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Revised Final Report

ALTERNATIVE APPROACHES TO LOCATING THE FOOD INSECURE: Qualitative and Quantitative Evidence from South India

by

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April 1996

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REVISED FINAL REPORT

ALTERNATIVE APPROACHES TO LOCATING THE FOOD INSECURE: QUALITATIVE AND QUANTITATIVE EVIDENCE FROM SOUTH INDIA

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EXECUTIVE SUMMARY

This paper reports on two methods used for identifying alternative indicators of chronic and acute food insecurity. A need for alternative indicators exists since many of the "benchmark" or "gold standard" indicators (such as household income or dietary intake) are too cumbersome to be of practical use in food aid targeting. The ideal alternative indicator should be statistically reliable, yet straightforward to collect and analyze.

The study uses data collected in four villages in the Indian Semi-Arid Tropics to illustrate two methods for identifying the alternative indicators. A qualitative methodology included ethnographic case studies of at-risk households, participatory mapping of vulnerable households within a community, food charts, and seasonality charts. The quantitative methods included both economic and nutrition surveys. The data were collected over three rounds in 1992-93 from 324 households in south-central India.

For the qualitative work, we used both the villagers' perceptions of food insecurity as well as the ethnographers' observations to generate a list of indicators for these areas. Triangulation among the various qualitative methods was used to validate the indicators suggested. For the quantitative study, we used statistical methods to test the strength of association between each indicator and six benchmark measurements of food security. The benchmark measurements were derived from dietary recall, anthropometric, and blood data. The dietary data were used to generate a benchmark for chronic and acute households' food insecurity. The anthropometric data were used to construct benchmarks of chronic and acute preschooler food insecurity. Finally, serum measures of vitamin A and iron adequacy were used to generate benchmarks of household micronutrient insecurity.

We tested a core set of alternative indicators against each of these benchmarks. The majority of the alternative indicators were drawn from a review of the food security literature as well our own qualitative work in the study sites.

Other indicators were included as they represent information that is typically available in secondary data sets collected by governments and research institutions.

For each benchmark, the quantitative tests involved two steps. We first "screened" the large set of core indicators for their statistical association with the appropriate benchmark. We then used a hypothesis-testing framework to test the relationship between the "screened" indicators and the benchmark of interest. The strength of the association was assessed using two criteria: a Bonferroni-corrected chi-square statistic and an unadjusted chi-square statistic.

Indicators that proved successful in the quantitative analysis were used in targeting simulations to explore the savings associated with using indicators to target food aid distributions. The simulations assumed a certain set of program characteristics. Given that program parameters will vary, these simulations are illustrative of the *potential* benefits to targeting. The results indicate that modest but significant associations between a targeting indicator and the benchmark can provide savings in terms of program costs. In some cases, the program savings can be quite substantial. We note, however, that program costs are not the only cost-related issue at stake; rather, data collection costs and the social and financial costs of making targeting "mistakes" must also be taken into account. A full accounting of these costs can render an alternative indicator less efficient than a benchmark indicator.

Assuming that a benchmark indicator is either too expensive or infeasible to use, are qualitative or quantitative methods more appropriate for choosing an alternative indicator? Our experience indicates that the choice of method depends on the type of human and financial resources available to an organization, the speed with which decisions must be made, and the types of secondary data already available. For example, targeting at the household and individual levels is likely to be a component of an NGO's programming activities. Given that (1) NGOs often work intensively in a limited number of communities and that (2) financial and human resources are generally limited, the qualitative method appears to be the most viable option for these organizations.

On the other hand, a combination of qualitative and quantitative methods might be more appropriate for organizations that plan to carry out more centralized forms of targeting (such as governments, large-scale NGOs, or international organizations.) The quantitative methods, however, require large sample sizes for statistical testing as well as personnel and equipment to collect and analyze these data. As such, use of these methods is limited to institutions with the requisite financial, human, and computing resources.

Clearly, there are advantages and disadvantages to each method chosen. The qualitative methods require less time for analysis, but require staff with special talents for interpreting qualitative information. In addition, qualitative results are not generalizable and are thus location-specific. By contrast, the quantitative method requires staff with statistical skills as well as large databases that increase the probability of sufficient power for tests of statistical association. The results from quantitative studies are more generalizable to similar populations, but can be puzzling if little is known about the program areas. As such, qualitative information is useful for indicator identification and evaluation, even when a quantitative approach is taken.

Finally, we must underscore the difference between using a qualitative method and a participatory one. At the outset, we planned to use participatory methods as we thought they would be more respectful and empowering to the communities we studied. However, we found that despite our best intentions, the research-based participatory methods were no more empowering for the villagers than our survey methods. This is more a testament to the objective of pursuing a predetermined research agenda rather than a failure of participatory methods per se. Our experience leads us to believe that qualitative techniques are truly participatory when employed in action-orientation interventions.

1. INTRODUCTION

1.1 THE NEED FOR ALTERNATIVE INDICATORS OF FOOD SECURITY FOR TARGETING

Targeting scarce resources toward the food insecure lies among the many objectives of food-related information systems. Although targeting is not a new tool, its use has become even more relevant in today's era of ever-shrinking aid budgets. To be successful, however, a viable targeting system requires indicators that are valid and reliable for identifying at-risk groups and still straightforward and inexpensive to use. In spite of this obvious need, a recent survey of food and nutrition policymakers in developing countries found many of the recommended indicators difficult to incorporate into ongoing information and targeting systems (Kennedy and Payongayong 1991). Too often, indicators are laborious and expensive to collect, difficult to analyze and interpret, and of limited use in targeting-related activities.

A need therefore exists for food security indicators that are simple to derive and simple to use. Recent empirical analyses by Haddad, Sullivan, and Kennedy (1992) suggest that relatively simple indicators can perform well in locating the food insecure. Their work suggested that indicators such as number of unique foods consumed, region, dependency ratio, household size, rooms per capita, incidence of illness, vaccination status, age at weaning, drinking water and sanitation facilities—all coded with only two or three different values—were able, either singly or in combination, to identify food-insecure households and preschoolers.

This work continues the work by Haddad, Sullivan, and Kennedy (1992) by exploring the methodological issues related to the identification and validation of alternative indicators for targeting food security programs. Two distinct methods of indicator development are considered: qualitative methods that rely on

indigenous knowledge and quantitative methods that rely on conceptual models derived from theory.

1.2 THE NEED FOR ALTERNATIVE INDICATORS IN INDIA

Fortunately, famines in India are a "nightmare of the past" (Gopalan 1992). This has been due to: food production that has kept up with population increases, government buffer stocks of grain which have stabilized food grain prices, democracy and a free press to give the rural poor a voice, the existence of relatively efficient inter-regional grain markets, the availability of informal consumption credit, and a set of explicit famine-relief policies such as rural public works programs (Drèze 1988; Bidinger et al. 1990).

Given the successful prevention of famine in India, is there a need for improved targeting of food security and nutrition programs? There are at least two reasons why the search for better targeting methods is crucial. First, improvements in aggregate food availability at the national and regional levels have not eliminated chronic and often severe food insecurity throughout much of the country. Child malnutrition rates in India, for example, continue to cause alarm. According to the UNDP's 1994 Human Development Report, 63 percent of children under five in India were underweight in 1990—the highest rate of any of the 127 developing countries listed (UNDP 1994).

Second, current programs designed to address food insecurity come at the cost of scarce resources that have alternative uses. For example, India's Title II food aid program has ranked as the world's largest non-emergency food program since its inception in 1954. In recent years, the value of Title II food aid has reached approximately US$100 million annually. There is a widespread feeling that current levels of food security in India could be achieved with less strain on public expenditures if policies were better targeted to the undernourished (Government of India 1990; Ravallion and Subbarao 1992; Jha 1992; Dev, Suryanarayana, and Parikh 1992; Bapna 1991; Harriss 1991).

Food aid programs in India are diverse, but center on providing aid to food-insecure preschoolers, women, and households (USAID 1994). Resources are currently targeted in a number of different ways. Under the Integrated Child Development Scheme (ICDS), health workers are asked to use anthropometry to screen prospective children and pregnant women for food supplements and child development programs (NIPCCD 1989). The World Food Programme currently runs a "self-targeting" Food-For-Work program, implicitly assuming that only food-insecure households will avail of this work scheme. However, undercoverage is a concern for many of these programs since not enough needy households or individuals receive benefits (Kennedy and Slack 1993). Program leakage can be high in some areas, with benefits often accruing to those who would not otherwise be considered needy (NIPCCD 1989). Interviews in our study villages indicated a frustration among *aganwadi* workers in their inability to target resources better (Vasantha 1993).

Clearly, resources mobilized to combat food insecurity—whether from the Government of India or in the form of donor food aid—will be much more effective if they can be targeted to the most food insecure. But who are the food insecure and where are they? Is it possible to identify these at-risk groups in a way that is consistent with local capacity for targeting and implementing these programs?

1.3 RESEARCH OBJECTIVES

The objective of this study is to explore two methods for selecting "alternative" indicators for targeting food security programs. In keeping with the message from policymakers and practitioners around the world, the alternative indicators should be simple to develop, collect, and use.

Specific study objectives include the development of relatively simple methods to:

1. Identify a set of candidate alternative indicators. This set of candidates will include (1)"generic" indicators that are derived from a general conceptual

framework of food security and are not unique to a particular setting as well as (2) "location-specific" indicators that are derived from qualitative field methods in the study area.

2. Identify appropriate "targeting" indicators by testing the statistical association of the candidate indicators with more direct, benchmark measures of food security.
3. Assess the relative performance of each of the targeting indicators for improving the efficiency of food security and nutrition-related programs. Increased efficiency is defined in terms of reducing program costs and maximizing the social benefit associated with programs.

1.4 OUTLINE OF REPORT

The study focuses on four villages in two Indian States: Maharashtra and Andhra Pradesh. Alternative and benchmark indicators of household and individual food security were collected using survey, ethnographic, and participatory methods during three rounds between August 1992 and September 1993.

Qualitative methods are used to identify locally-determined indicators of food insecurity. These methods include participatory rural appraisal exercises and traditional ethnographic case studies. In addition to the qualitative studies, a quantitative approach is presented for identifying indicators. For this method, the alternative indicators are compared to a set of benchmark indicators that are presumed to represent the true food security situation. The benchmark indicators are based on caloric adequacy measures, anthropometry, and biochemical serum determinations.

The performance of the alternative targeting indicators are judged by the strength of their association with the benchmark indicators as well as their cost-effectiveness. Two-by-two contingency tables are used to compare whether the proportion of cases (households or individuals) with a certain indicator characteristic are more likely to be food insecure than those without the same characteristic (Snedecor and Cochran 1989). Various targeting simulations are also undertaken to

demonstrate the potential resources saved through targeting with the indicators identified.

2. LITERATURE REVIEW

2.1 FOOD AND NUTRITION MONITORING IN INDIA[1]

A large number of nutritional assessment studies were undertaken in India over the period 1918-1972. Their coverage was limited, however, and they were not undertaken on a regular basis. This lack of comprehensive repeated assessments led the Indian Council of Medical Research to set up the National Nutrition Monitoring Bureau (NNMB) in 1972. The NNMB's mission is to

- continuously collect and process information on dietary intakes and nutritional status of representative segments of the Indian population, using standardized procedures and techniques, and
- undertake periodic evaluation of ongoing national nutrition programs.

A recent evaluation of the NNMB's activities (Rao, Sastry, and Rao 1987) found that current operations were hampered by lack of internal coordination and excessive administrative bureaucracy. As part of a series of efforts to improve the NNMB's efforts, the National Institute of Nutrition (NIN) initiated a project to develop a nutritional surveillance model that used simple and sensitive indicators that would be useful to both macro and micro planning. The project has been undertaken in Andhra Pradesh, and is designed to

1. Use primary and secondary data sources to illuminate the relationship between basic needs indicators, economic, environmental, and agricultural factors, and food consumption and nutritional status;
2. Develop a set of simple, quick to collect, and cost-effective indicators to form the core of a nutrition surveillance system; and
3. Develop both the computer software and hardware necessary to implement the monitoring system.

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The need for indicators with such characteristics has been identified by the NIN as of paramount importance. The research undertaken as part of this study, to identify effective indicators that are simple to collect and use in targeting ongoing nutrition programs, is a timely and innovative complement to the efforts planned by NIN.

2.2 CONCEPTUAL FRAMEWORK FOR UNDERSTANDING FOOD SECURITY

For this work, we adopt a commonly accepted definition of food security:

> *When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life* (USAID 1992).

By this definition, food security is a broad and complex concept that is determined by agro-physical, socioeconomic, and biological factors (Campbell 1991; von Braun et al. 1992). Furthermore, food security is defined by a triad of concepts: food availability, food access, and food utilization. By implication, the "food insecure" have lost, or *are at risk of losing*, availability and access to food, or the ability to utilize it. Several researchers have included this concept of *vulnerability* in their definitions of food security (Watts and Bohle 1993; Radimer, Olson, and Campbell 1990; Kendall, Olson, and Frongillo 1995). Few, however, have broadened the notion of food security to include elements of *social acceptability* (Radimer, Olson, and Campbell 1990; Kendall, Olson, and Frongillo 1995) and *sustainability* (Chambers 1991).

It is also important to recognize the temporal dimensions of the food security concept. *Chronic food insecurity* is characterized by a persistent inability to attain food access over the long term. *Acute food insecurity* is characterized by abrupt declines in food security status over a relatively short period of time. These short-term declines in food security status may occur on a fairly regular basis as the result of seasonal changes in food access in a given area. They may also be associated

with less frequent, but more acute, declines in food access, as in the case of famine.

The factors that influence the food security status of households and individuals may be quite diverse. The United States Agency for International Development (USAID) identifies a range of important issues that lead to the food insecurity of households and individuals in the developing world. These include, among others; chronic poverty, rapid population growth, declining per capita food output, poor infrastructure, ecological constraints, limited arable land, disease, poor water and sanitation, inadequate nutritional knowledge, civil war, and ethnic conflicts (USAID 1995).

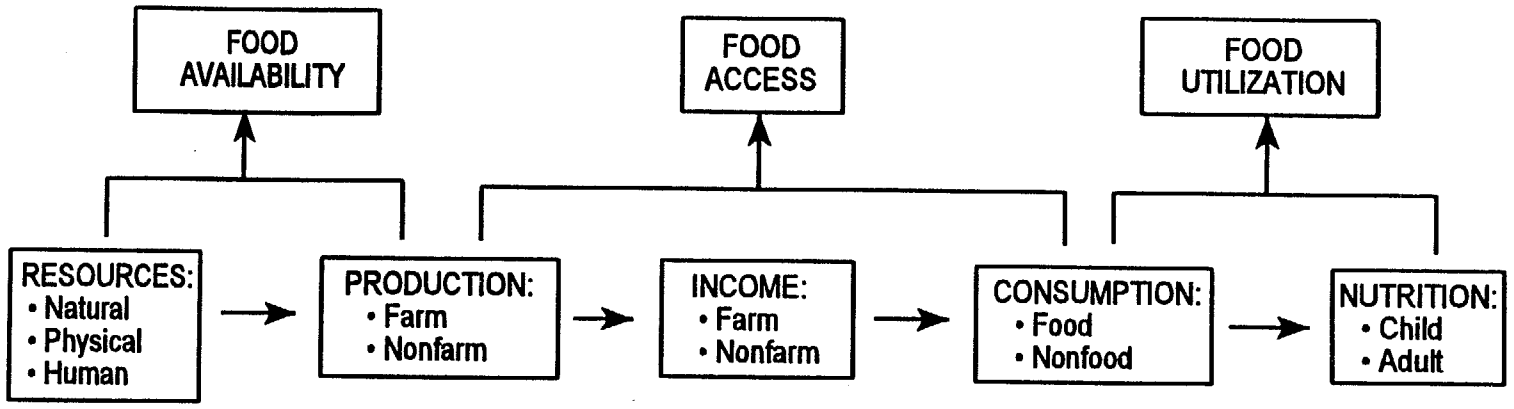
Figure 2.1 summarizes the diverse determinants of food security status into a general conceptual framework. In particular, the framework highlights the causal relationships between the various elements of food availability, access, and utilization. It therefore focuses on the links between the resources commanded by the household, levels of farm and off-farm production, household income, household and individual consumption, and individual nutrition. This configuration suggests that adequate food availability is a necessary, although not sufficient, condition to achieve adequate food access. Food access, in turn, is necessary, but not sufficient, for adequate food utilization.

2.3 FOOD SECURITY INDICATORS

Figure 2.1 also provides a brief list of indicators associated with each link in the food security causal chain. These indicators are derived from the food security literature. This literature spans a wide range of disciplines—including anthropology, nutrition, sociology, geography, public health, epidemiology, and economics. The recent literature is reviewed in Haddad, Sullivan, and Kennedy (1992) and Maxwell and Frankenberger (1992).

The indicators described in Figure 2.1 are somewhat "generic," as they are defined by theory rather than by a specific set of empirical observations. As a result, it is expected that these indicators may be obtained in a fairly consistent

Figure 2.1—Food security conceptual framework and "generic" indicator categories



"GENERIC" INDICATOR CATEGORIES

RESOURCES
Natural:
Rainfall levels/stability
Soil quality
Water availability
Forest resource access

Physical:
Livestock ownership
Infrastructure access
Farm implement ownership
Land ownership/access
Other physical assets

Human:
Gender of household head
Dependency ratio
Education/literacy levels
Household size
Age of household head

PRODUCTION
Total area cultivated
Irrigated area
Area in fallow
Access to/use of inputs
Number of cropping seasons
Crop diversity
Crop yields
Food production
Cash crop production

INCOME
Total income
Crop income
Livestock income
Wage income
Self-employment income
Producer prices
Market/road access

CONSTUMPTION
Total expenditure
Food expenditure
Nonfood expenditure
Consumer prices
Dietary intake
Food frequencies

NUTRITION
Anthropometry
Serum micronutrient levels
Morbidity
Mortality
Fertility
Access to health services
Access to clean water source
Access to adequate sanitation

Source: Adapted from Webb, Richardson, and von Braun (1993).

fashion across locations and socioeconomic contexts. This list of indicators is intended to be suggestive, however, not exhaustive. Undoubtedly, there are other indicators suggested by food security theory that have been excluded. Furthermore, there are sure to be additional indicators of food security that are unique to a particular setting. Such indicators may only be identified through fieldwork in each location.

The conceptual framework is useful as a starting point for identifying food security indicators for targeting. Consider, for example, that a program is focused on improving food access. Figure 2.1 suggests that targeting criteria should be chosen from measures that represent household production, income, or consumption. The precise measures chosen as targeting indicators will depend on the particular aspect of food access that the intervention is designed to address. Similarly, efforts to improve food utilization would likely employ indicators of consumption and nutritional status as targeting criteria.

When direct measures of these targeting criteria are difficult or expensive to obtain, the conceptual framework may also assist in the identification and prioritization of alternative indicators to test as proxies. In general, indicators in close proximity to one another along the causal chain described in Figure 2.1 are likely to be more strongly associated than those that are more distantly located.[2] Indicators of food frequencies, for example, are expected to be relatively strongly associated with indicators derived from dietary intake data, compared to indicators in the income category. Similarly, indicators of consumption are expected to be more strongly associated with indicators of nutritional status than indicators of production. This suggests a hierarchy for testing alternative indicators when resources are limited: indicators that lie close to the direct measure should be tested first, as they are most likely to have a strong association with the benchmark. There will, of course, be exceptions to this statement. Yet, in general, such indicators are more likely to identify the intended segment of the population than those selected from more distant points along the causal chain.

2.4 INDICATORS FROM INDIA

A review of the India literature reveals a specific set of indicators that are thought to capture important aspects of food security status. Correlates of preschooler nutrition status include low (scheduled) caste, no land (or very little), poor nutrition knowledge, mother forced to work outside the home, young age of mother at marriage, later-born child, being a girl-child, and recent diarrheal infection. The review is presented in full in Appendix 7.2.

3. METHODOLOGICAL FRAMEWORK

3.1 INDICATORS OF CHRONIC AND ACUTE FOOD INSECURITY

This chapter presents a method for identifying food security indicators at the individual and household levels. Alternative indicators are developed for both *chronic* and *acute* food insecurity. For this study, area indicators of chronic food insecurity are necessary because many of the households are persistently food insecure. Indicators of acute food security are also necessary, because some households are expected to exhibit seasonality in food production, income generation, and morbidity rates. Consequently, we focus on identifying indicators that tell us if a household is chronically food insecure and indicators that predict acute, season-to-season declines in household food security. It is important to note that households can simultaneously exhibit chronic and acute food insecurity.

3.2 IDENTIFYING CANDIDATE INDICATORS

Two types of candidate indicators are proposed. Candidate indicators are termed *generic* indicators if (1) they can be collected in a number of different settings and (2) they are derived from a well-defined conceptual framework of food security. Although the candidate indicators are postulated to operate across a wide range of possible settings, their interpretation and relative importance in describing a particular aspect of food security is likely to be context-specific. The actual usefulness of any generic indicator must therefore be tested in the context of each program. Examples of generic indicators are the household dependency ratio and the incidence of preschooler illness in a household.

