to review their progress and plans for the final evaluation report, and implementation of suggestions from Anderson's note of May 1988.

- D. Assist the investigators to resolve any problems or uncertainties they have encountered with data collection, cleaning, analysis, interpretation etc.

LIST OF INDIVIDUALS CONTACTED DURING THE CONSULTANCY

Government of India
Ministry of Human Resource Development,
Department of Women & Child Development

Mr. Ashok Sinha, Deputy Secretary (ICDS)
Mr. K.L. Gupta, Under Secretary (CD)

National Institute of Public Cooperation
and Child Development (NIPCCD)

Ms. N.V. Lalitha, Deputy Director (Training)
Ms. Neena Ranjan, Director

USAID

Dr. Roger Rochat, Asst. Director, Office of Health/Population/Nutrition
Mr. Spencer Silberstein, Office Director, Division of Health Services
Mr. Samaresh Sengupta, ICDS Project Officer, Division of Health Services
Dr. Saramma T. Mathai, Public Health Specialist, Division of Health Services
Dr. James Sherry, Office Director, Division of Biomedical Research &
Development
Ms. Jenny Ruducha, Research & Evaluation Specialist, Office of Development,
Planning & Programming
Mr. John Grant, Evaluation Coordinator, Office of Development, Planning &
Programming
Dr. Timothy Mahoney, Deputy Office Director, Office of Development, Planning
& Programming
Mr. Steven Freundlich, Division Chief, Office of Projects.

John Snow, Inc.

~~Ms. Sylva Etian, Chief of Party/Training Advisor~~

Manoff International, Inc. (Manoff Group)

Mr. Ashok Sethi, NHED Specialist

Community Systems Foundation

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Mr. K.K. Bansal (Baroda)

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Gujarat State Crime Prevention Trust's ICDS Mobile In-Service
Training Team in Panchmahals

Ms. Saroj Verma
Ms. Preeta Chawda
Ms. Sonal

Gujarat State Government, Panchmahals District

Mr. J.N. Singh, District Development Officer

Nutrition Foundation of India

Dr. C. Gopalan

TENTATIVE ANALYSIS PLAN FOR FINAL REPORT

1. Analyses done for papers which may be used for the report.

- a. Effect of various SES, maternal and child factors on the wt/age of boys and girls.
 - ANOVA
 - Stepwise regression analysis
- b. Relationship between maternal anthropometry and other factors and the wt/age and ht/age of infants.
 - ANOVA
 - Stepwise regression analysis
- c. Effect of literacy and nutrition knowledge of mothers on nutritional status of children.

	GRADES	IV	III	II	I	N
LITERATE						
ILLITERATE						
NUTRITION KNOWLEDGE SCORE						
0						
1-3						
4						

χ^2

χ^2

d. Effect of literacy status on nutrition knowledge

	0	1-3	4	score
LITERATE				
ILLITERATE				

χ^2

e. Effect of income on maternal literacy status and nutrition knowledge.

	Literate	Illiterate	0	1-3	4	score
≤ Rs 65/-						
> Rs 65/-						

χ^2

f. Effect of maternal nutrition knowledge on child nutritional status controlling for income and literacy status.

(ANCOVA) :

Main effect : Nutrition knowledge score

Covariates : per capita monthly income and literacy status

Dependent variable : Wt, ht, wt/ht as percent of NCHS median

g. Effect of each nutrition knowledge component on nutritional status of children when controlled for all SES variables