Fieldwork may also reveal a set of indicators that we call *location-specific*. Location-specific indicators typically only carry meaning within a particular study area due to unique agroclimatic, cultural, or socioeconomic factors. Types of food grown that are unique to an area, local seasonal behavioral patterns, or cultural feeding practices may define location-specific indicators. In India, an example of a unique indicator might be "caste." Location-specific indicators can only be

identified from a detailed understanding of local conditions. This understanding is best obtained by using qualitative data collection methods.

In this study, we use both qualitative and quantitative methods to identify and test alternative targeting indicators. The generic indicators are identified from the food security literature and tested using statistical methods. The location-specific indicators are suggested by information generated using qualitative methods.

3.3 THE NEED FOR A BENCHMARK

The search for effective alternative indicators relies upon comparisons of the candidate indicators to a benchmark or "gold standard" measure of food security. This comparison however, assumes that the benchmark indicator is itself a direct and accurate measurement of "true" food security status.

Given that food security is a multifaceted concept, there is no one indicator that encompasses all dimensions of availability, access, and utilization. However, from a practical perspective, a multifaceted food security indicator may not be what is needed. Rather, most food security programs are designed to address a particular element of the food security problem. As such, the choice of a benchmark indicator for selecting alternative targeting indicators should depend on the objectives of each program.

Assume, for example, that chronically low levels of food access is the food security concern that requires intervention. Under these conditions, candidate alternative indicators should be tested against a benchmark indicator of chronic access. A long-term measure of per capita food expenditure or energy intake are possible examples of appropriate benchmark indicators. Similarly, if preschooler malnutrition is the critical food security concern, then the benchmark measure might be some measure of child anthropometry. In the area of nutrition in particular, there is a considerable body of expertise in identifying appropriate indicators for various program types and information purposes (see, for example, Habicht and Pelletier 1990).

For the purposes of this study, alternative targeting indicators will be derived for six specific dimensions of food insecurity: chronic and acute household-level food insecurity, chronic and acute preschooler food insecurity, and vitamin A and iron deficiency. Table 3.1 summarizes the benchmark measures that will be used to evaluate a wide range of candidate alternative indicators in this study. The chosen benchmark of household food security is household energy adequacy. In order to increase the association between this indicator and the true, but unobserved, measure of adequate food intake (our definition of household food security), we (1) undertake two repeated 24-hour dietary recall surveys within each season, (2) collect three rounds of 24-hour dietary recall data in three seasons, and (3) construct calorie requirements based on age, weight, sex, physiological status, and a three-scale classification of activity patterns.

The analysis of alternative indicators for preschooler food security use anthropometric measures as benchmarks (height-for-age for chronic food insecurity and weight-for-height for acute food insecurity). The benchmark indicators of vitamin A and iron insecurity are also based on biochemical indicators of nutritional status. Serum vitamin A and hemoglobin serve as benchmarks for these analyses.

3.4 QUANTITATIVE MEASURES OF ASSOCIATION

There are a number of methods to evaluate the association between benchmark and alternative indicators: correlation coefficients (both continuous and rank), factor analysis, cluster analysis, and regression analysis, among others. Each of these methods has been reviewed for its usefulness to this project and has been found to present significant limitations for the purposes outlined above (Haddad, Sullivan, and Kennedy 1992; Haddad, Chung, and Yasoda Devi 1993).

Aside from these methods, two other methods merit special discussion: contingency tables and receiver operating characteristic curves (ROC analysis). Contingency tables are frequently used in the nutrition epidemiology literature as a measure of association. This method (also reviewed in Haddad, Sullivan, and

Table 3.1—Definition of benchmark indicators of food insecurity used in the quantitative assessment of alternative indicators

	Indicator of Chronic Conditions	Indicator of Acute Conditions
Household-level food insecurity	Households with less than 70 percent of caloric adequacy in four of six visits	Households dropping below 70 percent caloric adequacy between survey rounds 2 and 3, or those already below 70 percent adequacy experiencing a further drop of 10 percent or more
Preschooler-level food insecurity	Children five years of age and under with height-for-age Z-scores less than -3.00	Children under five years of age among the 30 percent with the most acute decline in weight-for-height Z-score between rounds 2 and 3
	Indicator of Vitamin A Deficiency	Indicator of Iron Deficiency
Micronutrient deficiency	Households containing at least one woman or child with serum vitamin A levels less than 20 μg/dl	Households with at least one woman or child with hemoglobin levels less than WHO cutoffs

Kennedy 1992) is summarized in Table 3.2 and described in detail in Tucker et al. (1989).

In a contingency table, observations are categorized according to two dichotomous criteria, the benchmark indicator and the alternative indicator.[3] Statistical tests may be used to indicate whether the alternative indicator is significantly associated with the benchmark indicator. Indicators that show a significant association with the benchmark can be rated according to two criteria:

sensitivity and specificity. Sensitivity is defined as the proportion of truly food-insecure individuals that is identified by the alternative indicator (i.e., the probability of a true positive). Specificity refers to the proportion of truly food-secure individuals that is correctly identified by the indicator (i.e., the probability of a true negative). If an indicator is to be effective at identifying the food insecure, it is important for both sensitivity and specificity to be high. As such, it is common in the nutrition literature to sum the sensitivity and specificity.[4]

Note, however, that the sensitivity-specificity table assumes that an appropriate cutoff point as been chosen for the alternative indicator. Research in the surveillance literature has shown that the performance of an indicator can be highly dependent on the chosen cutoff. An alternative indicator, however, can be tested across a range of cutoffs using ROC analysis. This method is a generalization of the two-by-two sensitivity-specificity analysis described above. It has been used in psychology (Szucko and Kleinmuntz 1981), medicine (Swets 1979), and nutrition epidemiology (Brownie, Habicht, and Cogill 1986; Ruel, Rivera, and Habicht 1994; Ross et al. 1995), among other fields.

From a technical perspective, the optimal cutoff point exists at the point where the sum of sensitivity and specificity are maximized. In practice, however, the choice of the cutoff may be fixed by program objectives and budgetary considerations. In many cases, program managers may wish to target only that segment of the population that is most food insecure. This is likely to be the targeting objective in cases when the program budget is insufficient to address the needs of all who are considered food insecure. Under these circumstances, the best targeting cutoff is one that will deliver exactly the number of participants for which program resources suffice (Habicht, Meyers, and Brownie 1982). In other words, the cutoff would be set at a value corresponding to the percentage of the population that can be served with available program resources.

Table 3.2—Relationships between true food insecurity, as determined by the benchmark and food insecurity measured by the alternative

		"True" Benchmark Measure of Food Security	
		Yes	No
Alternative Measure of Food Security	Yes	True-Positive	False-Positive
	No	False-Negative	True-Negative

Sensitivity = True-Positive/(True-Positive + False-Negative)

Specificity = True-Negative/(False-Positive + True-Negative)

Positive Predictive Value = True-Positive/(True-Positive + False-Positive)

True Prevalence = (True-Positive + False-Negative)/(True-Positive + False-Positive + True-Negative + False-Negative)

Measured Prevalence = (True-Positive + False-Positive)/(True-Positive + False-Positive + True-Negative + False-Negative)

Source: Habicht, Meyers, and Brownie (1982).

Selected Method of Quantitative Analysis

After careful consideration, the chosen method for this study is the two-by-two contingency table. For illustrative purposes, the cutoffs for the alternative indicator are set at either the lower 25 percent or the upper 25 percent of the distribution. The candidate indicators are then "screened" and tested statistically for the strength of their association with the benchmark indicator of interest (e.g., household and preschooler food insecurity, or micronutrient insecurity). We

underscore that the selected cutoff levels do not represent "the optimal cutoff" for this indicator. Rather, this method exemplifies a practical scenario faced by program staff and, more importantly, represents a level of analysis that is possible for program managers in India and elsewhere in the developing world.

3.5 INDICATOR SELECTION CRITERIA

The choice of a targeting indicator should be based not only on its statistical strength of association with a known benchmark of food insecurity, but also on the total costs and benefits associated with collecting and using that indicator. The benefits of using an indicator include (1) correctly excluding from a program the individuals that are truly food *secure*, and thus avoiding the cost of a wasted intervention, and (2) correctly including food-insecure individuals into a program, and thus reducing the social costs associated with unchecked food insecurity. The social costs of food insecurity include the psychological cost of hunger, decreased physical and cognitive development in children, the value of foregone income as a result of lower productivity and risk-minimization strategies, the costs of additional health care, and a wide range of other economic costs.

Thus, the total benefit derived from effective targeting is a combination of (1) a reduction in the social costs of food insecurity and (2) a reduction of financial costs of providing benefits to those who are not truly food insecure. The latter (termed a reduction in program leakage) amounts to a reduction in the program costs per food-insecure beneficiary. Total benefits, however, should be assessed *net* of those obtained under the default targeting system (i.e., either no targeting or targeting with a benchmark indicator).

Note, however, that by definition, no alternative indicator can out-perform the benchmark measure of food security in terms of identifying the truly food insecure. As a result, relative to the benchmark indicator, targeting with an alternative will always result in some program leakage and some suboptimal reduction in social costs, just by virtue of the fact that it cannot be as accurate as the benchmark indicator.[5]

The issue of less-than-perfect targeting with an alternative indicator is important when we consider the net costs and benefits of using an alternative indicator. Note that the correct criteria for choosing an alternative indicator involves more than the size of the expected social benefits plus program-level savings. Rather, the correct criteria will include the size of the expected benefits *net* of indicator data collection costs. As such, an alternative indicator will only be useful for targeting if it can provide significant data collection savings over the cost of the benchmark. Therefore, an alternative indicator may not be viable if the difference in data collection costs is small. Under these conditions, the savings associated with collecting an alternative indicator may not outweigh the loss in program benefits provided by "perfect" targeting with the benchmark.

Thus, the correct criteria for choosing an alternative indicator involve more than assessing the size of the expected reduction in social costs plus the reduction in program leakage. It must also take into consideration the cost of data collection. For example, assume that "perfect targeting" with a benchmark indicator reduces total costs (program plus social) by $200,000 compared to the case of no targeting. If the cost of collecting the benchmark indicator is $75,000, then the *net* cost reduction from using the benchmark is $125,000. Assume further that targeting with an alternative indicator results in a $150,000 reduction in total costs when compared to the no-targeting case. In this example, using the alternative indicator is warranted only if the cost of data collection is less than $25,000; otherwise the net reduction in costs would be less than that provided by the benchmark indicator ($125,000).

The decision to use a targeting indicator can be formalized into a cost-benefit problem. Targeting indicators, for example, should be selected such that they maximize the social benefits derived from the program, while minimizing the combined social and program costs (including indicator data collection costs). This is equivalent to choosing the targeting method that maximizes the program cost-benefit ratio, as specified:

$$\max_i \frac{B_i}{C_i}, \quad \textit{for all } \frac{B_i}{C_i} > 1, \tag{1}$$

where B_i = social benefit of program targeted on indicator i, and C_i = total (social plus program) cost with intervention targeted on indicator i.

In this formulation, the total benefit of the program that is targeted using indicator i can be defined as the extent to which the social cost of food insecurity is reduced. In theory, this can be calculated as the number of truly food-insecure individuals receiving benefits under the program (true positives) multiplied by the per capita social cost of food insecurity[6]:

$$B_i = sTP_i, \tag{2}$$

where s = per capita social cost of food security problem, and P_i = number of true positives obtained with indicator i. In practice, however, the social cost of food insecurity is difficult to measure (this issue will be discussed in Section 6.4).

As represented in Equation (3) below, the calculation of total costs includes

program intervention costs:	the cost of providing goods and services to each participant in the intervention multiplied by the total number of participants in the program (including those identified by the targeting indicator who are truly food insecure [true positives] and those identified by the targeting indicator who are not truly food insecure [false positives]);
social costs of remaining food insecurity:	the per capita social cost of the food security problem of concern multiplied by the number of truly food-insecure individuals who are misclassified by the targeting indicator and do

not receive benefits under the intervention (false negatives); and

targeting costs: the costs associated with identifying targeting indicators and collecting and analyzing this information from individuals who are candidate participants in the program.

$$C_i = r(TP_i + FP_i) + sFN_i + D_i, \tag{3}$$

where

r	=	per capita program costs,
FP_i	=	number of false positives obtained with indicator i,
FN_i	=	number of false negatives obtained with indicator i, and
D_i	=	targeting costs using indicator i.

With some types of interventions, there might be additional costs associated with treating false positives. Some health interventions, for example, produce deleterious side effects in individuals that are incorrectly diagnosed. These side effects can represent costs over and above the financial costs of program leakage. For food security programs that are focused on energy supplementation (as opposed to vitamin A megadose supplementation) we believe that it is appropriate to assume that the intervention has no negative side effects. In such cases, the cost of a false positive is limited to the financial cost of the intervention (program leakage costs) and the social costs of a false positive are equal to zero (see Habicht, Meyers, and Brownie 1982).

As may be apparent, the actual calculation of the social costs of food insecurity and malnutrition can be quite complicated. Leaving aside the question of the physical and psychological costs, it is difficult to measure the economic costs of food insecurity, given the difficulty of quantifying the costs of lost productivity,

additional health care costs, and other direct and indirect effects (Strauss and Thomas 1995). Therefore, comparison of targeting indicators on the basis of a complete accounting of costs and benefits may not always be possible.

On the other hand, calculating the program costs involved in delivering a set of goods and services to program beneficiaries is relatively straightforward, as is the determination of targeting costs. Obviously, these costs are likely to vary significantly across contexts. In particular, data collection costs, even for similarly defined indicators, can vary significantly from program to program, depending on the method of data collection utilized and the ability to share costs or "piggy-back" targeting efforts on to other program functions. In the research setting, for example, data collection costs can be quite high. In most cases, staff for data collection, data entry, and preliminary data analysis are recruited and trained specifically for the research survey, implying high labor and training costs. Equipment such as computers may also have to be specially purchased for the research effort as well. Where population densities are low, or survey locations are spread out across distant locations, the logistics costs of information gathering for research purposes may also be quite large.

In contrast, in an operational context, where well-trained program staff are already in place in the field, the requirements for additional staffing, equipment, logistics, and training costs are likely to be minimal. In the program setting, the cost of information is likely to represent primarily the opportunity cost of the time of existing field staff. This cost itself will vary considerably, not only with the complexity of the data collection task, but according to whether the information is gathered at a central program location or requires visits to individual households. An important concern in any program-based data collection effort is the possible erosion in the quality of the goods and services provided under the program, given excessive data collection and reporting requirements. This fact underscores the need to identify relatively simple indicators for targeting purposes.

The development of any targeting system is likely to entail two potentially separate data collection efforts with significantly different staffing and cost implications. First, in the initial stages of the program operations, some type of qualitative and quantitative fieldwork will be necessary to identify and test candidate indicators. Second, in the course of program operations, the screening of households or individuals for participation in the program according to the selected targeting indicator(s) will represent an ongoing data collection effort that may be quite distinct from the first. To the extent that the assessment of targeting indicators can be linked to baseline data collection activities of a program monitoring and evaluation system, for example, there may be opportunities to significantly contain the information system costs.

This study will focus on methods to be used in the initial evaluation of targeting indicators, rather than operational issues related to ongoing program screening. Because the present research activity is unable to mirror data collection costs incurred in a program setting—particularly ongoing screening costs, this study will carry out various targeting simulations to illustrate the method for determining the worth of an alternative indicator. The simulations will first illustrate the potential reduction in program leakage from improved targeting under a set of fixed assumptions regarding the size of the program and the per capita program costs of an intervention. The simulations will also address the issue of the social cost of food insecurity by defining the range of social costs over which the choice of an alternative indicator may (or may not) be appropriate. In cases where these ranges fall outside the set of realistic estimates of the likely social cost of food insecurity, clear choices among indicators may still be possible.

4. STUDY DESIGN

4.1 PROJECT SITE

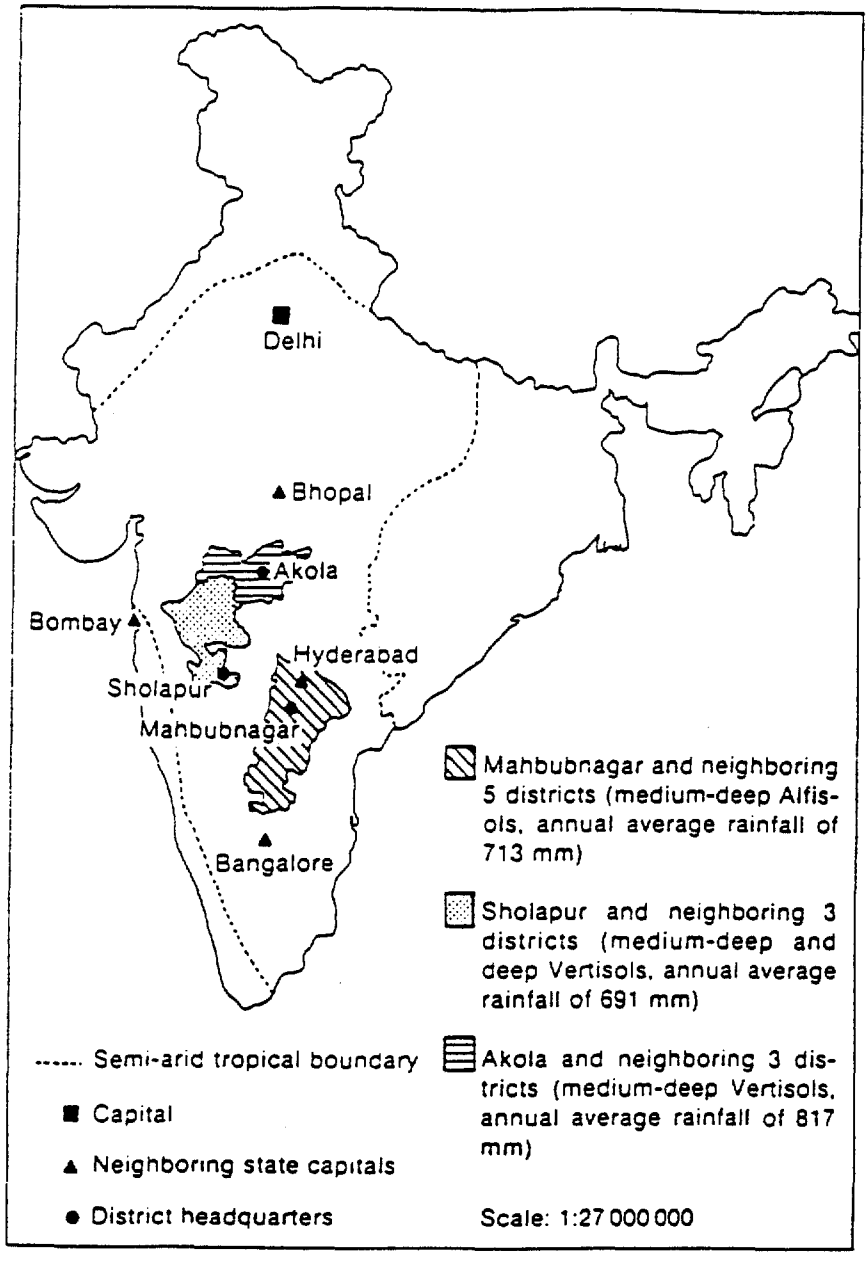
Four villages were chosen for the study. All four villages were part of ICRISAT's longitudinal Village Level Studies (VLS) conducted between 1975-84 (Old VLS) and 1989-90 (New VLS). These data have been the subject of many studies and are well documented in Walker and Ryan (1990).

Visits to the six villages in March 1992 indicated that a six-village study would be logistically difficult.[7] Instead, a four-village study of Kanzara, Shirapur, Aurepalle, and Dokur was proposed. Kalman and Kinkheda villages were dropped from the sample since agricultural conditions in Maharashtra were found to be more variable between districts rather than within districts. Specifically, rainfall patterns (and hence crop performance) were quite similar in Kanzara and Kinkheda, yet they varied considerably from those found in the dry Sholapur District, where Kalman and Shirapur were located. In the Mahabubnagar villages, the significant variability in cropping patterns and irrigation practices prompted us to retain both villages (Aurepalle and Dokur) in the sample.

The four study villages are located in three districts in two states of India. The villages are described in Appendix 7.3. Dokur and Aurepalle are located in Mahabubnagar District in Andhra Pradesh, Shirapur is in Sholapur District, Maharashtra, and Kanzara is in Akola District, Maharashtra (see Figure 4.1). The village economies are based on rainfed agriculture, but rainfall is low and is particularly erratic in Mahabubnagar and Sholapur Districts (see Table 4.1). The villages are rural and have agrarian-based economies, but are quite diverse economically and agroclimatically.

Aurepalle, a village that was once the worst-off economically (Walker and Ryan 1990), is situated in an area that is prone to droughts. The soils are poor and most farming is dryland. The increasing value and demand for two rural products, toddy (local liquor) and sheep, has diversified the village economy away from crop production. The effect has been to make many of the landless relatively well-off, so

Figure 4.1—Map of the study site



Source: Walker and Ryan (1990).

Table 4.1—Summary statistics for the four study villages

Characteristic	AUREPALLE	DOKUR	SHIRAPUR	KANZARA
Location	Mahabubnagar, Andhra Pradesh	Mahabubnagar, Andhra Pradesh	Sholapur, Maharashtra	Akola, Maharashtra
Distance from Hyderabad	70 kms south	125 kms south	365 kms west	528 kms north-west
Rainfall (general)[a]	Unassured; 630 mm	Unassured; 630 mm	Unassured; 630 mm	Assured; 890 mm
Total rainfall in 1992 (monthly standard deviation)[b]	428 mm (38.72)	578 mm (57.11)	319.4 mm (36.17)	450.6 mm (94.78)
Soils[a]	Red soil Low water retention	Red soil Low water retention	Deep black clay soil; high water retention	Medium deep black clay soil; medium water retention
Major crops[a]	Kharif sorghum, pearl millet, caster, paddy, pigeon pea, groundnut	Kharif sorghum, pearl millet, caster, paddy, pigeon pea, groundnut	Rabi sorghum, pigeon pea and minor pulses	Cotton, sorghum, mung bean, pigeon pea and wheat
Number of households in 1975[a]	476	313	297	169
Number of households in 1989-90[b]	664	464	451	292
Percent laborers[a]	31%	24%	33%	32%
Dominant caste groups[a]	Reddis	Reddis	Marathas Dhangars	Mali Marathas
Percent literate adults[c]	32%	29%	49%	66%
Average per capita landholdings (hectares)[c]	1.46	0.77	1.95	1.94
Mean household energy intake (kcal per adult equiv per day)[c]	2,265	2,298	1,957	2,044
Mean iron intake (mg per adult equiv per day)[c]	9.5	7.8	17.4	17.4
Mean carotene intake (ug per adult equiv. per day)	408	528	1,248	864
Average per capita land cultivated (hectares)[c]	1.18	0.31	1.58	1.90
Mean per capita total expenditure (rs per week)	58	45	67	41
Average price of sorghum (rs per kg) (3 seasons)	3.08	3.20	5.10	2.97
Average price of market rice (rs per kg) (3 seasons)	5.37	5.10	5.84	6.72
Average 1992-93 male daily wage (rs/day)	18	20	25	22
Average 1992-92 female daily wages (rs/day)	10	11	12	14

[a] Walker and Ryan (1990, 4).
[b] Unpublished ICRISAT data.
[c] ICRISAT-IFPRI. 1992-93. Alternative Indicators Study.

well-off that many have begun to acquire land. Farming continues to be a major occupation, however, with the majority of plots still rainfed.

Dokur, like Aurepalle, is situated in Mahabubnagar District, but is significantly different in two respects. First, the land is heavily irrigated, primarily from a large local tank. The effect of irrigation is clear: opportunities for employment are greater in the post-rainy (r2) and summer (r3) seasons. Second, the villagers in Dokur are accustomed to migrating for work during the "slack" seasons. Typically, villagers join "work gangs" to find temporary employment in construction or agriculture. Migration opportunities therefore provide alternative sources of income during the slack season or during difficult years.

Shirapur is situated in an area characterized by frequent droughts and erratic rainfall. The village economy is very much dependent on local crop production. A government Employment Guarantee Scheme (EGS) provides work for villagers, but the demand for labor is inconsistent as well as insufficient to employ all that need work. Shirapur is located relatively close to Sholapur city, but there is no tradition for migration in this village.

Finally, Kanzara is located in a rain-assured area of Akola District, hence dryland farming is less at the mercy of the monsoon. In addition, significant employment is usually available during the post-rainy (r2) and summer (r3) seasons as canal irrigation is available. Kanzara, however, is situated at the end of the canal, so irrigation is not always assured. Neighboring villages, however, have more assured access to canal irrigation, so there is usually a great deal of stability to labor demand. The year in which our study was conducted, however, proved to be a difficult year for this village. Canal water was withheld, so much less land was planted during the rabi season. In addition, untimely rains during the late kharif season ruined the sorghum crop, causing sorghum prices to plummet.

4.2 DATA COLLECTION METHODS

Two different styles of data collection were used for this study. The multiple forms of data collection reflected our interest in (1) examining qualitative and

quantitative methodologies for identifying and testing alternative indicators and (2) determining whether food security indicators are robust to method of investigation. Insights from this process may suggest that one method is more feasible or desirable under certain conditions.

4.2.1 *Quantitative Data Collection Methods: Economic and Nutrition Surveys*

Both economic and nutrition data were collected for this study (See Appendix 7.4 for details of the survey data collection). Table 4.2 shows the various modules collected in each of four study villages. Note that several modules offer overlapping information. One objective of the survey is to identify the methods that are most successful in the indicator identification exercise.

The survey modules try to keep the form of the alternative indicators as simple as possible. For example, income level was not calculated for each household. Rather, the number of income sources and sources of household income were recorded for each household.

Lastly, we have focused many nutrition and health questions on females and children. The focus on children is not new, but the focus on women who are not mothers is new. This focus reflects a growing recognition that women contribute significantly to household food production and, in many cases, are the sole providers of food. In such cases, it becomes important to understand that women's health status plays an important economic role within the household and may therefore have an impact on food and nutrition security beyond that associated with reproduction.

4.2.2 *Qualitative Data Collection Methods*

In addition to the survey data, qualitative data were also collected in two villages: specifically, participatory rural appraisal (PRA) modules, season-specific village-level ethnographic reports, and six case studies of selected families. This information is used to (1) develop unique location-specific indicators of food and

Table 4.2—Survey information collected during the India study

Number and Names of Modules	Dokur and Kanzara	Aurepalle and Shirapur
Module 1: Household roster		
Module 2: Migration		
Module 3: Education		
Module 4: Occupation		
Module 5: Housing		
Module 6: Land	< < < < < <All households in the sample > > > > > >	
Module 7: Income-generating assets and cropping		
Module 8: Durables		
Module 9: Credit		
Module 10: Expenditures		
Module 11: Dietary recalls	All individuals	All individuals
Module 12: Food frequency	All women, children <6 years	All women, children <6 years
Module 13: Anthropometry	All women, children < 6 years, all males once	All individuals
Module 14: Morbidity	< < < All females > 10 years; all children < 6 years > > >	
Module 15: Breast-feeding	< All mothers of partially or completely breast-fed children >	
Module 16: Reproductive history	< < < < < All females married or engaged > > > > > >	
Module 17: Vitamin A food frequency	< < < < All children < 6 years; mother of the child > > >	

nutrition insecurity and (2) provide qualitative support for the information produced by the survey.

4.2.2.1 *Participatory Rural Appraisal (PRA)*

Large surveys are often justly criticized for being inappropriately designed and disrespectful of local knowledge. One way of countering this criticism is to gain more information about the local context and to design surveys that are appropriate to this setting. Another approach is to employ data collection methods that encourage researchers to listen to, and learn from, respondents (Chambers 1991). Specifically, PRA data collection embodies the principles of "optimal ignorance" (not trying to find out more than is needed) and "appropriate imprecision" (not measuring more accurately than is necessary for practical purposes).

The use of PRA techniques offers the possibility of obtaining a holistic picture of individual/family/community food security interactions while reducing the costs of data collection. The application of the approach to nutrition and health is relatively recent (Bentley 1988) and has been mostly limited to project development and evaluation. However, recent research experience focusing on the complementary nature of qualitative and quantitative methods for evaluating health and nutrition status has proved to be quite successful (Paolisso and Regmi 1992).

To explore the use of PRA as a research tool for generating indicators, three different PRA exercises were conducted concurrently with the survey work. The three exercises chosen for the study were village mapping, food charts, and seasonality charts (see Appendix 7.5 for the Guideline to PRA Methods for this study). Village mapping is used to identify households that are at "*very high risk*" and "*no risk*" of food insecurity *as defined by the villagers*. Essentially, the method involves asking a group of villagers to draw a map of their neighborhood. Typically, the map is drawn on the ground using *rangoli* (or colored powder) provided by the investigators. The same group of villagers is then asked to identify households that are "very high risk" of food insecurity *by local standards*. The villagers then provide

reasons for why these households were chosen. These "reasons" serve as *emic* or locally-defined indicators of food insecurity.

The identification exercise is conducted separately for men and women in order to measure gender-differentiated perceptions of risk. Figure 4.2 shows a map drawn in Aurepalle during the last round in 1993. Figure 4.3 shows an example of a completed map.

The construction of food charts was undertaken at the household level. The key informant in each household is the person in charge of cooking. The informant is asked to list the foods eaten in this season by the household. No attempt is made to standardize the number of foods reported by the informant: the fact that an informant wishes to list two types of sorghum as opposed to one may be a valuable indication of diet diversity or household coping. The investigators then places a small bag with a sample of the food on a sheet in front of them to represent each food. The informant is asked to place ten beans in a column above the food item most consumed, and one bean on top of the food item least consumed. Next, the informant is asked to place a colored bean below each food item to signify the frequency of consumption. Consumption of other foods is rated using 1-10 beans, using the two foods just identified by one bean and ten beans. Figure 4.4 shows an upper caste woman in Shirapur completing a food chart. The finished food chart is shown in Figure 4.5.

The third PRA method used is the seasonality chart. This method is conducted with small groups (differentiated by gender and caste) to understand the yearly changes in rainfall, harvests of two main staples, food consumption, male and female labor demand, childhood illness, and women's illness. Separate groups of men and women are asked to "make a picture" of how the above aspects of village life has varied throughout the past 12 months. The group is asked to place 10 beans of one color in a column above the month in which a particular characteristic (e.g., rainfall) is highest. The group is then asked to place one color in a column above the month in which the same characteristic is least evident. The remaining months are rated or ranked using these two endpoints as reference

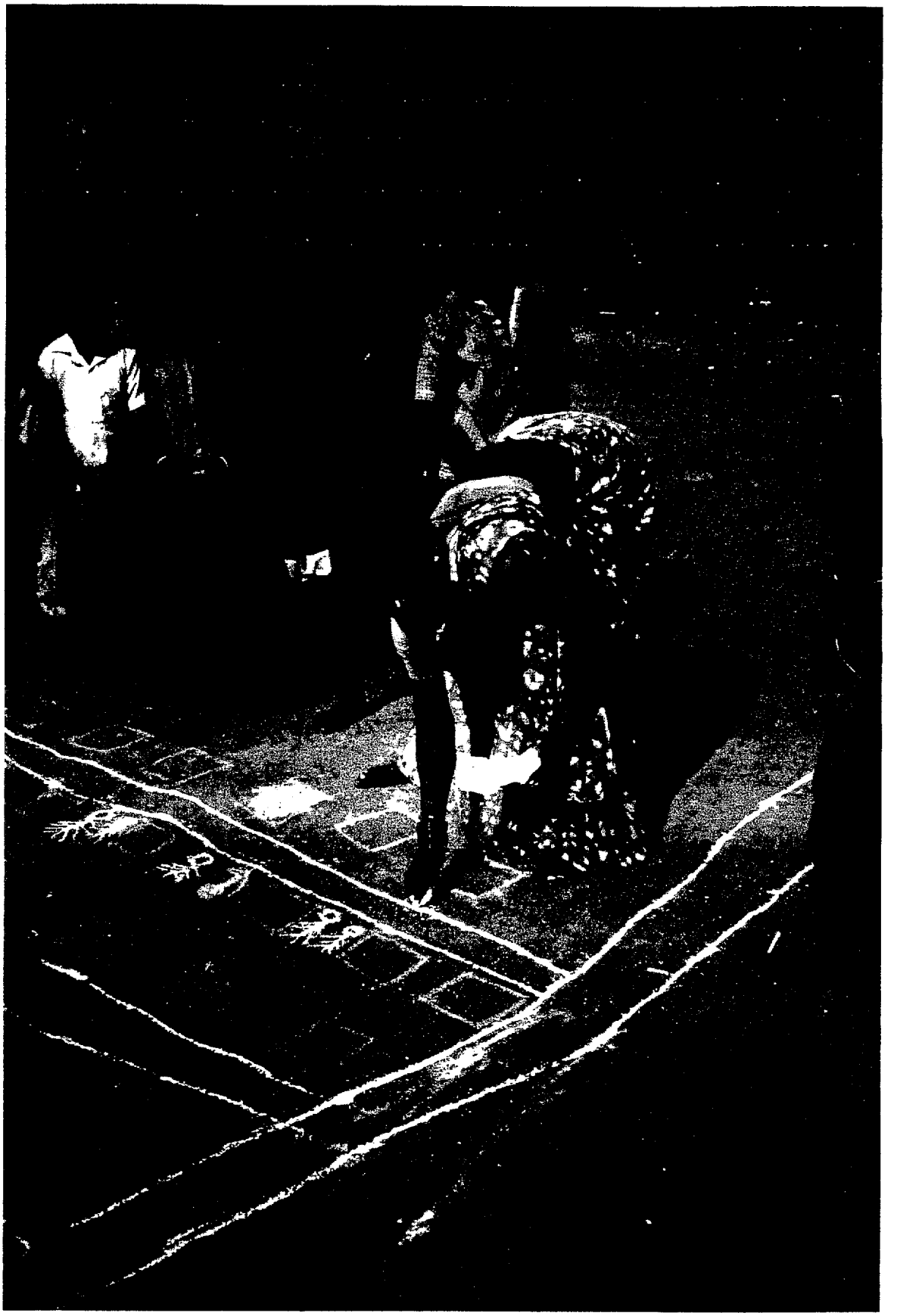


Figure 4.2—Village map drawn in Aurepalle, Round 3

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Figure 4.3—Example of a completed village map

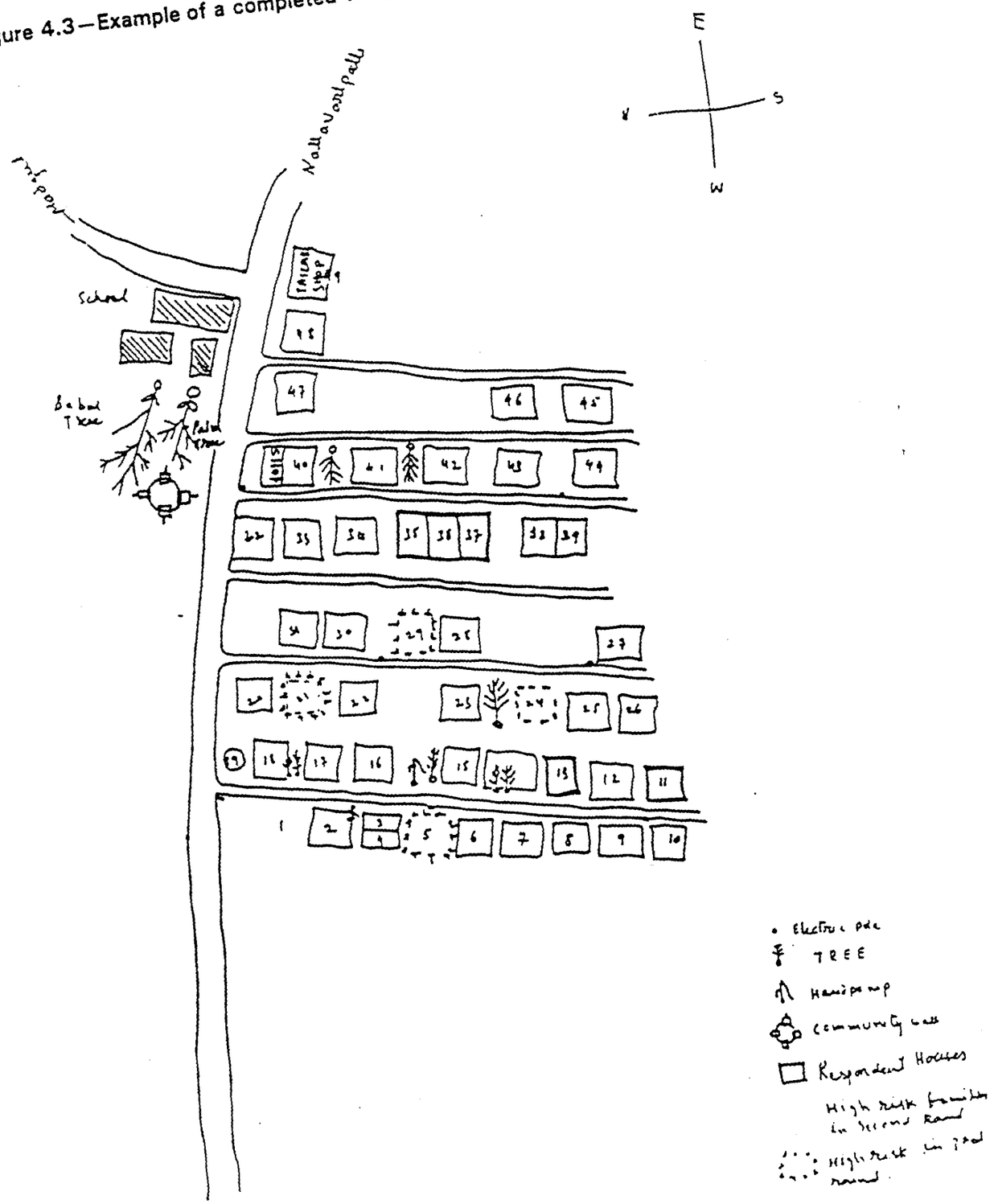

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Figure 4.4—Upper caste women in Shirapur, completing a food chart