e.g. ANCOVA with

Main effect : age for introducing solids valid/invalid

covariates : All SES variables

dependent variable : *wt/age, ht/age, wt/ht z score*

2. Analysis on relationship between vit A, morbidity and nutritional status.

a. Gross tabulation

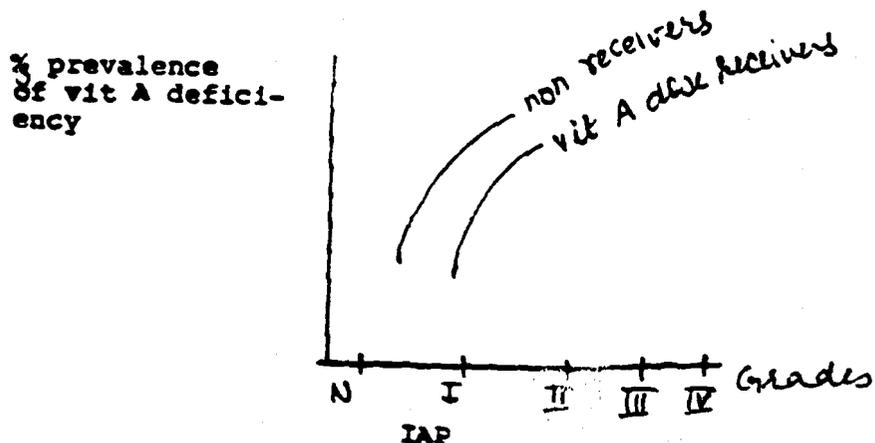
Vit A deficiency sign	Measles		Anemia	
	Yes	No	Yes	No
Present				
Absent				

Vit A deficiency sign	Nutritional status (wt/age)			
	< 80%	< 70%	< 60%	< 50%
Present				
Absent				

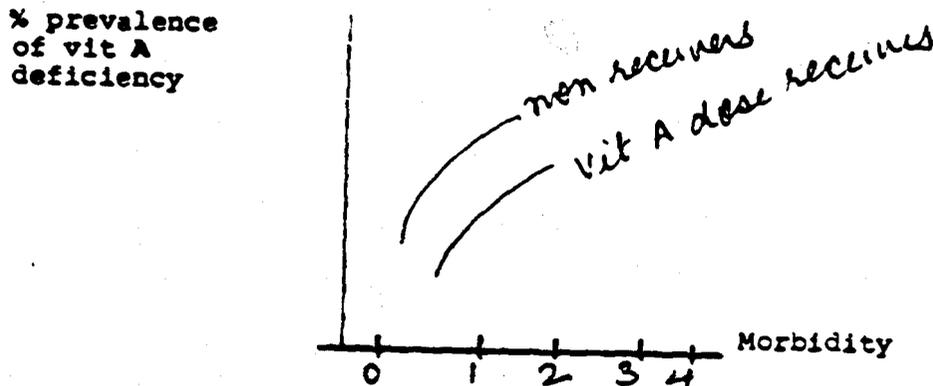
Similar analysis for vitamin A prophylaxis receivers vs non receivers.

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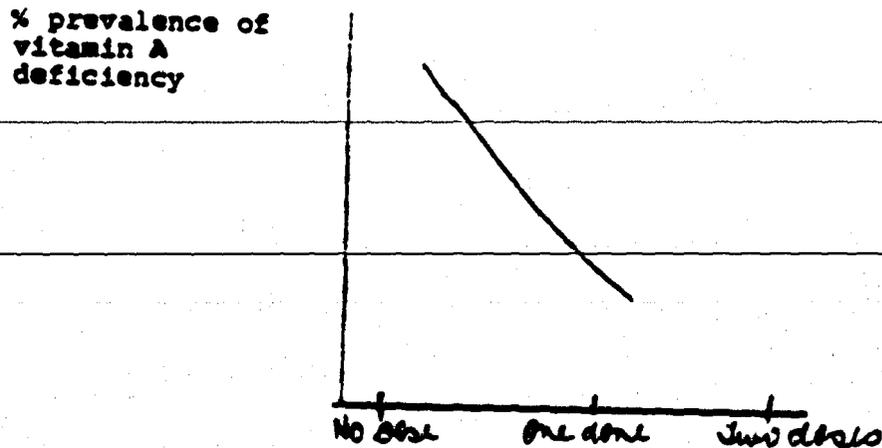
- b. Regression analyses of nutritional status of children (IAP classification) and percent prevalence of vit A deficiency of vit A dose receivers and non-receivers.