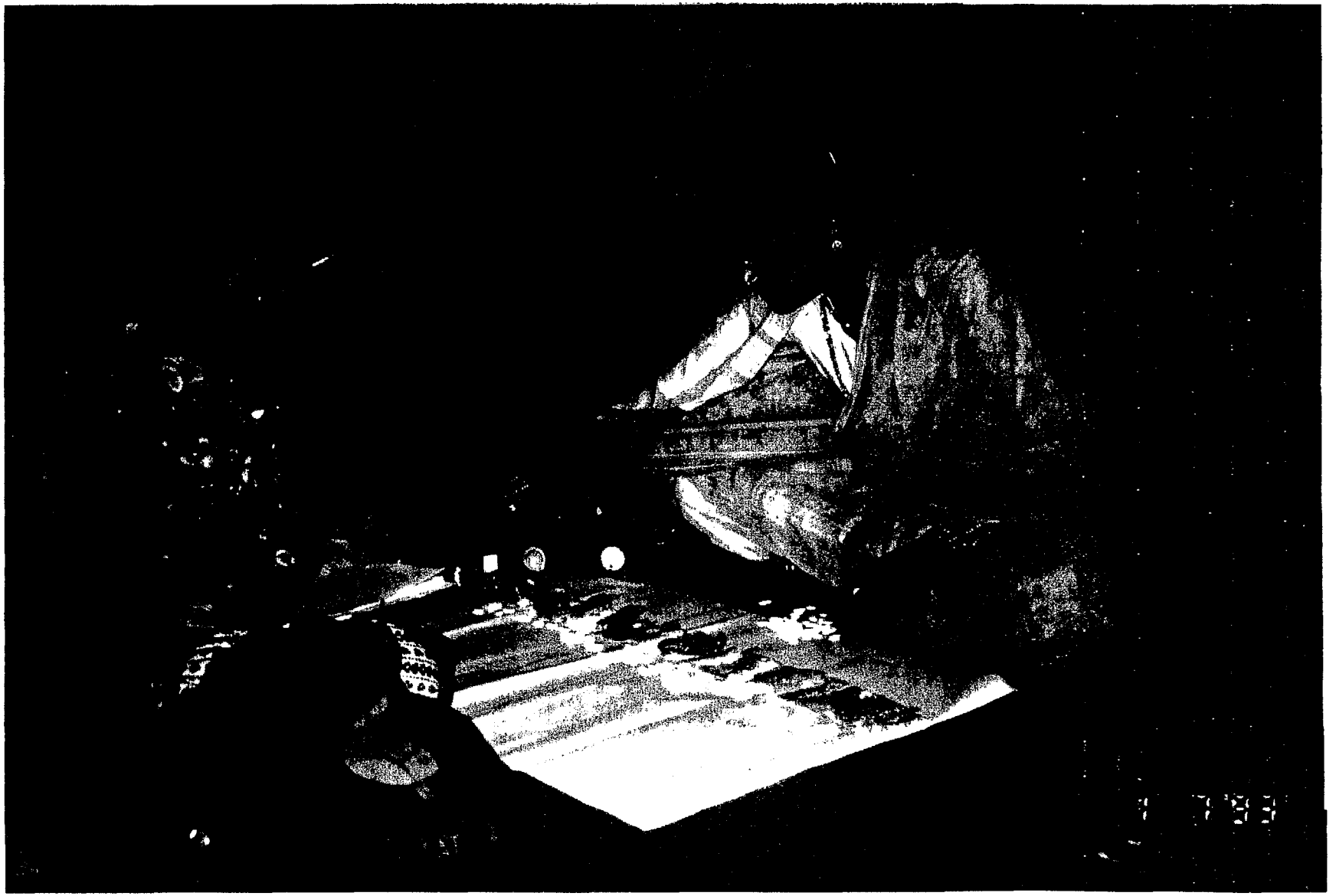

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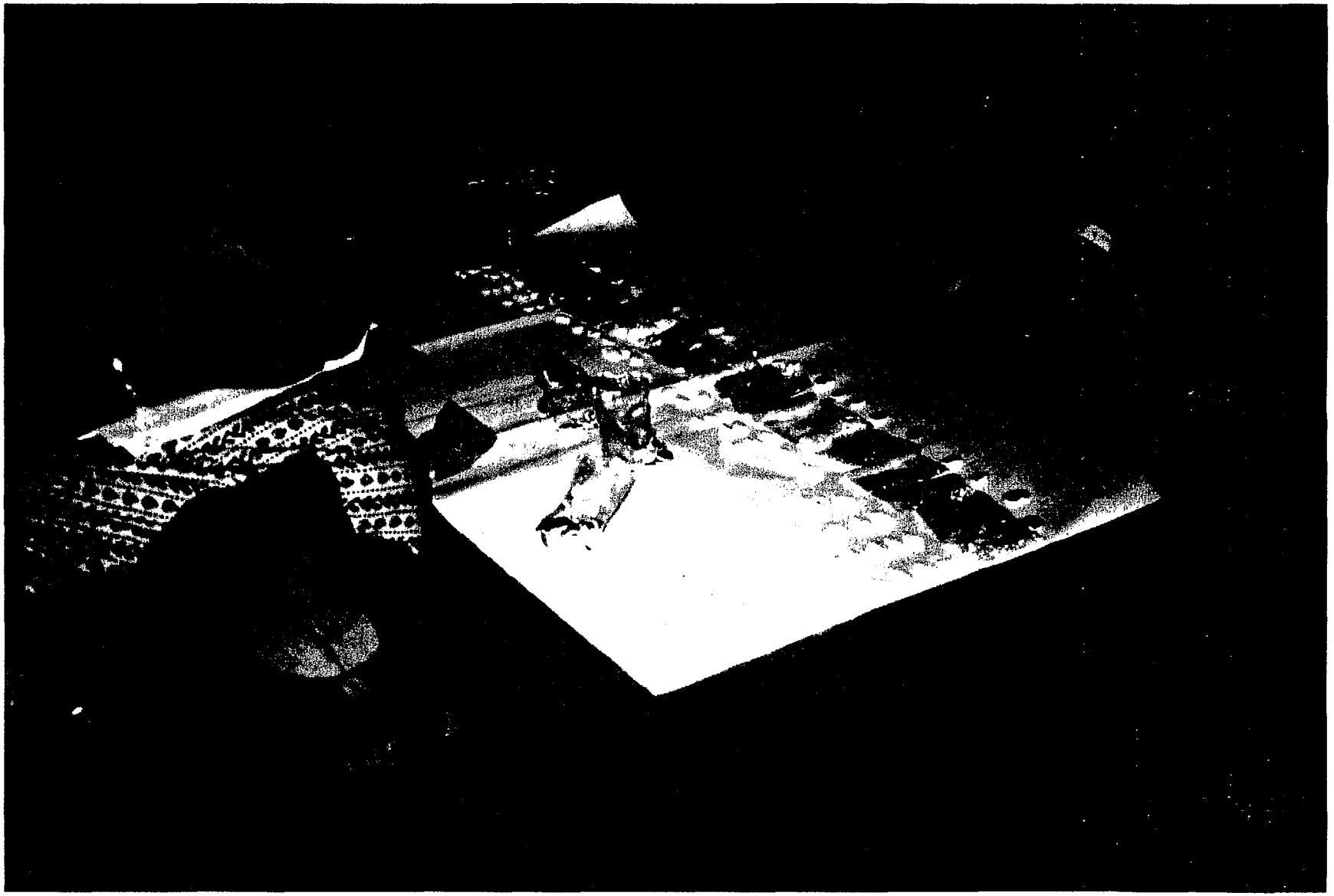
Figure 4.5—A completed food chart



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points. The result is a histogram-like picture with anywhere from one bean to ten beans above each month, illustrating the seasonal trends over time. This exercise is then repeated with a group of higher caste to capture intra-village heterogeneity in perceptions. Figure 4.6 shows a group of low-caste men charting availability of work in Aurepalle. The figure shows that the exercise is characterized by lively discussion. Figure 4.7 shows a close-up of a completed seasonality chart. Note that pictures of local festivals and agricultural events are used to depict the months of the year. Pictorial representations increase participation by illiterate villagers.

4.2.2.2 *Ethnographic Case Studies*

In a further attempt to learn how villagers describe the concepts we understand as "hunger" and "food insecurity," an ethnographer was placed in Shirapur and Aurepalle for the duration of each survey round. The ethnographer used in-depth interviews, key informant interviews, focus groups, and participant observation to conduct six household case studies as well as village-level profiles during each round. The case study work was used to develop unique, *emic* indicators of food insecurity (defined by locals or "insiders"). These indicators will be compared with the *etic* indicators produced by the survey (defined by the researchers or "outsiders").

Although the case study method is meant to be fluid and unstructured, general guidelines for the ethnographers were developed. These guidelines are given in Appendix 7.6. The guidelines include the following topics:

1. What are local perceptions of "health" and "food security"? What community, household, and individual resources are required to obtain health and food security? Does this vary by sex and age?
2. Within this community, what are traditional early signs of "food insecurity"? How are "high risk" households or individuals identified by local people?
3. What is a "good quality" diet? In times of plenty or scarcity, how does this diet change and what are the consequences of change?

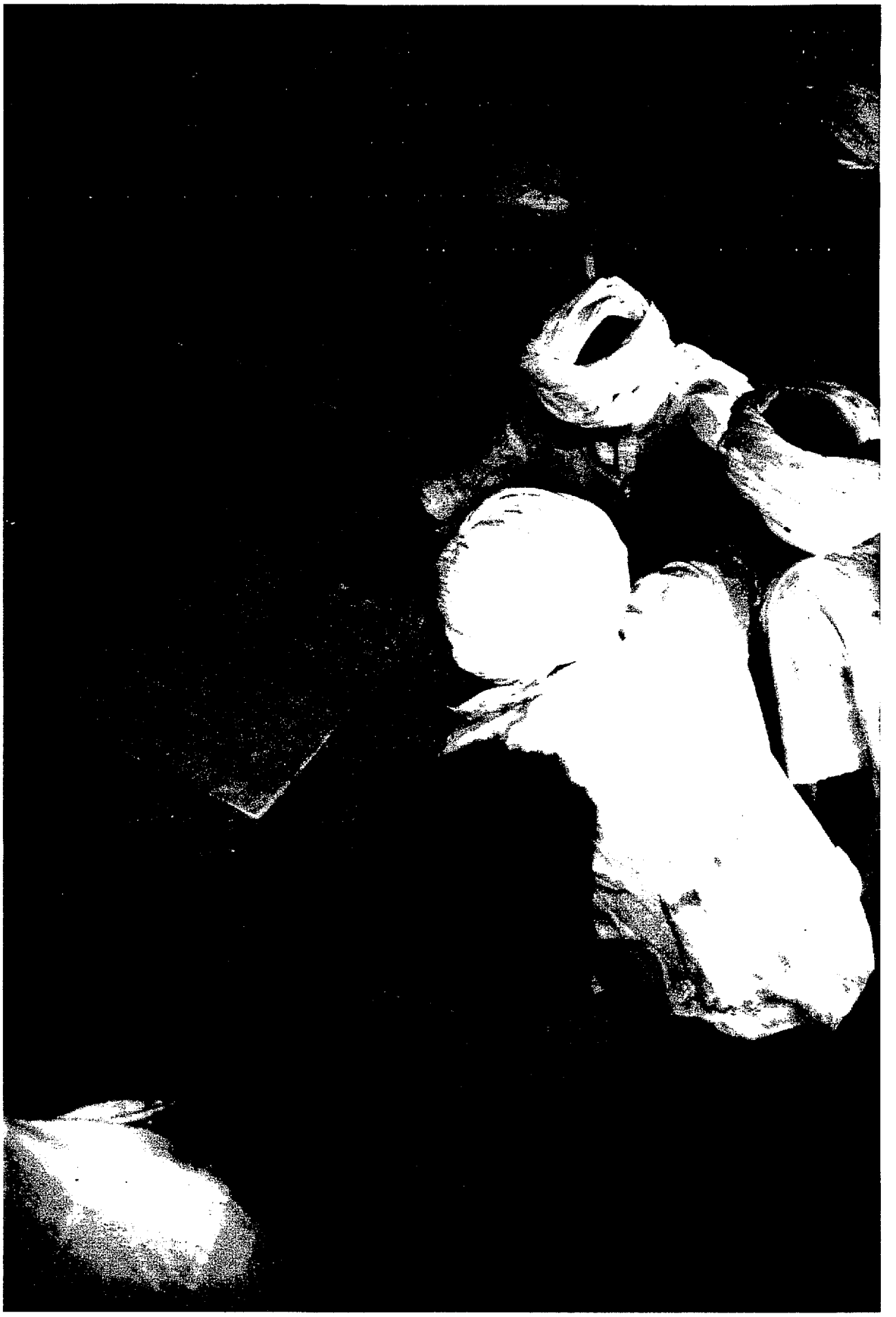

Figure 4.6—A group of low caste men charting the availability of work in Aurepalle

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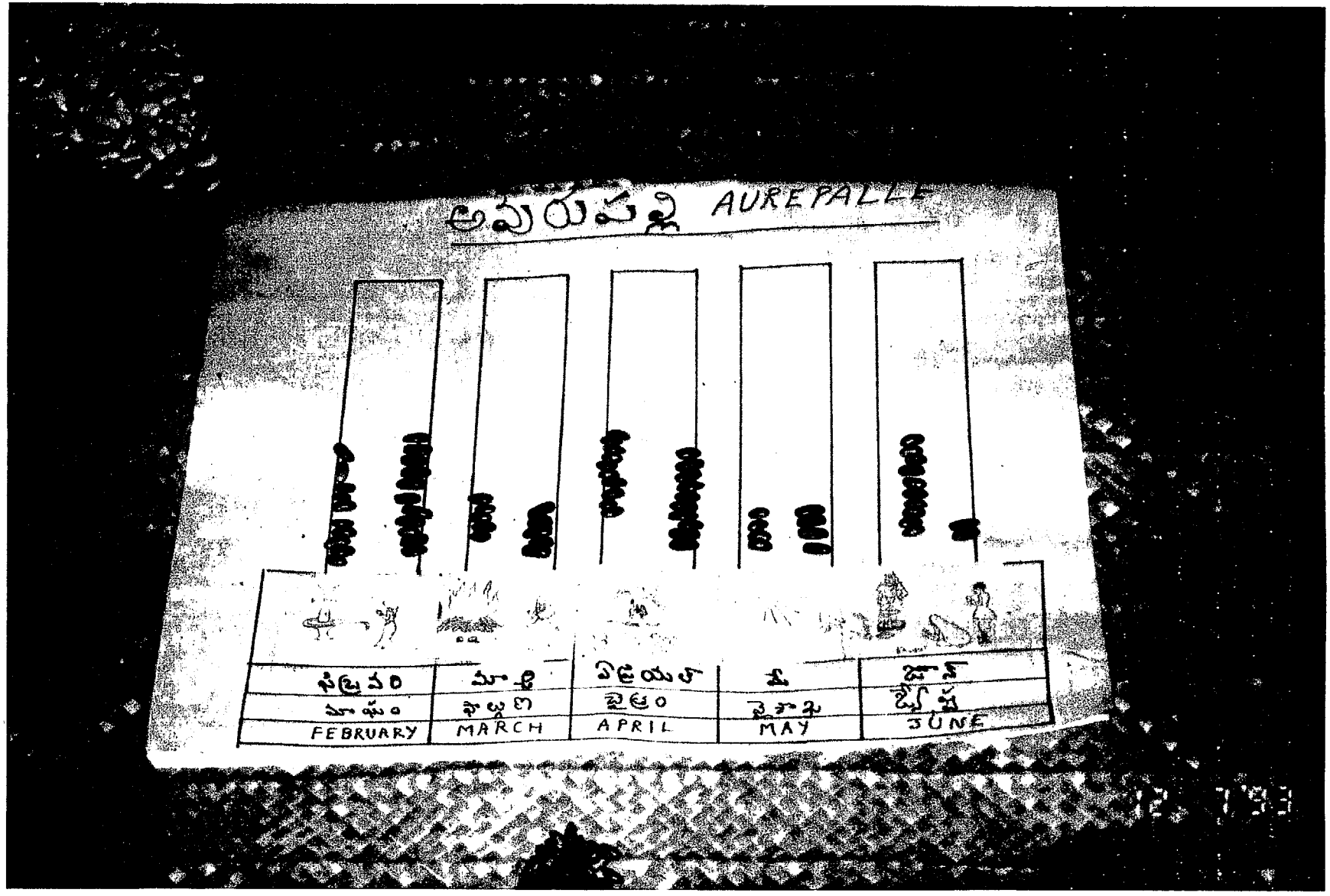
Figure 4.7 — A completed seasonality chart



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4. What has been the experience of local people regarding fluctuations in food or nutrition insecurity? What factors are perceived to be responsible for these fluctuations? How do rural households cope with threats to food or nutrition security? What do people do to protect food/nutrition security?
5. What is the decisionmaking process within the household with regard to achieving food/nutrition security or responding to problems in its attainment? Who makes specific decisions, how are resources allocated/reallocated? What is the bargaining power of different family members?

4.2.3 *Biochemical Analyses*

To provide objective "benchmarks" of micronutrient adequacy, serum measurements of vitamin A and iron status were collected for preschoolers and their mothers in two villages. Hemoglobin samples were analyzed using the filter paper technique developed by NIN (NIN Annual Report 1986). Vitamin A samples were analyzed using a variation on the microfluorometric technique reported in Sivakumar (1977).

4.3 CHOICE OF HOUSEHOLDS SURVEYED

The size and composition of the sample was selected to (1) maximize the use of the Old VLS time series for future analyses of structural factors affecting current food and nutrition security and (2) maximize intra-village variability.

With regard to the first objective, the three-village Old VLS time series contains a household-level time path of the economic status of 120 households over 10 years. In addition to the Old VLS time series, the Six Village Nutrition Study provides a 15-year-old nutrition baseline for individuals in the 240 Old VLS households. The children in this data set are now adolescents and adults and many have separated into families of their own. Combined with a present-day follow-up of the same households, these data permit a comparison of nutritional status and economic well-being during childhood and adulthood.

To maximize the number of cases on which longitudinal contrasts may be performed, it was necessary to (1) resurvey as many of the OLD VLS families as possible and (2) survey the households of individuals who have separated from the original OLD VLS household ("spin-off families"). An investigation of the spin-off families required an increased survey burden in each of the OLD VLS villages, so the number of villages investigated needed to be reduced.

To maximize intra-village variation, the sample was expanded beyond the Old VLS sample and their spinoffs. Specifically the new VLS households were included and a few "non-VLS" families were added to bring the sample up to 80 households in each village. In total, 320 households were surveyed from the four villages. The total sample represents 17 percent of the total number of household in the four villages.

Unfortunately, the longitudinal analysis, beyond our three-round 1992-93 analysis, proved to be infeasible, given the resources available to the project. The primary difficulty lies in linking individual records across the two data sets. Past documentation is available on the household-level data, but individual-level records are not as clean. Therefore, further cleaning of the Old VLS data set are necessary before the two individual-level data sets can be linked. The data in this study have, however, been collected so as to permit a future analysis of this issue.

4.4 TIMING OF SURVEY ROUNDS

The semi-arid climate of the study villages results in seasonal variations in food production, labor demand, and purchasing power (Behrman 1987). As such, we surveyed during three rounds corresponding to the late monsoon (round 1, "late kharif"), post-rainy (round 2, "rabi"), and late summer/early monsoon (round 3, "late summer or early kharif") seasons.

Figure 4.8 shows the timing of the crop cycles in the four villages. The kharif season varies regionally, but generally runs from June through October in the study villages. The rains may begin as early as June, but they often do not make a significant start until later in the kharif season. The late kharif season tends to be

Figure 4.8—Timing of the three survey rounds in the four study villages

Village	1992					1993						
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
Aurepalle												
Round			1					2			3	
Typical food availability			surplus					medium			low	
Season			kharif					rabi			late-summer/ early kharif	
Dokur												
Round	1					2					3	
Typical food availability	low					surplus					low	
Season	kharif					rabi					late-summer	
Shirapur												
Round			1				2				3	
Typical food availability			low				surplus				low	
Season			kharif				rabi				late-summer/ early kharif	
Kanzara												
Round		1				2					3	
Typical food availability		medium				surplus					medium-low	
Season		kharif				rabi					late-summer/ early kharif	

the busiest season in all villages (except Shirapur), since it is the main cropping season. In Shirapur, by contrast, farmers plant at the end of the rainy season, so the post-rainy (r2, rabi) season is the busiest time. The main staple crop harvest usually takes place in late October in Kanzara, November in Aurepalle, December-January in Dokur, and February in Shirapur. In all villages, smaller staple crop harvests occur during other parts of the year. In general, however, the late summer/early kharif time is a period of relative scarcity for all villages, since the smallest staple crop harvest is obtained at this time. Furthermore, in 1993, the monsoon began late and, as a result, little to no agricultural activity occurred in the last round of data collection (late summer-early kharif season).

The longitudinal dimension of data collection is important for areas characterized by heavy seasonality. If only one round of information is collected, the researcher assumes that the relationship between the true food security status and the alternative indicators is stable over time. This may be true for some indicators, but an indicator that identifies *chronically* food-insecure households in one season may not perform during the next season. It is therefore important to follow households over time so that we may identify indicators that (1) identify households that remain consistently food insecure and observe what indicators are robust to changes in season and)2) use alternative indicators to predict households that move in and out of food security, experiencing *acute* periods of food insecurity. Only longitudinal data provide this opportunity.

5. QUALITATIVE RESULTS: INDICATORS OF HOUSEHOLD FOOD INSECURITY

The qualitative methods described in Section 4.2.2 were applied in two villages, Shirapur and Aurepalle. Over the course of approximately one year, researchers used the participatory and case study methods to elicit information on local perceptions regarding food insecurity. Triangulation between the various qualitative methods produced the set of indicators shown in Table 5.1 The evidence for each indicator is discussed below.

PRODUCTIVE ASSETS: LAND

In Shirapur and Aurepalle, villagers commonly identified landholdings as an important determinant of a household's ability to provide food for its members. During the mapping exercise, villagers cited reasons for identifying certain households as "food insecure." In both Aurepalle and Shirapur, villagers indicated that roughly 40 percent of households were food insecure due to landlessness or lack of good quality land. The in-depth case studies supported this finding. Specifically, many case studies showed that landless families are day-by-day uncertain whether they will find work. In Aurepalle, Chinnama's family of seven is landless and she cannot think of sitting home for a single day. She states, "if I lose wages for one day, then we must struggle for two days to eat." Similarly, in Shirapur, Krushnabai, a landless widow, depends heavily on her partially disabled son's wages to buy groceries..."if and when he gets them." Owning land, she claims, would make it easier for them to obtain loans. In addition, they could at least lease the land out and collect rent. This would take the pressure off days when no wages are earned.

Quality of land appeared to be more important than quantity in determining the food security status of the family. In Shirapur, the Gofne family owned five acres of dry land. Lack of irrigation meant that farm production hinged on receiving abundant and timely rainfall. In Shirapur, roughly three years in five are poor rainfall years, hence the risk of poor crop production is great. This year was not unusual:

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Table 5.1—Household indicators identified by the qualitative analysis

- Poor quality land or landless
- Distress sales of large livestock or small livestock
- Distress sales of other productive assets
- Distress sales of other "valued" assets, e.g., jewelry
- High number of small loans, especially from informal sources (neighbors, relatives, and shopkeepers)
- Choice of drought tolerant crops when more profitable, but risky options exist
- Heavy reliance on wage work
- Women who work for wages who have young children
- Accepting permanent laborer positions
- Few income earners in large family
- Purchase of staple grains on a more-than-once-a-week basis
- Substituting inferior quality staple foods for preferred quality
- Substituting inferior quality vegetables or legumes, or going without
- Substituting gruels for the main staple (to stretch consumption)

Pandhari Gofne of Shirapur received only 50 kilograms of sorghum from his land, just enough to feed his extended family for a month.

By contrast, access to irrigation meant that inferior land could be fairly productive. Therefore, households with a modest amount of fertile land or irrigation were often better-off than those with larger plots that were dry and unfertile.

PRODUCTIVE ASSETS: LIVESTOCK

Although lack of land seemed to be the most commonly cited reason for food insecurity, observation and interview revealed that livestock ownership or sale might also be a good indicator. In both villages, the ethnographers observed that poor households rarely owned large livestock. In Shirapur and Aurepalle, large draft animals, specifically bullocks, are necessary to plow the land. Bullocks are so essential that many farmers do not cultivate their land if they do not have access to them or do not have any cash to rent them. The most resource-poor households lack relations with those who own bullocks. A. Sayalu of Aurepalle, for example, owns 2.5 acres of low quality land (*banjar dubba*). Since he does not have access to a bullock, he must either borrow money from the village moneylender (*savakr*) to rent them or let his land sit idle. This year, Sayalu decided to let his brother graze animals on the land rather than farm it. Larger farmers, by contrast, owned a number of large livestock such as cows, bullocks, and buffaloes. These households typically owned irrigated land, which reliably provided crop wastes to feed the animals.

Despite the advantages of owning large livestock, these animals could also become an unnecessary burden to families living on the edge. Usually, if a poor family owned any large animals, it was just one or two. During bad agricultural years (such as the year of our study), fodder and water prices were high and these households could not afford to feed the animals. In Shirapur, for example, the Gofne family was forced to liquidate what seemed to be a profitable asset. Deepak Gofne explained that their bad harvest meant that they must spend exorbitantly to buy fodder for the bullocks.

The experience of the families who owned buffaloes and Jersey cows was similar. Even though Sumit Navendra of Shirapur owned one-and-a-half acres of irrigated land, he could not get enough fodder to feed his three Jersey cows. With the cost of fodder rising, Sumit Navendra sold two of his cows and began to half the amount of fodder fed to his remaining cow. Milk production, he predicted, would fall and it would probably be unprofitable to maintain the last one.

Nevertheless, he felt sentimental about this cow and kept it because it was "lucky." Feeding a Jersey cow, he claimed, was like "raising an elephant" (*hattilla poslyagat*).

Because large livestock often generate income, households are reluctant to liquidate them. However, when they do, it is because they have no other choice. Shaik Abdul Ahemad, an attached laborer[8] from Aurepalle, was planning to sell a milking buffalo for Rs 2,000, even though it provided roughly Rs 250 per month. He and his wife had no stocks of rice and had already cut down on purchases of vegetables, oil, and chilies. Debtors were demanding their money and Abdul Ahemad saw no other way but to sell the buffalo. Selling the buffalo would pay half the loan and allow him to buy rice for the family.

OTHER PRODUCTIVE ASSETS

During our ethnographic work, we also observed that ownership of various other productive assets could either contribute to the food security of the household or destabilize it. In general, it depended on whether the asset allowed the household to rise out of debt or whether it created more debt. In Shirapur, for example, a middle-aged widow named Annapurna began a small business making *chuhlas*, or mud stoves. Her business did not require any capital and, before long, she had saved some money to put toward a chile grinding device. The remainder she took as a loan. Before long, Annapurna's chile grinding business was providing regular income. Within no time, she had paid off her old debts and was making regular payments against her loan. Buying the chile grinder, she said, was the best decision she ever made.

Not all investments worked out, however. Krishnayya, a well digger from Aurepalle, used Rs 10,000 in savings to purchase a crane with a partner. The crane could be used to remove mud from hand-dug wells. Although he would earn about Rs 1,200 for each well contract, Krishnayya miscalculated the demand for the crane as well as the costs of paying a team of laborers to work the crane. As a result, his crane sat idle and his other debts, totaling Rs 1,700, were unpaid. He

took another loan to buy some dry land, but the poor rains meant no harvest this year. Later in the year, we learned that he was forced to migrate to the city to repay his debts.

LIQUIDATABLE ASSETS: SMALL LIVESTOCK, JEWELRY, AND ROOF TILES

Villagers of Aurepalle and Shirapur also invested in items that could be liquidated rapidly and without hassle. The most common asset of this category was small animals, such as goats and sheep. Goats, in particular, did not require special fodder and could survive on "anything green." Acquiring a goat was also not very difficult. Government schemes for those below the poverty line (BPL) were available for buying goats. If one did not qualify for a BPL loan, the local custom of share-rearing allowed a household to acquire an animal by taking care of another household's animal for a period of a year. After the animal has two offspring, the rearer and the owner each take one and the mother is returned to the owner.

Aside from ease of acquisition, villagers reported that goats and sheep were assets that could be sold with relative ease whenever money was needed to repay a debt. In Shirapur, Janabai Mane, an elderly man with three school-aged children, regularly sold sheep whenever he needed cash. Similarly, Krushnabai owned 12 goats and considered them to be her "gold." During times that she urgently needed money, she could sell a goat for Rs 200-600, the equivalent of 20-60 days of wage labor for a woman.

Although small livestock were by far the most common form of liquidatable assets, we observed a few households using other goods as short-term deposits for their wealth. In both villages, we observed that households often liquidate a woman's jewelry when a crisis occurs. For example, Vimal Potdar, a landless woman in Shirapur, had to cope with the costs of a sudden illness. She took a loan using her tin roof as collateral. When she could not repay the loan, she was forced to sell her *mangal sutra*, or marriage necklace, to save the roof. Selling jewelry was also useful to raise cash to make investments, but it often signaled the beginning of more debts. For example, N. Jangayya and his brother both sold their wives

jewelry to raise a down payment on a piece of land. They borrowed the rest, roughly Rs 25,000, from a moneylender at a rate of 36 percent interest.

LOANS

Our ethnographers noted that most food-insecure families were preoccupied with obtaining and paying back loans. Both agreed that a good indicator of household food insecurity was the number of small debts owed. Among the food insecure, it was not uncommon to have a variety of debts. In Aurepalle, five out of the seven case study families were heavily in debt. Pedda Balanna said that he had so many loans, he could not remember the number of people he owed. His wife, Mallamma, said that she did not know how to repay these loans. Almost certainly, they will use a system of *adal-badal* (literally "exchange") to repay. By this, Mallamma meant that she will take a loan from one person to pay another and then take a new loan to pay off the second one. The situation of multiple debts was commonplace. Krishnayya Gouda, for example, owed Rs 3,000 to a moneylender, Rs 1,000 to a cousin, Rs 3,000 to his wife's aunt, Rs 300 to a caste fellow, and a number of small *bakis* (or debts) to clothes merchants and neighbors. The total debt was greater than one year's salary.

In Aurepalle, households held larger sums of debt than in Shirapur. But in both villages, the strategy of juggling small debts from neighbors, shopkeepers, and friends was a remarkably robust finding among the food insecure. Steeped in debt, food-insecure families took small loans (Rs 5 -10) to purchase enough food for one meal. In addition, they borrowed grain, with or without interest, from neighbors, large landowners, and shopkeepers. It was not uncommon for households to have debt at several stores in the village. In Shirapur, for example, Krushnabai explained, "We don't have lumpsum amounts to buy groceries or pay back the credit at once." Instead, she buys on credit from two or three grocers at once, each of whom only allow her a small amount of credit. In this way, Sushilbai juggles her daily food expenses, even though she remains in an endless cycle of debt. Similarly, Sabera

holds credit at three different grocery shops. When a shopkeeper refuses to give her credit, she tries to get credit at another until she can pay back the first one.

Poor households also took loans from local moneylenders at high interest rates. Often, the interest amounted to as much as the principle. Pedda Belanna, for example, took a Rs 312 loan four years ago. After four years, the interest and the principle amounted to Rs 650. Villagers also took large loans from banks or cooperatives, but more often avoided these sources, as the paperwork was too troublesome and confusing. In Aurepalle, bank officers were not as strict about collecting on loans and many villagers were lax about repaying. Here, the ethnographer observed that debt was a "web from which it is difficult to extricate oneself." Many of the villagers felt the same way. One attached laborer, from a Harijian case study family, was "drenched" in debt and finally had to migrate from the village, since he had no possible way to repay it all.

CHOICE OF CROPS CULTIVATED

The choice of crops cultivated often signaled the amount of risk a family was willing to accept. The most food-insecure households, whether they held irrigated or nonirrigated land, were more risk adverse and they often chose crops accordingly. For example, among the families that owned dryland, most could not grow a great variety of crops. In addition, most adopted a strategy of growing crops that did not require much water or other inputs. In Aurepalle, caster (a cash crop) and sorghum (a food crop) were common choices among the poorer farmers. Raju Maisayya, a small farmer from Aurepalle, gambled this year on good rain and planted cotton. Rainfall this year was erratic, however, and the cotton did not grow well. His family had urged him to grow either caster or sorghum, since both grow well in dry, low-input conditions. Investing in cotton, his wife said, was "like throwing money on plants" (*chetla pal*). Similarly, in Shirapur, Dyaneshwar Patil adopted the risk minimizing strategy of farming with a partner and choosing crops that require little water. This year, they are only growing sorghum and Dyaneshwar

expects that as much as 50 percent of the crop could fail due to lack of water. Many other dryland farmers in Shirapur followed a similar strategy.

By contrast, among the households who owned land, those who were able to grow risky cash crops were comparatively food secure. Digamber Gharbude, for example, worked as an attached laborer for three to four years and saved enough to dig a well. Ten years ago, they irrigated their land and their income has changed dramatically. They never have to buy grain and they never substitute inferior quality hybrid sorghum for the preferred local varieties. Aside from sorghum, they are able to take on riskier cash crops such as chilies, onions, corn, groundnut, chickpea, red gram, and sugarcane.

The main difference in crop choice between the food secure and food insecure seemed to be that the food secure could guarantee water for the more risky, but profitable, crops, such as cotton or chilies. For those that were not food secure, the only strategy was to act risk adverse, that is, to plant a crop that would grow under favorable or harsh conditions. In both villages, the emphasis in choice of crop appeared to be on reducing the likelihood of failure, not on whether it was a cash crop or a food crop. Resource poor farmers often chose cash crops, such as sunflower, castor, or safflower, which did not require good soil, purchased inputs, or abundant irrigation.

WAGE WORKERS

In both villages, wage workers with no other source of income were often food insecure. Women wage laborers of Aurepalle commented that their food security for a particular day depended on whether they got work on that day. Hanumamma, an elderly wage worker who supports her disabled husband, depends almost entirely on wage work, but cannot always get it (see Profile 1). Due to the seasonality of the agricultural cycle, the food security status of agricultural wage workers also followed a seasonal pattern. Most wage workers that were interviewed (irrespective of caste) agreed that the period right after the main harvest was a time of relative food security. During this time work was abundant and they

Profile 1: "I Have Buried Eight Sons"

This case study illustrates how old age and lack of family support make it difficult for elderly households to cope. It also illustrates how a change in the household demographics can make a significant change to the food security of those living on the margin.

When we first interviewed Kavali Mogulanna and his wife, Hanumamma, they were living alone. Mogulanna was 78 years old and his wife was 65. He stopped working last year but Hanumamma continued to go for wage work when she could get it. Mogulanna has become so old that he can't even bathe himself anymore. Nevertheless he reported, "my only problem is age, otherwise I am healthy."

Throughout his life, he worked on and off as an attached laborer. Together he and Hanumamma had nine children. "I buried eight sons," she said, and then described how each of seven children died before the age of five. Two lived past their childhood years. Their one remaining child, a daughter, lives in the same village and is also poor. Hanumamma explained that her daughter sometimes sends them food. She elaborated by saying that they had received one-quarter kilo of red gram *dhal* six months ago.

A long time ago, Mogulanna inherited 3.7 acres of land from his father, but they were forced to sell it to pay debts from the marriage of their one son who survived childhood. Their single asset was a baby buffalo, given to them by her brother. Hanumamma explained why she wanted to sell it. "I am finding it difficult to take care of this animal. It needs a lot of food and water, which I can't provide...I have become very old and don't have the energy to look after it."

In her old age, Hanumamma still goes for paddy harvesting so that she will earn in-kind wages. She was unhappy to admit that many people do not want to hire her anymore because she is not quick and efficient; in addition, her vision is bad. After returning from the fields one day, Hanumamma said that she was so tired that she couldn't pound the paddy she earned for dinner. There was no cooked food in the house, so the two went to sleep without eating. "I will tie my stomach with a cloth and go to sleep (*Kadupu biggera katkoni pandkunta*)," she explained. She had done this many times so that she wouldn't feel hungry.

Aside from occasional harvesting jobs, Hanumamma sometimes works as a sweeper in a wealthy landlord's house. They also receive Rs 90 every three months as an old-age pension from the government. But this is hardly enough to survive; most of it goes right away to pay small debts from shopkeepers and neighbors.

were paid in-kind wages. Conversely, the months preceding the harvest are relatively lean.

For wage working families, the lack of regular work during the lean seasons was often exacerbated by increased morbidity among children. The effect of children's illness on household food security of wage households was clearly stated by the women interviewed: during these periods, women often had to forego wage work in order to look after their sick children.

"PERMANENT" OR "ATTACHED" LABORERS

Villagers of Aurepalle and Shirapur agreed that families with an attached laborer were usually food insecure. In Shirapur, villagers reasoned that "no one became a permanent servant unless they were desperate" (*nad aslekich Chakari dharato*). At times of crisis, families became attached laborers to obtain lumpsum amounts to pay off loans, while still ensuring a minimum supply of food. Shaik Abdul Ahemad, for example, needed a large sum of money when his wife became ill. He borrowed it from a large landowner and began working as a permanent servant. Balrappa, of the Gofne family of Shirapur, also worked as a permanent servant to pay off the wedding expenses of his younger brother, Deepak. Neither Balrappa nor Shaik Abdul Ahemad were happy with the terms, but agreed that it was the only way to get a large sum of money advanced when they needed it. While Balrappa was able to extract himself at the end of his contract, Shaik Abdul Ahemad appeared to be in a never ending cycle of debt. As such throughout his life, he frequently rendered his services as an attached laborer.

Most permanent servants affirmed that the salary they received was not enough to support an entire family for a year. In such cases, the rest of the family, particularly the women, were under considerable stress to make up the shortfall. Case studies indicated that the relationship between the laborer and the landlord was fairly exploitative. For example, Yadayya of Aurepalle took a Rs 5,000 loan to pay for his daughter's marriage. To repay this loan, Yadayya had to work for his landlord for two years. With the death of his father, however, and the associated

costs of a funeral, Yadayya estimated that he would be forced to work another year on an attached contract. Other than the lump sum advance, he received no wages and his wife was completely responsible for supporting their family of five. His wife, Satamma, earned six to seven rupees a day (roughly 18 to 24 cents per day) and saw no end to their problems. "It's better to die rather than live this life," she told an investigator ("*Sacci poinde neyamu e batku kanna*").

We conducted interviews in six households with members that worked as attached laborers. Only one family stated that they thought that permanent labor (*jeetam*) was a good option. Raju Maisayya of Aurepalle, for example, has worked as a permanent servant since childhood for a village "rich man" (*dora*). Maisayya and his wife claim that *jeetam* is good because there is assurance of a lump-sum salary and they do not have to search for work daily. In addition, their landlord is a good man; he provides money, fodder, and grain whenever they need it and pays medical bills. They agreed, however, that the work is hard and that their wages are lower than those of a daily agricultural worker. Nevertheless, his landlord has provided him with loans to buy land and he can farm a small plot. In addition, with his wife's wages, they are able to send their only child to school. Maisayya's experience with *jeetam*, however, appears to be exceptional.

WOMEN WITH YOUNG CHILDREN WHO WORK FOR WAGES

Interviews with our case study families, key informants, and observation in the village indicated that women with small infants who still went for wage work often came from food-insecure households. When asked, villagers agreed with this assertion; local customs dictate that a mother should stay with their children, particularly if they are breast-fed. On the whole, women from food secure, particularly, upper caste families, did not work outside their home or their own farms. Conversely, mothers in food-insecure families had no choice but to go for wage work. In Aurepalle, for example, Balamma took her four-month-old daughter, Manjula, to the field when she works. Her family cannot manage alone on her husband's earnings; he says, "*kashtam chesi batkutunnaru*"—"we are surviving

only by working hard." In Shirapur, Manisha also took her infant when she went for sorghum harvesting. During the harvest period, she was employed less than one month, but earned 50 kilograms of sorghum, enough to feed her family for two months.

Many women lamented over having to leave their children unattended while they sought wage work. Jaya Sujatha, for example, passed tenth grade and has a good job in a spinning factory. However, her husband does not contribute regularly to the family income. To feed her family, she will take any job, even agricultural work. Her children "wander the village in (her) absence." "They are too young to take care of themselves," she said, "but what to do?"

MIGRATION IN SEARCH OF WORK

In Aurepalle, migration appeared to be a strong indicator of food insecurity. Wage work within the village was often not available during the lean seasons. Families with no productive activities within the villages sent migrants to cities or to labor-deficit agricultural areas. In Aurepalle, Sayalu migrates in a circular fashion to Hyderabad, 70 kilometers from Aurepalle. There he works as a rickshaw puller for 15 days a month; the remaining 15 days he returns to Aurepalle to be with his family. "I don't have to struggle for jobs. I run a rickshaw in the city and save money for my family," he says. Each month he sends about Rs 250-300 (about US$8-10) to his wife and then seeks work during the 15 days that he is home in the village. If he gets work, then he might earn Rs 100 rupees (US$3) in 15 days. Women also migrated temporarily during the lean season. During the summer (r3) season, four women from the Aurepalle case studies migrated to labor-deficit areas for rice planting or harvesting. All were from food-insecure families that had no other means of making money for food.

Migration, however, appears to be a very village-specific response. In Shirapur, fewer people migrated to the city, even though it was much closer to Sholapur than Aurepalle was to Hyderabad. Investigators claim that Shirapur villagers are not "accustomed" to migrating. In addition, there were several

Employment Guarantee Schemes nearby, although none provided regular work and did not employ all that wanted work. Finally, contractors do not come to Shirapur seeking workers and no groups have formed on their own to migrate as they do in other villages.

HIGH HOUSEHOLD DEPENDENCY RATIOS

Throughout the qualitative work, villagers identified various demographic variables as strong determinants of household food security. More so than the absolute size of the household, the villagers listed characteristics that were related to the number of persons capable of earning money or the number that must be supported by those who work. Many of these variables (e.g., "one person earning," "disabled head of household," "many small children") are related to the *etic* concept of the dependency ratio. For example, the villagers thought that households that were dependent on a single wage earner were at high risk of food insecurity. During the mapping exercises in which they identified the most food-insecure families in their neighborhoods, villagers cited "only one earner" as a common reason for which these households struggled. In Shirapur, for example, 37 percent of the total households identified had only one earner; in Aurepalle, 36 percent of the households identified had one earner.

The villagers also identified households comprised of many elderly or solely elderly members as food insecure. In Aurepalle, 40 percent of households identified during the mapping exercise had an elderly member who could not work for money or could only do light housework. The situation was similar in Shirapur, where 43 percent of the identified households were identified because they had old members. Villagers also noted that many of these elderly households did not have any social support; either their sons did not support them or they did not have any sons. Consequently, they struggled. In Shirapur, one elderly woman, Malanbai, was identified by all mapping groups as being food insecure. Malanbai described herself as so poor that nobody would invite her to a wedding (see Profile 2). She reasoned that it would be odd to have "a rough woollen piece patching up a fancy sari"

Profile 2: "My body has the habit of work, so it is still working."

This story illustrates that sometimes the only resource an elderly widow has is her two hands.

Malanbai, an old widow, attributed her "downfall" to old age, joblessness, loss of a working son and the lack of social support. She was married to an "attached laborer" before she reached menarche. She never saw her husband in the daylight until her first daughter was born.

During the big drought of 1972, her family ate wild weeds to cope. Nevertheless, she lost her husband and four children. Only one son remained. Soon after their deaths, her brother-in-law drove her family out of their house. Malanbai lived with her son and worked to survive; she earned 75 paisa a day (roughly 2 cents). Her son was good to her, but he died young after he stepped on a nail and contracted tetanus. Her daughter-in-law left with her grandchild, who died soon after. Shortly after, her brother-in-law insisted that she repay 1,500 rupees, which he said her husband had borrowed from him. The village *panchayat*, whom she likened to "God," supported this demand.

It took her four years to pay off the loan, but today she is still extremely poor. She never borrows money and does not run credit at any shops. When she doesn't have money, she eats roti with chile or "*kanya*" without sugar or salt. When she has money, she buys a small quantity of cheap vegetables (like eggplant) or low quality dhal. "I don't even look at potatoes and tomatoes," she commented. Her method of coping with poverty was matter-of-fact. "I don't dare ask anybody for money. If I cannot get anything to eat, I drink lots of water and go to bed hungry."

In her elderly state, Malanbai is still considered one of the best wage workers in the village. She works hard and is honest. Employers often seek her when they need workers. "It makes me happy that they remember me for work," she says. Nevertheless, Malanbai is ostracized by her family and relatives; when she enters their house, they cover their cooked food. They do not invite her to weddings or festivals. "I have cleaned everyone's dirt for so long that now they think that I too am dirty," she said. She stopped visiting her daughter because her son-in-law was suspicious that his wife was feeding her mother.