- c. Regression analysis of morbidity and prevalence of vit A deficiency of vit A dose receivers and non-receivers.



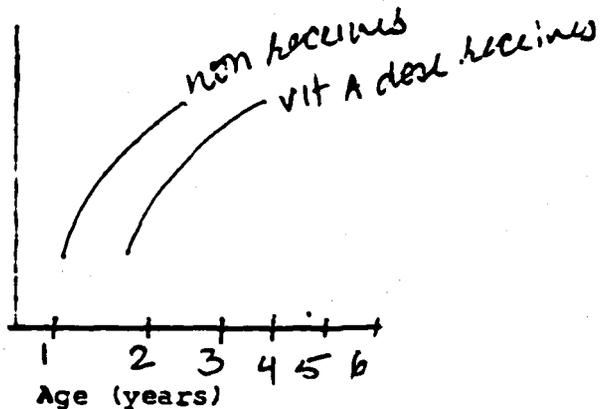
- d. Regression analysis : effect of vit A prophylaxis doses on prevalence of vitamin A deficiency



- e. ANCOVA : Main effect : vitamin A prophylaxis dose
 covariate : Age
 dependent variables : % prevalence

f. Regression analysis for the effect of age on prevalence of vitamin A deficiency

% prevalence of vitamin A deficiency



3. Other Analyses

(1). Supplementary feeding:-

- a. Agewise, the difference in weight, height and wt/ht of supplemented and non-supplemented (ANOVA)
- b. Effect of months of participation on WAPM, HAPM and WHPM controlling for SES and age of children.
- c. Effect of days of participation for supplementary feeding on the nutritional status of children.
 - Regular (≥ 15 days) vs irregular (< 15 days) participation

	WAPM	HAPM	WHPM	Z scores	t test
Regular participation					
Irregular participation					

+ Regression analyses : with both participation days and WAPM etc as continuous variables.

d. Effect of food ration on child nutritional status.

Energy ration	N	I	I1	Grades
$< 300-50$ kcals				
≈ 300 kcals				
$> 300 + 50$ kcals				
Protein ration				
< 89 g				
≈ 120 g				
> 120 g				

x²

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ANOVA

	WAPM	HAPM	WHPM	(or Z scores)
<	300-50 kcals			
=	300 kcals			
>	300+50 kcals			

Similarly for severely malnourished children using

<	600 - 100 kcals	<	16 g protein
=	600 kcals	=	20 g protein
>	600 + 100 kcals	>	24 g protein

In case of pregnant women: wt, ht and wt/ht x 1000².

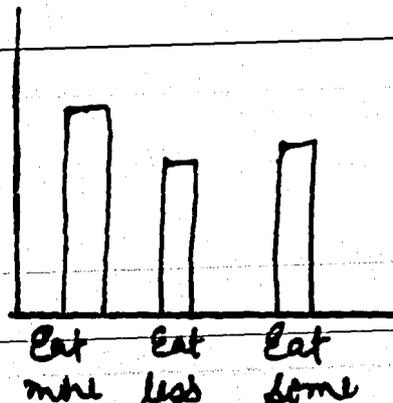
<	500-100 kcals	<	16 g protein
=	500 kcals	=	20 g protein
>	600 + 100 kcals	>	24 g protein

e. Effect of accuracy of methods used to measure ration on the amount of ration.

	Correct/ Adequate ration 300/600 kcals	Correct/ Inadequate ration >< = 300/600 kcals
Accurate method		
Inaccurate method		

f. Effect of food habit of pregnant and lactating women on their participation in supplementary feeding at AW

% participation



ANOVA

	WAFM	HAPM	WHPM	(or Z scores)
<	300-50 kcals			
≈	300 kcals			
>	300+50 kcals			

Similarly for severely malnourished children using

<	600 - 100 kcals	<	16 g protein
≈	600 kcals	≈	20 g protein
>	600 + 100 kcals	>	24 g protein

In case of pregnant women: wt, ht and wt/ht x 1000².