Malanbai knows that her ability to work is her only asset in life. Fearing that she would be helpless if she became sick, she considered selling the half acre of dryland that she still owned. As soon as her son-in-law and brother-in-law heard, they wanted their share. For the time being, Malanbai had given up the idea of selling her land.

("*shalila ghongadiche thigal kashala*"). In her old age, Malanbai had no children who would care for her and she depended completely on daily wage work to support herself. On days that she had no work and no stored food, she says that she "drinks lots of water and sleeps 'hungry'."

During the mapping exercise, villagers also identified households with several small children as food insecure. This indicator was not as strongly associated with food insecurity as the presence of the elderly. Our case study families provide several reasons for which these household were vulnerable. First, child-bearing and caring responsibilities often kept women away from wage work. Chinnama, a 24-year-old mother of five, reported that she lost seven days of wages when her daughter was ill. To tide the family over, she borrowed Rs 20 (equivalent to US$.60—two days wages) from her neighbor to buy food. In Shirapur, a 26-year-old mother named Malabai worked until the eighth month of her first pregnancy. She stayed home for three months after her delivery, but then resumed wage work, since her wages were essential for the family.

Aside from the cost of lost wages, children's sicknesses require money for doctor's visits, transport, and medicines, as well as lost wages for the caretaker. Yelliah Gouda, a toddy tapper, complained about spending roughly 100 rupees per month for his children's medicines (equivalent to roughly 10 of his wife's wage days). Similarly Chinnama claimed that in addition to losing her 7 days of wages she had to pay transport costs and doctor's fees when she took her daughter to see a physician in Amangal. Chinnama explained that if she or her husband become ill they can sleep off the fever. However, if the children become ill she must take them to the doctor despite the cost.

BUYING STAPLES ON A DAILY BASIS

Direct observation and interviews indicated that purchasing staples on a daily basis was a strong indicator of food insecurity. Poor people could not afford to buy enough for long periods of time. They bought cereals at least twice a week, usually after the "wage day." Researchers recorded a number of instances in our case-

study families where mothers purchased only enough food for a few meals at a time. In Aurepalle, Chinnama and Balamma regularly bought only what they needed as they were dependent on daily wages. Sometimes purchasing grains on a daily basis was part of an intricate food security strategy. In Shirapur, Savita was the second wife of a farmer with some irrigated land. Her husband did not support her. To cope, she said that she would buy sorghum on a daily basis whenever she would get wage work. She would save her bag of storable local sorghum for the leanest season. When questioned, villagers agreed that buying staples on a daily basis was an indicator of food insecurity. The Gofne family commented, "One who can't earn enough to store at least for two or three days will buy every day. They are surely food insecure."

Households in which working age adults had physical disabilities or chronic illnesses were also identified as being food insecure during the mapping exercises. We also found examples in our case-study families. Laxman Gore of Shirapur became ill at the age of two. As a result of this sickness, his upper right arm became wasted and now he has a problem getting wage work. Similarly, Yelliah Gouda fell from a toddy tree almost 20 years ago. He can still climb toddy trees, but is unable to do heavy work such as well-digging, road making, plowing, or harrowing. Aside from long-term disabilities, accidents with temporary consequences can bring on large medical expenses, which begin a downward spiral (see Profile 3).

Vinod Manohar of Shirapur used to work on a sand carting truck. However, recently, a motorcycle hit him while he was on his bicycle. One month after the accident, Vinod Manohar was still unable to work and was forced to borrow Rs 2,500 to pay medical expenses. His wife, Archana, said, "Now we have to borrow money for the first time in our life. We are finished."

STAPLE SUBSTITUTIONS

In Shirapur, the normal meal included sorghum *roti* (unleavened bread) with a liquid legume preparation (*dhal*) or a cooked vegetable curry dish. In Aurepalle, the

Profile 3:
"We Have to Borrow Money for the First Time in Our Lives. We Are Finished."

This family's story illustrates how unexpected accidents can set a relatively food-secure family into debt and food insecurity.

Archana and Vinod Manohar live in an abandoned, dilapidated house. Vinod Manohar typically works on a sand carting truck and farms some of his own land. Two weeks ago, Vinod Manohar met with an accident when he was riding his bicycle and hurt his hand and head. He was treated for superficial cuts. Later, he returned to the doctor because his teeth were loose and he felt lots of pain in his jaw. He felt a constant vibration in his head (*dokyala thartharte*). The doctor wired his teeth and jaw and told him to only have milk and an occasional biscuit. He stopped working and his wife began to go for weeding work.

Until this time, the family was doing quite well. Vinod Manohar was an only son and had inherited two acres of dryland. He was a careful farmer and improved the land by manuring. They got good yields and were able to save their money, since they had no children for six to seven years. They bought a cow and fed it well; it was giving two liters of milk a day. Both he and Archana worked and earned about Rs 390 per week (approximately US$13). "We were earning well and our expenses were minimal," he said.

During this time, Vinod Manohar and Archana had no debts. They were doing so well they could afford to spend nearly Rs 10,000 on pilgrimages and rituals so that they could have a child. When Archana became pregnant, they sold the animals so that she could rest. Archana was able to stay home with her son and Vinod Manohar was planning to buy some livestock for her to tend to while at home.

Their plans were dashed with this accident. For the initial check-up, they borrowed RS 500 and the doctor estimates they will need Rs 2,000 more. They had no savings; recently they had spent Rs 4,000 on two acres of land. "Now we have to borrow the money for first time in our life. We are finished" ("*aamachi pachava dharan basali*").

Archana said that they still have one bag of sorghum. They ate one bag of hybrid jowar because it was cheap and was prone to pest infestation (*kid lawkar lagate*). Their bag of local jowar could be stored for two years and would be useful during the rainy season. They were also planning to buy wheat and rice so that the remaining stock of jowar will last them until next harvest.

typical meal was the same except rice was substituted for *roti*. In Aurepalle, families substituted broken rice (available for Rs 3 per kilogram instead of Rs 5.25) or ration rice for their preferred rice. One elderly woman was seen collecting rice that was spilled in the field after the paddy harvest. She also collected a black colored rice (*taal buva*), which had been discarded with the chaff while winnowing. Her employer, a large landowner, let her take it when she sifted and pounded the paddy. In Shirapur, poorer families substituted subsidized sorghum available at the ration shop.

When households do not have enough of even an inferior grain (broken rice or ration rice in Aurepalle or ration sorghum in Shirapur), they often resort to making a solid gruel out of sorghum or millet. In Aurepalle, villagers often make *sanketti*, a solid gruel made from boiled millet or sorghum. Traditionally, this is eaten after the October grain harvest (when people are paid in-kind), but during other times of the year, consumption of *sanketti* is considered to be a sign of stress. When asked, the villagers agreed that this pattern of consumption was consistent with food insecurity. In Aurepalle, a group of women from the *madigas* caste reasoned that *sanketti* did not require any accompaniment of expensive vegetables. Furthermore, only a small quantity of grain could be stretched into a full meal by cooking *sanketti*.

Similarly, in Shirapur, families that did not have enough sorghum to make *rotis* ground the available sorghum, boiled it, and made a thick gruel called *kanya*. All case families interviewed in Shirapur explained that they thought this was a certain indicator of food insecurity. *Kanya*, they said, was an "emergency" food, and was usually eaten for a day or two until the family gathered enough resources to buy enough grain to make *rotis*.

In Aurepalle, villagers spoke of another staple substitute, a thin gruel called *ambali*, which is made of pounded rice. Traditionally, *ambali* is drunk during the summer (r3) to quench thirst. One group of upper caste women said that if *ambali* is eaten in the off-season, it is usually a sign that the household is struggling for food. A group of *madiga* caste (scheduled caste) members said that mostly the

poor *harjian* households eat *ambali*. "*Ambali* quenches their thirst and kills their hunger" ("*doopa arthadi, aakali chasthadi*"). An old man from the group explained that if they drank *ambali* during the day, they will not feel like eating until the evening. Another concluded, "a woman who has suffered and who is hungry will be able to describe these foods. A woman with a full stomach won't be able to say anything" ("*debballu thinna amma, aakali konna amma chopthadi, kadpu nindina amma aemi chopthadi*").

VEGETABLE AND LEGUME SUBSTITUTIONS

In addition to substitutions for staple foods, observation and interview revealed that food-insecure families often substituted cheaper, more accessible, foods for the traditional *dhal* or curry preparations. Families in Shirapur bought broken legumes, such as broken *toor dhal* (*dalga*) or *matki* (33 percent), since it was half the price of proper split *dhal*. In addition to stretching their legume preparations, they often made a, thin, watery *dhal* dish. Sometimes, they substituted eggplant (a relatively cheap vegetable) or spinach for the more expensive *dhal* (35 percent).

During the summer (r3) lean season, some families were not able to purchase *dhal* or vegetables due to lack of wages. Ethnographers in both villages reported that many families collected wild green vegetables as a substitute. The wild vegetables were abundantly available during this season and, when cooked, did not require spices or oil. In Shirapur, investigators found that food-secure families ate certain wild vegetables just to add variety in the diet. However, for many households, consumption of wild vegetables was part of an important strategy to stretch their food budgets during the lean season. Malanbai, the elderly widow from Shirapur, said that she cooked these wild greens so that she could save money for when her monthly allocation from the ration shop became available. If she did not have enough money on the day the food came, she would have to forego her allocation. In the *harijian busti* (neighborhood), one woman showed the investigator a large pot of boiled wild greens that was seasoned only with salt. She

said that this was all her family would have for lunch. One man sitting nearby commented, "What else can we do? We can't even buy oil, salt, or chile powder. (Otherwise) we would just sit (here) and not eat (*tarmadya det basayache*)."

In Aurepalle, observation and interview with case study families also indicated that wild vegetables were an important food resource during the rainy season. Chinnama of Aurepalle collects these vegetables two to three times a week, since she does not need to spend money on them. Eating too much, though, causes vomiting, headaches, and dizziness, commented Balaiah, a *harijian* woman from Aurepalle. She figures that people in the *harijian busti* eat these wild greens at least three times a week. "We can't help it," she continued, "just like goats eat grass, we eat this like grass."

When families were destitute, they ate no *dhal* or curry. In Aurepalle, our ethnographer noted several times that her case study families ate rice with red chilies (*miraga thoku*) when no vegetables or legumes were available. In Shirapur, the traditional way of eating *roti* included a traditional blend of many spices (called black *masala*). Consumption of *roti* with plain red chili was therefore an indication of food insecurity, since black *masala* contained many ingredients such as garlic and expensive oil. During the food chart exercise, the households that reported that they do not run short of food also said that they liberally used good quality spices. By contrast, the poor used small quantities of fewer spices, just enough to flavor the black *masala*.

One case study family said that only the poor eat *roti* with only crushed chilies. Similarly, Laxmamma, a *harijian* woman from Aurepalle, commented that the landlords "never eat chile powder with ration rice. Why would they? They have enough for generations to eat together."

DOWRIES

Throughout India, the tradition of providing dowries for daughters is a huge burden for poor families. Our study villages were no exception. In Shirapur, Pushpa Prakhesh and her daughter-in-laws were so well-off that they never had to

go out for wage work. Nevertheless, she states that they had to sell a lot of land and animals to marry off their three daughters. When asked about her household expenses, she implied that daily expenses were not a problem. However, she remarked, "the major expense is sitting next to you," referring to her fourth daughter.

Many families did not have any resources to sell to raise the dowry money. Instead, they took loans. Janabai Mane of Shirapur had four daughters and one son. For his first daughter's marriage, he borrowed Rs 7,000; for his second, Rs 10,000. Dowries were often multiples of what a family could earn in a single year, hence some people became attached laborers to raise the necessary sum. Many times, dowry money "recycled" itself through some families. The money received from a new daughter-in-law might be used to marry off one of the groom's sisters. It was therefore up to luck whether a family had more girls than boys. Sushelabai had five sons and claimed that it was a "must" to accept the money, even though all the daughter-in-laws had been her husband's nieces. Radhabai of Shirapur has three grand daughters and was clearly on the losing side of the dowry lottery. Realizing this, she lamented "*lokachya tondache zadane potare*,"[9] meaning that dowry not only feeds other people, but also provides for all their future needs.

GIFTS AND OBLIGATIONS TO RELATIVES

The ethnographers noted that many of the food-insecure households had taken large loans to fulfill traditional obligations to family. Many respondents claimed that they had no choice and that it was their duty. The Gofne family, for example, frequently did not have enough food to eat. Nevertheless, they felt obliged to have a large celebration for their daughter-in-law's parents when she matured. Deepak Gofne estimated that out of 100 paise (percent), he had saved only 25 paise for the celebration and would borrow the other 75.[10]

In Aurepalle, families that were food insecure also expressed a need to fulfill social obligations. Sabera Abdul Ahemad's family, which has no rice stocks in the house, is contemplating selling their only buffalo to meet debts and buy rice. Her

husband worked as an attached laborer to pay off the debt. Nevertheless, they are planning to butcher one of their four chickens when their relatives visit. "We have to provide a nice meal for guests. . . .it is our custom," she said.

Some families got themselves into a cycle of irretrievable debt by fulfilling these obligations (see Profile 4). Nandishilor of Shirapur spent lavishly when his wife's relatives came to visit, buying sweets and clothes for them on credit. To get himself out of debt, he became an attached laborer. His children are losing weight and he admits that it might have been foolish. "The guests might have forgotten the gifts (*aher*) that were given them, but we are still suffering in living hell (*narakwas bhogato*)." For the rich, this was not a problem, but to families living on the margin, it often provoked a cycle of debt from which they could never escape.

RELIGIOUS OBLIGATIONS AND HOLIDAYS

Even the poorest case study households expressed a need to celebrate holidays with new purchases and to fulfill religious holidays. In Aurepalle, Chinnama's family often borrows food or grain from neighbors or shopkeepers. Yet last year, her husband, Sayalu, took a loan from the cooperative bank that was supposed to be used to fund income-generating activities. Instead, Sayalu used the money to buy his family new clothes and to celebrate the *dussehra* festival. In Shirapur, Krushnabai, the woman whose postpartum daughter-in-law felt that she could not demand food since she was not working, explained that she had recently bought an "urban looking" outfit for her infant granddaughter. It was her first *marathi* new year and she wanted it celebrated properly.

Aside from holidays, some of our poor case study households undertook unusual lengths to fulfill religious obligations. In Aurepalle, Pedda Balanna (the man who was so steeped in debt that he could not remember how many people he owed) was planning to give up his house and, with his relatives, build a temple on the same site. To buy a new plot and construction materials, he planned to take another loan and sell 20 goats. His wife seemed very proud of their actions and said that during the celebrations at the new temple, her husband will "get god inside of his body."

Profile 4:
"Even a Sinking Person Would Try to Hang on to a Small Stick"

This story illustrates how landlessness, debt, unexpected sickness, and social obligations work together to create a situation of food insecurity.

Nandishilor's family has always been poor, so poor that when it became time for him to seek a bride, no one was willing to "make an alliance" with him. Once, while in Pune, he met Vimal and her brother. They also were very poor. Because they were both poor and unmarriageable, they decided to marry each other. Now they live in Shirapur in a two-room house obtained from the Indira Gandhi Yojna. Nandishilor worked on a sand carting truck and Vimal did not work. Some time ago, Nandishilor became sick and needed an intravenous drip. They owned no land, so Vimal borrowed Rs 500 by offering the tin sheets from her roof as collateral. The moneylender demanded that she give him the sheets; rather than live without a roof, she sold her *mangal sutra* (marriage necklace).

The debt situation worsened, however. Some time ago, some distant relatives came to visit and Nandishilor felt obliged to offer them gifts and good foods. The sweets and clothes were purchased on credit and, four years later, the debt has not been repaid.

With interest, the debt became bigger and bigger and lenders started troubling them. Nandishilor was finally forced to accept work as an attached laborer to pay his debts. He received a lump sum of Rs 500 and was given 28 kilos of sorghum per month. The large debt was paid off. But Nandishilor and Vimal were forced to take small loans, since their in-kind earnings were not enough to make ends meet. To supplement their income, Vimal raised a couple hens to buy *mith-mirchi* (daily groceries). The children demand food that they were once accustomed to eating, but Vimal cannot provide it now. They both see that their children have lost weight.

Vimal said they have passed many nights when they both have cried together. Nandishilor feels guilty because he cannot feed his family enough and his wife has to start working. Their children look after themselves and stay outside the house the entire day. "What to do?," she remarked; her wages are their sustenance. Vimal lamented to our investigator that she had no choice but to work. "*Budtyala tinkyacha aadhar*" she said..."even a sinking person would try to hang on to a small stick."

6. QUANTITATIVE RESULTS

During the course of this study, we considered several different methods to quantitatively evaluate each indicator. The first section of this chapter outlines the choice of method for indicator evaluation. The second section presents the results of a quantitative assessment of indicator performance. The third section uses a simulation to illustrate the potential savings associated with a targeted food distribution program.

6.1 ISSUES CONCERNING CHOICE OF METHOD TO DETERMINE STATISTICAL ASSOCIATION BETWEEN THE BENCHMARK AND THE ALTERNATIVE INDICATOR

At the beginning of the project, we identified a method to evaluate the performance of each indicator. This method, known as the overlap procedure, is described in Haddad, Sullivan, and Kennedy (1992). The overlap method basically asks what proportion of households (or individuals) with a certain indicator characteristic is also food insecure? A strong indicator shows a high (and significant) proportion of observations that are in both the food insecure and target groups. The statistical significance of this "overlap" is determined with a simple t-statistic to determine a significant difference between two proportions. Indicators that are identified as "successful" are submitted to a targeting simulation for a final testing of its ability to distribute food aid to the food insecure.

A preliminary analysis of these data used the overlap method to evaluate indicator performance (Chung, Haddad, and Ramakrishna 1994). An evaluation of these results, however, indicated that the overlap method was flawed for evaluating the performance of the alternative indicators (Cogill 1994, personal communication; Khan and Riely 1995). More specifically, the overlap method rewarded indicators that identified a high proportion of food insecure among the target group, but did not take into account the number of observations misclassified by the indicator. An indicator could therefore appear highly successful with the overlap method, but still be a poor performer due to a high number of false positives and false negatives.

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Relying solely on this criteria, the analysis led to the misidentification of some indicators as "successful" when, in fact, they had relatively low sensitivity and specificity. In addition, other indicators that the overlap method identified as poor performers were actually no worse in terms of sensitivity and specificity than some of the "successful" ones.

In terms of different statistical methods of association, the biostatistics literature suggested the use of a chi-square statistic to test for a statistical association between the benchmark and the candidate indicator (Rossner 1995; Snedecor and Cochran 1989). Beyond the general choice of a chi-square statistic, we explored options for setting the critical value for determining statistical significance. Parallel examples from the literature were nonexistent since (to our knowledge) no study of indicators has attempted an analysis with more than a handful of indicators. Rather, most quantitative analyses have limited the set of candidate indicators to a small number (usually less than 10) taken from a single discipline (Ruel, Rivera, and Habicht 1995; Ross et al.1995; Glewwe and van der Gaag 1990).

For this study, however, we found it difficult to restrict the number of candidate indicators to only a handful. The reasons are threefold. First, we wanted the set of candidate indicators to reflect a multidisciplinary understanding of food security determinants. The food security literature, however, is extremely broad, since it includes all factors that affect food availability, food access, and food utilization. Our preference, therefore, was to find a single method that could test many indicators simultaneously. This would allow for a direct comparison of performance among indicators that cross disciplinary boundaries (and are thus rarely compared).

Second, for practical purposes, different forms of the same indicators are tested. The reasoning behind this seemingly redundant search is simple: food program practitioners are not always in a position to collect the exact data they require. As a result, they must often use existing secondary data sources. To reflect these constraints in data availability, we tested multiple formulations of some

indicators to determine if the formulation affected its performance. As a specific example, we tested several formulations of the dependency ratio to determine how sensitive an indicator's performance may be to its formulation.[11] We also dichotomized various continuous variables and tested both the dichotomized variable and the continuous variable itself. For example, we constructed a dichotomous variable "at least one preschooler sick with diarrhea. . ." from a variable that gave the number of preschoolers in the household that had diarrhea. Both variables were tested to determine if there was anything to be gained from collecting a continuous variable over a simple dichotomous one.

The typical limitations on data availability also suggests that we should be concerned whether an indicator performs equally well at all times of the year. Does it matter, for example, when we collect data to target the chronically food insecure? Are data from one season just as effective as data collected in another? For this reason, we collected indicators in three seasons and tested each for its association with chronic food insecurity. If an indicator performs equally well across the seasons, then it implies that the timing of indicator collection is not important. This information would be especially useful to organizations with limited data collection budgets.

The three factors described above encouraged us to test the performance of a large number of alternative indicators. All in all, we found over 450 variations of food security indicators suggested by the literature that could be tested with our data. This set of indicators is listed in Appendix 7.7 and became our "core set" of alternative indicators. The set was large, however, and this presented a number of methodological problems. First, the test for significant association between the benchmark and the more than 450 core indicators presented a situation of multiple statistical comparisons. Repeating the same "experiment" several times leads to the possibility of obtaining a high number of significant associations purely due to chance. The chance of making such an error can be reduced, using procedures such as the Bonferroni adjustment (Rossner 1995). The Bonferroni procedure adjusts the critical value of the test statistic to ensure that the overall probability of

declaring significant differences between indicators and the alternatives is maintained at some fixed level of significance (say $\alpha = .05$).

The Bonferroni adjustment is a conservative adjustment and it raises the critical value of the chi-square statistic: the more experiments conducted, the higher the value of the critical chi-square statistic. For example, the critical value for a single test of association between a benchmark and an alternative indicator is 3.84; for two indicators, it rises to 5.02; and for three or four indicators, it rises to 6.63 (see Table 6.1). Between 11 to 50 indicators, it rises to 10.83.[12] Beyond 50 indicators, the additional correction required rises rapidly, making it extremely unlikely that any indicator will clear the Bonferroni-corrected chi-square value.

The multiple comparisons problem indicates that there is a large statistical cost to testing more than a handful of indicators. More specifically, increasing the number of indicators tested raises the critical chi-square value, making it harder for an alternative indicator to demonstrate a significant association with the benchmark. To overcome this difficulty, we randomly split the sample into an "exploration" data set and a "confirmation" data set. The exploration data set contained 35 percent of

Table 6.1—The relationship between the number of indicators tested and the critical chi-square statistic needed to determine a significant relationship between the alternative indicator and the benchmark

Number of Indicators Tested	Critical Chi-Square Value Using the Bonferroni Adjustment
1	3.84
2	5.02
3 to 5	6.63
6 to 9	7.88
10 to 50	10.83
above 50	rises to infinity

the sample and was used to screen the more than 450 potential indicators[13] for use in a second round of statistical testing. To do this, the exploration data set was first used to create two-by-two contingency tables for each alternative indicator (Snedecor and Cochran 1989). Chi-square statistics indicating the strength of association between the benchmark and the alternative indicator were calculated. If the chi-square statistic for an indicator exceeded 3.84 (the critical value for significant association [$p < .05$] assuming a single comparison), then that indicator passed into the second round of testing. This initial screening was designed to decrease the number of indicators tested during the second round and therefore lessen the severity of the multiple comparisons problem.

Successful indicators were identified using two criteria. The first group of indicators, designated the "double winners," included indicators that demonstrated a chi-square statistic exceeding the critical value of 3.84 in both rounds of testing. A second group of winners, designated the "Bonferroni winners," included indicators that met stricter performance criteria. This group demonstrated a chi-square statistic greater than 3.84 in the screening round and a significant chi-square statistic using the Bonferroni adjustment in the second round. Results from both performance criteria are reported, as they illustrate the range of results that are possible, given different requirements for indicator performance. While the group of double winners represents a group of indicators that succeeded under the least conservative criteria, the Bonferroni winners represent the group that succeeded under the most conservative criteria; the double-winner group no doubt includes some indicators that are random winners, while the Bonferroni group no doubt excludes indicators that are truly useful.

6.2 A QUANTITATIVE ASSESSMENT OF THE PERFORMANCE OF THE ALTERNATIVE INDICATORS

A quantitative assessment of the performance of the alternative indicators is summarized in the tables below. Each table reports the results of the statistical tests of association between the core set of alternative indicators and one of the six

benchmark indicators of food insecurity: (1) chronic household food insecurity, (2) acute household food insecurity, (3) chronic preschooler food insecurity, (4) acute preschooler food insecurity, (5) household vitamin A insecurity, and (6) household iron insecurity. Since many indicators were tested, the performance of only selected indicators are shown. Each table reports the chi-square statistics for (1) indicators that passed the first screening test for significant association with the benchmark (chi-square > 3.84) and (2) indicators that are commonly collected in field surveys and are often used as proxies for low economic status.[14] The last two columns indicate whether the alternative indicator was successful according to the Bonferroni or double winner criteria.

The results are somewhat surprising. Few indicators were identified as "successful," using even the less conservative criteria represented by the double winners. Even fewer successful indicators were identified in the household-level analyses and none were successful at the preschooler level. Very few indicators of vitamin A deficiency were identified and none were identified for iron deficiency. Below, we discuss the results for each benchmark analysis.

6.2.1 *Chronic Household Food Insecurity*

For this analysis, we defined a household to be chronically food insecure if caloric adequacy fell below 70 percent in four of six dietary visits during the entire study period.[15] The choice of 70 percent as the benchmark cutoff was based on a calculation of the energy required to sustain a minimum activity lifestyle.[16] Under this definition, approximately 32 percent of all households were chronically food-insecure.

The results of the chronic household analyses are shown in Table 6.2. Several alternative indicators showed a strong association with the benchmark for chronic household food insecurity. None, however, showed a significant association with the benchmark in every season.

The indicators that showed the strongest performance (i.e., that met the Bonferroni criteria) came from the household food frequency questionnaire[17]; as

Table 6.2—Performance of selected alternative indicators of chronic household food insecurity

Indicator	Exploration Data Set			Confirmation Data Set			Double Winner?	Bonferroni Winner?
	χ_1^2	$Se_1 + Sp_1$	n_1	χ_2^2	$Se_2 + Sp_2$	n_2		
Alternative indicators screened in First Round								
Household located in Shirapur	4.75	124	97	4.39	114	196	Yes	No
High number of preschoolers in household, r1	5.04	127	97	4.57	116	196	Yes	No
Infrequent consumption of meat, r2	11.96	139	96	11.90	126	195	Yes	Yes
Infrequent consumption of eggs, r2	7.94	133	96	2.78	114	195	No	No
Frequent consumption of wheat, r2	8.14	133	97	2.30	112	195	No	No
Frequent consumption of fats or oils, r2	6.96	132	96	18.44	133	195	Yes	Yes
Frequent consumption of sugar or jaggery, r2	6.38	131	97	14.23	129	195	Yes	Yes
Frequent consumption of sorghum, r2	5.11	128	96	14.76	131	195	Yes	Yes
Frequent consumption of tea with milk, r2	4.78	127	96	7.97	122	195	Yes	No
Frequent consumption of nuts, r2	4.80	125	97	3.73	114	195	No	No
Frequent consumption of wheat, r3	5.54	127	97	7.92	120	196	Yes	No
Frequent consumption of sugar, r3	4.54	126	97	21.06	136	196	Yes	Yes
Frequent consumption of fats or oils, r3	4.15	126	97	18.37	133	196	Yes	Yes
Frequent consumption of pearl millet, r3	4.75	124	97	2.73	88	196	Yes	No
Frequent consumption of buns/bread, r3	4.06	124	96	2.92	113	196	No	No
High number of chickens owned, r2	4.27	124	96	3.68	114	192	No	No
High percent of food consumed from gifts, r3	6.20	124	96	0.49	106	196	No	No
Other commonly cited indicators								
Low per capita total expenditures (mean of 3 rounds)	1.53	115	95	6.52	118	192	No	No
Low per capita food expenditures (mean of 3 rounds)	1.97	116	95	3.06	113	192	No	No
High food share of total expenditures (mean of 3 rounds)	3.07	120	95	5.07	116	191	No	No
Forward caste	12.46	55	97	0.00	101	196	No	No
Backward caste	1.05	44	97	0.12	103	196	No	No
Scheduled caste	6.35	75	97	0.36	95	196	No	No
High household size (r 1)	0.17	93	97	0.73	107	196	No	No
High dependency ratio 2 (r1): Number of preschoolers/total number in household	2.72	118	97	2.92	113	196	No	No
High dependency ratio 10 (r1): Total number in household/ (total number in household - number of disabled)	1.34	114	97	3.04	113	196	No	No
Low per capita area of agricultural plots controlled by household (mean of 3 rounds)	0.00	103	82	1.76	111	168	No	No
Low per capita sum of cultivated land (mean of 3 rounds)	0.00	100	83	0.01	112	170	No	No
Low per capita number of agricultural plots controlled by household (mean of 3 rounds)	0.09	103	61	1.76	100	123		

Se = Sensitivity
Sp = Specificity

such, they represent information about the frequency of consumption of various foods. A priori one would expect that certain foods would be more commonly consumed by food-insecure groups and other foods more commonly consumed by more food-secure groups. The results, however, run counter to this logic. First, most of the indicators that are successful in locating the food insecure represent "more frequent" consumption of high-income elasticity foods, such as fats, oils, nuts, sugar, wheat, and processed cereal foods (buns/bread).[18] A priori we would expect that food-secure families would be more likely to consume these foods than food-insecure families. Yet, only one dietary indicator appears to be consistent with economic theory; "infrequent consumption of meat" is statistically correlated with chronic food insecurity. In addition, most of these counterintuitive dietary indicators appear more successful at identifying the food insecure than those suggested by the conventional poverty literature (e.g., indicators representing household expenditures, demographics, landholdings, and caste).

Previous analyses of the dietary data are helpful for interpreting these counterintuitive results. More specifically, a recent study on dietary patterns split the sample by state (Maharashtra vs. Andhra Pradesh) and then calculated the calories (per adult equivalent) derived from different food sources (Chung and Bouis 1996). The results showed very different dietary patterns between the two states (Table 6.3). More specifically, the villages located in Maharashtra (Shirapur and Kanzara) consumed more energy from sorghum and wheat than the study villages located in Andhra Pradesh (Aurepalle and Dokur). In addition, households in the Maharashtran villages typically consumed more energy from fats, oils, nuts, and sugar.

The set of dietary indicators shown in Table 6.3 mirrors the dietary trends shown in Table 6.2. When taken together, the set of "successful" dietary indicators describe the Maharashtran diets relative to the Andhran diets; Maharashtran diets are higher in sorghum, wheat, oil, sugar, and nut consumption relative to the Andhran diets. As a result, we interpret the joint performance of these dietary indicators to be more representative of the location they represent

Table 6.3—Energy sources by food source and location of village

Village/ Food Group	Energy Intakes Per Adult Equivalent			
	Expenditure Tertile			
	1	2	3	All
	(kilocalories)			
Maharashtra villages				
Rice	53	83	96	77
Sorghum	946	1,092	1,047	1,028
Millets	18	1	13	11
Other cereals	407	257	307	324
Pulses	153	131	97	127
Milk products	30	55	72	52
Other vegetables	21	19	19	20
Fruits	12	9	7	9
Cooking ingredients	366	352	409	376
Meat	6	5	5	5
Green leafy vegetables	3	5	8	5
All cereals	1,424	1,433	1,463	1,440
Total All	2,014	2,008	2,081	2,034
Andhra Pradesh villages				
Rice	1,774	1,714	1,602	1,696
Sorghum	260	289	259	269
Millets	23	72	54	50
Other cereals	10	24	15	16
Pulses	40	45	51	45
Milk products	60	62	100	74
Other vegetables	25	26	27	26
Fruits	2	9	3	5
Cooking ingredients	140	154	192	162
Meat	8	11	10	10
Green leafy vegetables	2	2	1	2
All cereals	2,067	2,099	1,930	2,031
Total All	2,344	2,408	2,314	2,356

Source: Chung and Bouis (1996).

rather than any causal pathway involving any one of these foods per se. In short, each significant food consumption variable is in effect acting as a proxy for a location or geographic indicator. The plausibility of the geographic indicators is supported by the performance of the "Shirapur village" indicator in identifying the chronically food insecure.

Aside from the Shirapur and food frequency indicators, the only other successful indicator was the number of preschoolers in the household. This indicator, however, only succeeded during one season, using the more liberal double-winner criteria. Given that the number of preschoolers is not expected to change drastically from round to round, it is doubtful that it is a robust indicator of chronic household food insecurity. The lack of robustness of a relatively "structural" indicator (one that is not expected to change in the short term) suggests that this double winner may, in fact, be a random winner in both rounds of testing.

6.2.2 *Acute Household Food Insecurity*

For this analysis, we focus on *abrupt changes* in household caloric adequacy. To construct a "benchmark" of acute household food insecurity, we identified households that plunged from a state of food security into a state of food insecurity. To do this, we defined two points between which we could assess the changes in food security status. In this region, seasonality varies among the villages, but the third round is a lean season for all (during this time, the rains have not yet begun and little work is available). As such, the period between round two (the post-rainy season) and round three (late summer, early kharif season) was a good time to assess acute changes in food security.

To construct a benchmark of acute household food security, we defined a household to be acutely food insecure if (1) its household caloric adequacy ratio drops below 70 percent between rounds two and three OR (2) its calorie adequacy ratio is already below 70 percent in round two and drops 10 percent or more in the subsequent round.[19] Indicators collected in the second round (the post-rainy

season) were tested for their ability to predict a fall into food insecurity during the third round (late summer, early kharif season).

The results of the acute household analyses are shown in Table 6.4. Several alternative indicators showed a strong association with the benchmark of acute household food insecurity. Among the strong performers are the food frequency indicators representing frequent sugar, sorghum, fats and wheat consumption. As with the chronic indicators, we interpret the joint performance of these dietary indicators to be representative of the location they represent rather than any causal pathway involving any one of these foods per se. As explained earlier, we believe that each of these indicators acts effectively as a proxy for a location or geographic indicator.

In addition to the proposed geographic indicators, two other alternative indicators performed well. Both involved the acquisition of foods: households that consumed a high percentage of foods from gifts and households that obtained a high number of foods on a weekly basis. These findings reflect behavior that is consistent with our expectations of food-insecure households; households under stress consume foods from gifts (a local euphemism for a food loan or a handout) and obtain many foods on a weekly basis (ostensibly because wages are paid once a week in these villages). These findings are also consistent with accounts that came out of the ethnography. Food-insecure households often borrowed and loaned foods for short periods of time and bought food immediately on wage days. The fact that these indicators are predictive of household falling into food insecurity in the subsequent round indicates that coping strategies for households "on the brink" begin long before the household actually drops into acute food insecurity.

6.2.3 *Chronic Preschooler-level Food Insecurity*

For this analysis, we defined a preschooler as chronically food insecure (PCFIS) if the Z-score for height-for-age was below -3.0. This cutoff point corresponded to the bottom 30 percent of sample distribution for height-for-age. A high level of chronic preschooler food insecurity was evident in the study villages:

Table 6.4—Performance of selected indicators of acute household food insecurity

Indicator	Exploration Data Set χ_1^2	Se_1+Sp_1	n_1	Confirmation Data Set χ_2^2	Se_2+Sp_2	n_2	Double Winner?	Bonferroni Winner?
Alternative indicators screened in First Round								
High percentage of food consumed from gifts, r2	5.50	126	97	4.92	118	193	Yes	No
High number of food consumed obtained on weekly basis, r2	4.08	124	97	8.33	124	194	Yes	Yes
Frequent nuts/oilseeds consumption, r2	8.22	133	97	1.38	110	196	No	No
Frequent tea with milk consumption, r2	6.17	131	96	9.29	127	196	Yes	Yes
Frequent sugar consumption, r2	5.60	129	96	14.10	133	196	Yes	Yes
Frequent sorghum consumption, r2	4.16	126	97	4.80	119	196	Yes	No
Frequent fats/oils consumption, r2	4.07	125	96	10.66	129	196	Yes	Yes
Frequent wheat consumption, r2	4.24	125	97	8.93	126	196	Yes	Yes
Lives in Shirapur (yes)	8.19	132	96	3.68	114	192	No	No
High dependency ratio 2, r2	5.46	125	97	0.54	107	197	No	No
High dependency ratio 5, r2	5.46	125	97	0.54	107	197	No	No
High percent preschoolers in household, r2	5.46	125	97	0.54	107	192	No	No
High value of food consumed as gifts, r2	5.49	126	97	3.04	115	194	No	No
Household has a high number of loans, r2	4.66	124	97	1.16	111	197	No	No
High number of foods consumed from gifts, r2	7.24	130	97	1.43	111	194	No	No
Other commonly cited indicators								
Low per capita total expenditures (mean of 3 rounds)	1.03	113	95	0.09	105	192	No	No
Low per capita food expenditures (mean of 3 rounds)	0.01	104	95	0.05	103	193	No	No
High food share of total expenditures (mean of 3 rounds)	4.30	124	95	0.01	102	191	No	No
Forward caste	4.75	125	97	0.39	106	197	No	No
Backward caste	0.62	88	97	1.87	87	197	No	No
Scheduled caste	1.54	87	97	0.63	107	197	No	No
High household size (r1)	1.91	83	97	0.02	102	197	No	No
High dependency ratio 2 (r1): Number of preschoolers/ total number in household	1.72	116	97	0.54	107	196	No	No
High dependency ratio 10 (r1): Total number in household/ (total number in household - number of disabled)	5.46	125	97	0.24	105	197	No	No
Low per capita area of agricultural plots controlled by household (mean of 3 rounds)	0.01	98	82	1.41	89	168	No	No
Low per capita sum of cultivated land (mean of 3 rounds)	3.69	72	61	1.75	86	123	No	No
Low per capita number of agricultural plots controlled by household (mean of 3 rounds)	0.03	95	83	0.00	98	170	No	No

Notes: Se = Sensitivity
Sp = Specificity
r1 = Round 1, late kharif season
r2 = Round 2, post-rainy season
r3 = Round 3, late summer/early kharif season

47 percent of the preschoolers in Kanzara were chronically food insecure, 37 percent in Dokur, 27 percent in Shirapur, and 20 percent in Aurepalle.

The results for these analyses are shown in Table 6.5. Most striking is the fact that no alternative indicators (at the household level) are successful at identifying the PCFIS. Two of the alternative dietary indicators (frequent consumption of oils in rounds one and two) were screened as potential indicators in the first round of testing, but appeared to be "random winners," since they failed to perform in the second round of testing. None of the more conventional poverty indicators performed well at identifying the PCFIS either.

6.2.4 *Acute Preschooler Food Insecurity*

We defined a preschooler to be acutely food insecure (PAFIS) if he/she is among the worst 30 percent of preschoolers in terms of a drop in Z-score weight-for-height between rounds 2 and 3. This drop corresponds to a difference of .4 in the weight-for-height Z-score.

The same set of core alternative indicators were tested for their association with PAFIS. Again, as with the chronic preschooler analysis, no alternative indicators could be found that significantly predicted the specified drop in weight-for-height between rounds 2 and 3 (see Table 6.6). In addition, none of the more conventional poverty indicators performed well at identifying the food insecure.

6.2.5 *Household Micronutrient Insecurity*

This section discusses the indicators for identifying households with women or preschoolers with vitamin A and iron deficiencies. For these analyses, the "benchmarks" of micronutrient adequacy are based on serum measurements of vitamin A and hemoglobin. Samples were collected from preschoolers and women in Shirapur and Aurepalle villages in two different seasons.[20] Because our aim was to identify households with vitamin A and iron deficient preschoolers or women, households without preschoolers or women of reproductive age were excluded from these analyses.