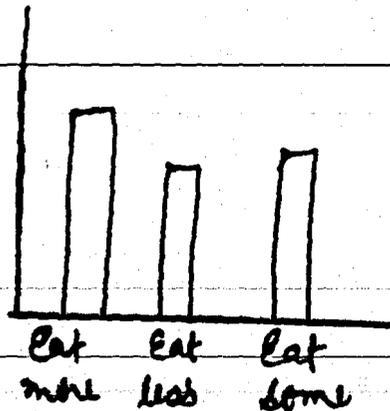
<	500-100 kcals	<	16 g protein
≈	500 kcals	≈	20 g protein
>	600 + 100 kcals	>	24 g protein

e. Effect of accuracy of methods used to measure ration on the amount of ration.

	Correct/ Adequate ration 300/600 kcals	Correct/ Inadequate ration >< ≈ 300/600 kcals
Accurate method		
Inaccurate method		

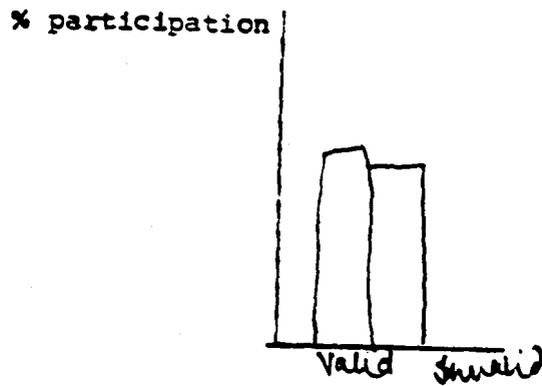
f. Effect of food habit of pregnant and lactating women on their participation in supplementary feeding at AW

% participation



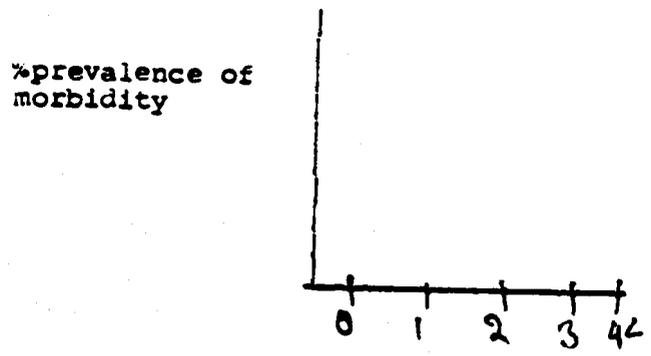
91

g. Knowledge of weaning age of mothers and its effect on participation of infants for supplementary feeding at AW.

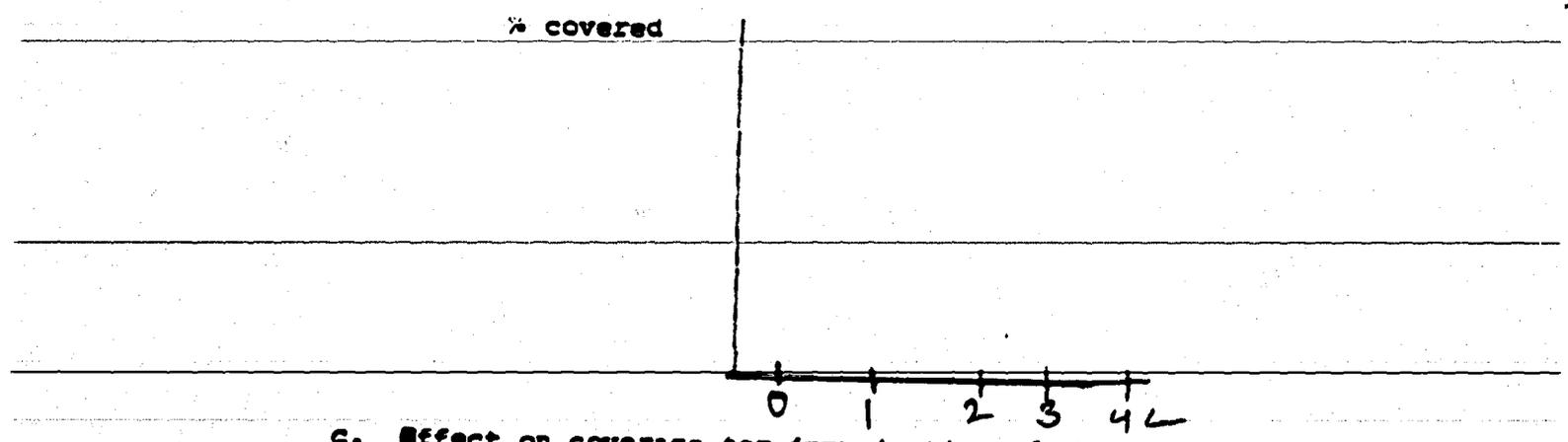


2. Health services components

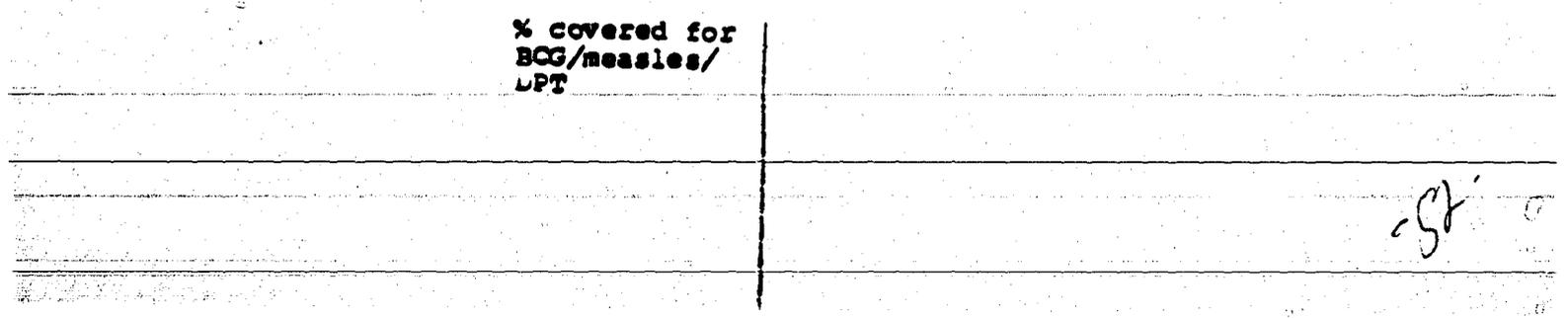
Relationship between
 a. Effect of number of health check ups (on percent prevalence) of morbidity in children.



b. Effect on coverage for vitamin A prophylaxis



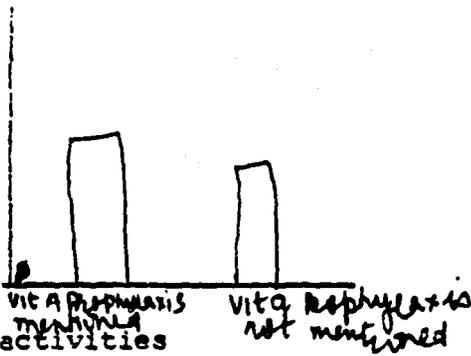
c. Effect on coverage for immunization of children



ST

- d. Similar analysis (a,b,c) for ANM activity score instead of health check ups.
- e. Effect of each ANM activity score component on the respect service provided
e.g.

% coverage for
VITAMIN A
prophylaxis



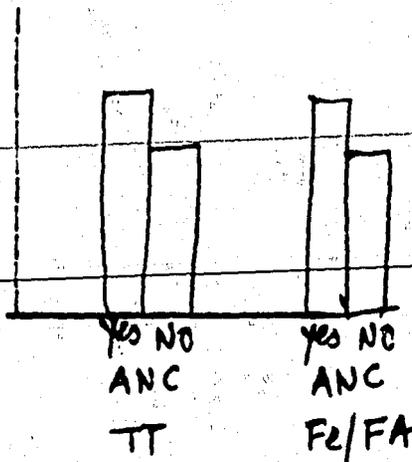
Similarly for other activities

- f. Cross tabs to study effect of immunization on prevalence of disease. For measles and polio

	Disease	
	Yes	No
Immunized		
Not immunized		

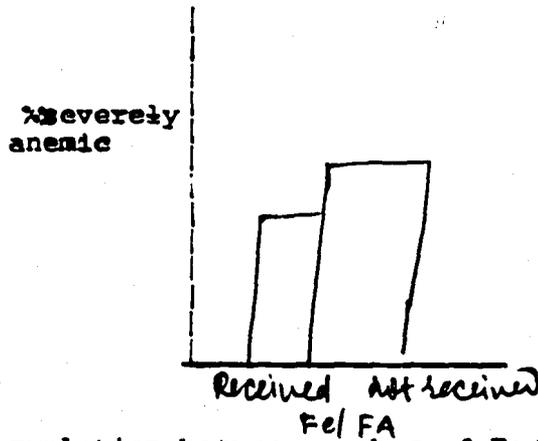
- g. Effect of antenatal check-ups received by pregnant women on the coverage for TT and Fe/FA

% cover-
age



h. Effect of Fe/FA on anemia in pregnant and lactating women

1)



ii) Correlation between number of Fe/FA tablets received with percent prevalence of anemic ($<11g/dl$)

i) Effect of Hb level, pallor, participation at supplementary feeding, Fe/FA and TT coverage, on DMR and TMR (or under 3 deaths) of pregnant and lactating women.

3.

Nutrition Health Education

a. Effect of NHE classes on maternal nutrition knowledge score.

NHE Classes	Nutrition knowledge score of mothers		
	0	1-3	4-6
0			
1			
2			
3			

b. Relationship between AWWs and mothers nutrition knowledge.

- Tests :
1. Correlation
 2. Regression analysis
 3. Cross-tab

AWWS' NUTRITION KNOWLEDGE SCORE	MOTHERS' NUTRITION KNOWLEDGE SCORE		
	0	1-3	4-6
1-3			
4-6			
7			

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c. Relationship between AWW's knowledge of growth charts on GM

AWWS' Growth Chart knowledge	Accurate weight on GC	Inaccurate weight on GC	No wt on GC	No growth chart
Valid				
Invalid				

4. Growth Monitoring

a. effect of GM on the nutritional status of children

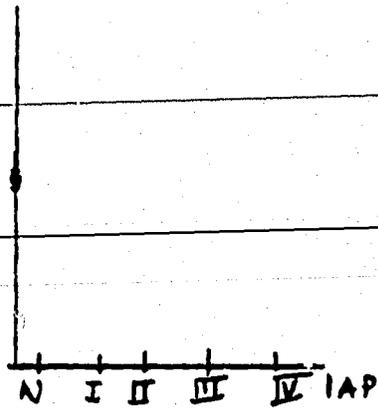
	Nutritional grades				
	N	I	II	III	IV
Accurate wt on GC					
Inaccurate wt on GC					
No weight on GC					
No GC					

Similarly for ht and wt/ht

ANCOVA : using Z scores of wt, ht, wt/ht as dependent variable, and SES, sex and age as covariates with GM components as main effect.

5. Effect of nutritional status on child mortality (longitudinal survey)

deaths/1000



b. Also calculate MSS (maximum sum of sensitivity and specificity) and relative risk at different levels of undernutrition (grades I, III, IV).

c. Intervening effect of maternal literacy status and family income

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Death rate/1000

	IV	III	II	I	N
Literate					
Illiterate					
✓ Rs 65/- PCM					
✓ Rs 65/- PCM					

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