Table 6.5—Performance of selected alternative indicators of chronic preschooler food insecurity

Indicator	Exploration Data Set			Confirmation Data Set			Double Winner?	Bonferroni Winner?
	X_1^2	Se_1+Sp_1	n_1	X_2^2	Se_2+Sp_2	n_2		
Alternative indicators screened in First Round								
Frequent consumption of fats and oils by household, r1	5.34	123	122	1.58	109	239	No	No
Frequent consumption of fats and oils by household, r2	5.66	126	115	1.02	108	225	No	No
Household has more than one income source (yes), r1	4.54	122	122	0.13	103	241	No	No
High number of household members engaged in a caste occupation (yes), r2	4.17	117	119	0.14	2	139	No	No
High number of household members engaged in a caste occupation (yes), r3	3.92	116	114	0.05	102	134	No	No
Low number of foods purchased per fortnight, r1	6.93	124	122	0.66	94	240	No	No
High percent of foods consumed from stocks, r2	9.57	128	118	0.26	104	234	No	No
Low number of foods purchased per week, r2	5.30	122	118	0.23	103	236	No	No
Low number of nonfoods purchased per year, r1	7.88	125	122	0.09	103	239	No	No
Household gave gifts, r2	4.39			0.00				
Low number of nonfoods purchased per week, r1	5.59	122	122	0.12	97	239	No	No
Household does not have a vegetable garden, r1	5.73	118	122	0.02	102	241	No	No
Household does not have a vegetable garden, r2	4.16	115	118	0.32	104	234	No	No
Low number of kind loans given out, last month, r1	5.72	118	122	0.02	101	239	No	No
Did not give gifts in r2	6.63	127	119	0.06	103	234	No	No
Other commonly cited indicators (household level)								
Low per capita total expenditures (mean of 3 rounds)	0.21	106	112	0.67	93	233	No	No
Low per capita food expenditures (mean of 3 rounds)	0.00	98	112	3.31	112	225	No	No
High food share of total expenditures (mean of 3 rounds)	0.00	101	112	0.00	99	227	No	No
Forward caste	0.02	103	122	1.70	92	243	No	No
Backward caste	0.10	95	122	0.07	103	243	No	No
Scheduled caste	0.00	102	122	0.75	106	243	No	No
High household size (r1)	0.09	104	122	0.00	101	241	No	No
High dependency ratio 2 (r1): Number of preschoolers/ total number in household	2.46	85	122	0.59	94	241	No	No
High dependency ratio 10 (r1): Total number in household/(total number in household - number of disabled)	0.02	103	122	0.35	105	241	No	No
Low per capita area of agricultural plots controlled by household (mean of 3 rounds)	0.58	110	92	0.08	97	203	No	No
Low per capita sum of cultivated land (mean of 3 rounds)	1.13	116	65	0.01	99	142	No	No
Low per capita number of agricultural plots controlled by household (mean of 3 rounds)	0.35	92	92	0.69	107	203	No	No

Notes: Se = Sensitivity
Sp = Specificity
r1 = Round 1, late kharif season
r2 = Round 2, post-rainy season

Table 6.6—Performance of selected indicators of acute preschooler food insecurity

Indicator	Exploration Data Set χ_1^2	$Se_1 + Sp_1$	n_1	Confirmation Data Set χ_2^2	$Se_2 + Sp_2$	n_2	Double Winner?	Bonferroni Winner?
Alternative indicators screened in first round testing								
Household did not give gifts, r2	5.29	130	75	5.49	122	153	Yes	No
Household did not give cash transfers, r2	6.68	134	75	1.31	112	153	No	No
Low number not able to work, r2	7.95	134	75	0.29	106	154	No	No
Low number dependency ratio #7, r2	8.61	132	75	1.50	111	154	No	No
Low number dependency ratio #1, r2	5.67	130	75	0.92	109	154	No	No
Low number dependency ratio #4, r2	5.48	126	75	0.93	109	154	No	No
Low number dependency ratio #8, r2	4.37	124	???	1.27	113	154	No	No
Low number dependency ratio #10, r2	4.00	112	75	1.07	110	154	No	No
Low number dependency ratio #3, r2	4.00	122	75	1.07	110	154	No	No
Low number dependency ratio #9, r2	4.00	122	75	0.09	104	154	No	No
Number of agricultural workers	5.84	132	75	1.77	117	91	No	No
Other commonly cited indicators								
Low per capita total expenditures (mean of 3 rounds)	0.00	97	74	0.64	108	149	No	No
Low per capita food expenditures (mean of 3 rounds)	1.71	83	74	0.03	103	149	No	No
High food share of total expenditures (mean of 3 rounds)	0.17	107	74	0.04	97	149	No	No
Forward caste	0.36	85	75	0.02	97	154	No	No
Backward caste	2.09	120	75	2.34	115	154	No	No
Scheduled caste	0.05	95	75	2.72	88	154	No	No
High household size, (r2)	1.06	87	75	4.12	80	97	No	No
High dependency ratio 2 (r2): Number of preschoolers/ total number in household	3.06	120	75	3.24	116	136	No	No
High dependency ratio 10 (r2): Total number in household/(total in household − number of disabled)	4.01	122	75	1.07	110	97	No	No
Low per capita area of agricultural plots controlled by household (mean of 3 rounds)	0.07	99	75	1.08	90	154	No	No
Low per capita sum of cultivated land (mean of 3 rounds)	0.20	87	75	0.00	102	154	No	No
Low per capita number of agricultural plots controlled by household (mean of 3 rounds)	0.33	112	75	0.66	91	154	No	No

Notes: Se = Sensitivity
Sp = Specificity
r1 = Round 1, late kharif season
r2 = Round 2, post-rainy season

Tables 6.7 and 6.8 provide an overall picture of vitamin A and iron status in the study area. Mean levels of serum vitamin A are shown in Table 6.7. For women, there is a significant decline in serum vitamin A between the late kharif season (round 1) and the late summer season (round 3). There is no significant difference between the villages in the incidence of vitamin A deficiency of preschoolers or women.

Table 6.8, however, shows that iron deficiency is clearly a serious problem in both Aurepalle and Shirapur.[21] In Aurepalle, over 60 percent of preschoolers fall below the WHO cutoff for anemia in both rounds. For women, only 47 percent were anemic in the first round, but iron status fell in the third round, leaving 75 percent of the women sampled anemic. In Shirapur, anemia values also rose during the third round. In the first round, 57 percent of the women were anemic and, by the third round, 81 percent were anemic. Preschooler values followed a similar trend: 65 percent were anemic in the first round, worsening to 84 percent in the third round.

These high rates of anemia and vitamin A deficiency are characteristic of these parts of South Asia (ACC/SCN 1992). As such, food aid programmers may be interested in identifying households with micronutrient deficiencies. However, programmers may be hindered by their capacity to collect individual-level measurements. To address this constraint, the micronutrient indicator analyses focuses on testing the association between the core set of alternative indicators and two different micronutrient benchmarks, both which are defined at the household level. Separate analyses were undertaken for each micronutrient in each season. For the vitamin A work, a household is considered vitamin A-insecure if at least one woman or preschooler in the household falls below the WHO cutoffs. A similar benchmark indicator is derived for household iron security. Households are considered to be iron-insecure if at least one woman or preschooler in the household falls below the NHANES II cutoff (Pilch 1985).

Constructing micronutrient indicators at the household level is a novel idea, particularly since individual serum measurements are already available. This

Table 6.7—Mean serum vitamin A (ug/dL) and percentage below NHANES II cutoffs[a] by season, age group and village

Village	Round 1: Late Kharif Season				Round 3: Late Summer Season			
	Mean	Standard Deviation	Percentage Below Cutoff	N	Mean	Standard Deviation	Percentage Below Cutoff	N
Aurepalle								
Preschoolers	29.5[b]	13.3	20.0	50	31.1[b]	13.6	11.7	60
Women	41.3[d]	15.1	4.8	62	35.4[dc]	10.3	4.2	48
Shirapur								
Preschoolers	22.6[b]	8.0	50.0	34	24.4[b]	7.5	28.6	49
Women	34.3[d]	12.3	11.1	54	28.8[dc]	10.1	14.0	43

[a] World Health Organization (1972).
[b] Significant difference in preschoolers' serum vitamin A values in Aurepalle and Shirapur.
[c] Significant difference in women's serum vitamin A values in Aurepalle and Shirapur.
[d] Significant decline in serum vitamin A values between seasons.

Table 6.8—Mean blood hemoglobin (g/dL) with percentage below WHO cutoffs[a] for anemia by season, age group and village

Village	Round 1: Late Kharif Season				Round 3: Late Summer Season			
	Mean	Standard Deviation	Percentage Below Cutoff	N	Mean	Standard Deviation	Percentage Below Cutoff	N
Aurepalle								
Preschoolers	10.1	1.8	68.0	50	10.5	1.5	63.3	60
Women	11.9	1.4	46.8	62	11.3[b]	1.4	75.0	48
Shirapur								
Preschoolers	10.7[c]	1.3	64.7	34	9.6[c]	1.8	83.7	49
Women	11.4[c]	1.9	57.4	54	10.2[cb]	1.6	81.4	43

[a] Pilch (1985).
[b] Significant difference between blood hemoglobin levels in Aurepalle and Shirapur.
[c] Significant decline in blood hemoglobin values between seasons.

strategy, however, is consistent with the spirit of testing simple protocols for identifying targeting instruments. If successful, these analyses could provide a basis for less complicated data collection protocols by targeting agencies.

Vitamin A deficiency

The results for the late-kharif season analyses (round one) are shown in Table 6.9 and those for the late-summer season (round three) are shown in Table 6.10. For each analysis, the benchmark for vitamin A insecurity was a simple dummy variable indicating whether a household contained at least one woman or preschooler that was deficient in vitamin A during that round (as determined by the NHANES II cutoffs) (Pilch 1985).

For the late kharif-season, a number of alternative variables screened into the second round of testing (Table 6.9). Many of them were indicators from the food frequency questionnaire. Most of them, however, did not perform well in the second round of testing. Only one of the screened indicators qualified as a double winner: household with a high number of preschoolers.

For the late-summer season (round three), very few alternative indicators screened into the second round of testing (Table 6.10). Only two alternative indicators qualified as double winners: households with a high number of preschoolers and households that had at least one preschooler with diarrhea during the last 14 days. Of these two, only the latter qualified as a Bonferroni winner.

Few indicators were produced from the vitamin A analyses. Yet the two suggested from these analyses are related to a plausible causal pathway. Households with more preschoolers, and households containing preschoolers with diarrhea, appear to be more likely to have vitamin A-deficient women and children. These indicators are logical given our knowledge of (1) the linkages between morbidity and vitamin A deficiency and (2) the competition for care and proper nourishment within households with many preschoolers. Note, however, that only the latter indicator (a more structural indicator) was robust across seasons. By contrast, the former indicator appears to be more season-specific. Given that

Table 6.9—Performance of selected alternative indicators of vitamin A insecurity, round 1, late kharif season

Indicator	Exploration Data Set			Confirmation Data Set			Double Winner?	Bonferroni Winner?
	χ_1^2	Se_1+Sp_1	n_1	χ_2^2	Se_2+Sp_2	n_2		
Alternative indicators screened in first round testing								
Frequent consumption of nuts/oilseeds	8.31	148	45	2.47	124	75	No	No
Frequent consumption of rice	7.52	144	45	0.07	106	75	No	No
Frequent consumption of green leafy vegetables	7.52	144	45	0.43	112	75	No	No
Frequent consumption of sorghum	4.54	138	45	0.22	110	75	No	No
Frequent consumption of tea with milk	4.54	138	45	0.11	108	75	No	No
Frequent consumption of pulses	5.31	137	45	2.13	121	75	No	No
Number of preschoolers in household, (r1)	8.95	153	45	4.47	131	75	Yes	No
At least one preschooler sick with diarrhea in the last 14 days, r1	4.06	134	45	4.56	131	75	Yes	No
High dependency ratio #4, r1	10.01	151	45	2.13	121	75	No	No
High dependency ratio #7, r1	5.61	142	45	0.93	93	75	No	No
High dependency ratio #8, r1	4.78	478	45	0.93	93	75	No	No
Household lives in Shirapur	4.54	138	45	0.22	110	75	No	No
High number of foods consumed per week, r1	4.78	138	45	1.45	172	75	No	No
Did not give cash transfer last month, r1	6.55	146	45	0.99	117	75	No	No
Other commonly cited indicators								
Low per capita total expenditures (mean of 3 rounds)	0.80	118	43	0.73	86	70	No	No
Low per capita food expenditures (mean of 3 rounds)	0.80	118	43	0.04	94	71	No	No
High food share of total expenditures (mean of 3 rounds)	0.02	107	43	0.00	95	70	No	No
Forward caste	0.10	100	45	0.49	106	75	No	No
Backward caste	0.72	100	45	0.11	108	75	No	No
Scheduled caste	0.09	99	45	1.24	86	75	No	No
High household size, (r1)	0.32	114	45	1.06	106	75	No	No
High dependency ratio 2 (r1): Number of preschoolers/total number in household	3.04	131	45	0.43	112	75	No	No
High dependency ratio 10 (r1): Total number in household/(total number in household − number of disabled)	3.04	131	45	0.74	114	75	No	No
Low per capita area of agricultural plots controlled by household (mean of 3 rounds)	0.02	108	39	0.15	109	61	No	No
Low per capita sum of cultivated land (mean of 3 rounds)	0.00	107	28	0.09	110	46	No	No
Low per capita number of agricultural plots controlled by household (mean of 3 rounds)	3.58	134	39	0.02	102	61	No	No

Notes: Se = Sensitivity
Sp = Specificity
r1 = Round 1, late kharif season

Table 6.10—Performance of selected alternative indicators of vitamin A security, round 3, late summer, early kharif

Indicator	Exploration Data Set			Confirmation Data Set			Double Winner?	Bonferroni Winner?
	X_1^2	Se_1+Sp_1	n_1	X_2^2	Se_2+Sp_2	n_2		
Alternative indicators screened in first round testing								
Number of preschoolers in household, r3	3.89	143	44	3.89	130	71	Yes	No
At least 1 preschooler sick with diarrhea in the last 14 days, r3	4.56	141	43	8.23	139	71	Yes	No
High number of preschoolers, r3	4.47	143	44	3.88	130	71	Yes	No
Other commonly cited indicators								
Low per capita total expenditures (mean of 3 rounds)	0.14	101	42	0.24	90	68	No	No
Low per capita food expenditures (mean of 3 rounds)	0.14	86	42	0.19	91	68	No	No
High food share of total expenditures (mean of 3 rounds)	0.13	114	42	1.19	116	68	No	No
Forward caste	0.39	118	44	0.12	108	72	No	No
Backward caste	1.09	77	44	0.01	102	72	No	No
Scheduled caste	0.00	108	44	0.41	90	72	No	No
High household size, r3	0.91	124	44	0.13	116	71	No	No
High dependency ratio 2 (r3):Number of preschoolers/total number in household	0.47	119	44	0.13	116	71	No	No
High dependency ratio 10 (r3): Total number in household/(total number in household – number of disabled)	0.77	122	44	0.13	108	71	No	No
Low per capita area of agricultural plots controlled by household (mean of 3 rounds)	0.00	108	38	1.56	80	58	No	No
Low per capita sum of cultivated land (mean of 3 rounds)	0.18	96	28	0.81	82	45	No	No
Low per capita number of agricultural plots controlled by household (mean of 3 rounds)	0.03	95	38	0.09	100	58	No	No

Notes: Se = Sensitivity
Sp = Specificity
r3 = Round 3, late summer/early kharif season

sickness is more prevalent during the period following the rain, it is logical that the diarrhea indicator performs best during the late-kharif season (round 1).

Aside from these few successful alternative indicators, none of the more conventional poverty indicators performed well as a whole. None showed a significant association with the benchmark indicator of vitamin A insecurity.

Iron deficiency

The high levels of anemia in the area suggest that it may not be necessary to target an iron-improvement program. However, under the assumption that intervention resources will always be limited, we explored the possibility of developing alternative indicators of iron deficiency. Again, because practitioners cannot always target at the individual level, we searched for household-level indicators that could identify households containing no iron deficient preschoolers or women of reproductive age. The benchmark for iron deficiency was a simple dummy variable, indicating whether the household contained at least a woman or preschooler that was iron deficient (as determined by the WHO anemia cutoffs) (WHO 1972).

The results for the analysis of alternative indicators for iron security are shown in Tables 6.11 and 6.12. No successful indicators could be found for iron deficiency in either season.

6.3 HOW DO THE ALTERNATIVE INDICATORS SUGGESTED FROM THE QUALITATIVE WORK COMPARE TO THOSE DERIVED FROM THE QUANTITATIVE WORK?

The indicators tested in the quantitative analyses were derived from a review of the food security literature as well as our own qualitative work reported in Chapter 5. After completing both the qualitative and quantitative analyses, a logical question remained: how similar were the lists of successful indicators derived from each method? How did the indicators identified in the qualitative work perform in

Table 6.11—Performance of selected alternative indicators of iron insecurity, round 1, late kharif season

Indicator	Exploration Data Set			Confirmation Data Set			Double Winner?	Bonferroni Winner?
	χ_1^2	Se_1+Sp_1	n_1	χ_2^2	Se_2+Sp_2	n_2		
Alternative indicators screened in first round testing								
High number of female preschoolers, r1	9.57	153	45	0.06	106	75	No	No
High number of females, r1	4.11	137	45	0.00	96	75	No	No
High dependency ratio #10, r1	3.91	133	45	1.03	86	75	No	No
High dependency ratio #3, r1	3.91	133	45	1.03	86	75	No	No
High dependency ratio #9, r1	3.91	133	45	1.03	86	75	No	No
High percent of persons incapable of work, r1	3.91	133	45	1.03	86	75	No	No
At least one child sick in past 14 days, r1	8.13	150	45	0.01	102	75	No	No
Number of sick children in past 7 days, r1	6.02	143	45	0.06	106	75	No	No
Commonly cited indicators								
Low per capita total expenditures (mean of 3 rounds)	0.06	98	43	0.78	87	70	No	No
Low per capita food expenditures (mean of 3 rounds)	0.06	98	43	3.67	75	71	No	No
High food share of total expenditures (mean of 3 rounds)	2.94	129	43	0.25	91	70	No	No
Forward caste	0.01	107	45	0.86	86	75	No	No
Backward caste	0.28	87	45	0.00	102	75	No	No
Scheduled caste	0.01	107	45	1.00	112	75	No	No
High household size, r1	2.81	130	45	0.22	108	75	No	No
High dependency ratio 2 (r1): Number of preschoolers/ total number in household	7.15	143	45	0.00	96	75	No	No
High dependency ratio 10 (r1): Total number in household/ (total number in household – number of disabled)	3.91	133	45	1.03	86	75	No	No
Low per capita area of agricultural plots controlled by household (mean of 3 rounds)	0.78	119	39	1.00	85	50	No	No
Low per capita sum of cultivated land (mean of 3 rounds)	0.00	109	28	0.02	94	61	No	No
Low per capita number of agricultural plots (mean of 3 rounds)	0.76	119	28	0.06	99	46	No	No

Notes: Se = Sensitivity
Sp = Specificity
r1 = Round 1, late kharif season

Table 6.12—Performance of selected alternative indicators of iron insecurity, round 3, late summer, early kharif

Indicator	Exploration Data Set			Confirmation Data Set			Double Winner?	Bonferroni Winner?
	χ_1^2	Se_1+Sp_1	n_1	χ_2^2	Se_2+Sp_2	n_2		
Alternative indicators screened in first round testing								
High number of chickens owned	9.63	159	44	0.25	116	70	No	No
Other Commonly Cited Indicators								
Low per capita total expenditures (mean of 3 rounds)	0.01	105	42	0.02	94	68	No	No
Low per capita food expenditures (mean of 3 rounds)	0.01	105	42	0.14	99	69	No	No
High food share of total expenditures (mean of 3 rounds)	0.85	121	42	0.97	127	68	No	No
Forward caste	0.09	101	44	0.09	98	72	No	No
Backward caste	0.02	91	44	0.02	95	72	No	No
Scheduled caste	0.00	107	44	0.00	106	72	No	No
High household size, r3	0.72	121	44	0.34	118	71	No	No
High dependency ratio 2 (r3): Number of preschoolers/total number in household	0.13	112	44	0.30	116	71	No	No
High dependency ratio 10 (r3): Total number in household/ (total number in household − number of disabled)	0.98	122	44	0.00	117	71	No	No
Low per capita area of agricultural plots controlled by household (mean of 3 rounds)	0.00	108	38	0.00	110	58	No	No
Low per capita sum of cultivated land (mean of 3 rounds)	0.23	100	28	0.03	108	45	No	No
Low per capita number of agricultural plots controlled by household (mean of 3 rounds)	0.51	121	38	0.06	96	58	No	No

Notes: Se = Sensitivity
Sp = Specificity
r1 = Round 1, late kharif season

terms of their statistical association with the benchmark indicators? What did this mean for indicator development and use?

Since we wanted contemporaneous information from the qualitative and quantitative sections, the two data collections were launched simultaneously. However, doing so meant that it was not possible to use the information derived from the qualitative work to inform our survey design. As such, many indicators suggested by the qualitative work did not appear on the survey and could not be tested. Some of the "winners" from the qualitative work appeared coincidentally in the survey and we were able to test them quantitatively. These indicators are shown in Table 6.13.

Table 6.13—Indicators suggested by the Qualitative work that appeared in the survey and were tested using quantitative performance criteria

Indicators of Household Chronic Food Insecurity Identified by Qualitative Techniques (Reported in Chapter Five)	Corresponding Indicator from the Survey, Tested Quantitatively in this Chapter
Poor quality land	Number of irrigated plots
Landless	Landless
Distress sales of livestock	Sold large livestock (since last round)? Sold medium livestock (since last round)? Sold small livestock (since last round)?
Distress sales of other valued assets	Sold jewelry (since last round)? Sold house (since last round)? Sold land (since last round)?
High number of loans from informal sources	Number of informal loans
Permanent Laborers	Household has a permanent laborer
Few Income earners in a large family	Dependency ratio (10 formulations)
Purchase staple grains on a more-than-once-a-week basis	Purchases grain more than once a week
Heavy reliance on wage work	Number of members that are casual laborers Number of members that are agricultural laborers

However, of the indicators listed in Table 6.13 none were found to have a significant association with chronic household food insecurity. What does this lack of "overlap" between the qualitative and quantitative results mean?

Our primary explanation involves the fact that single indicators were tested in the quantitative analysis. In our qualitative work, however, villagers rarely identified a single reason for which a household was food insecure, but rather a number of reasons. During the qualitative exercises, the research team asked the villagers to identify the households that "constantly struggle to feed their members." They then probed for the reasons why these families were food insecure. In every case, the villagers named more than one reason why they thought the household struggled and, in most cases, it involved two or three reasons. Our ethnographic reports of families also suggested that it was a combination of factors rather than any single factor that predisposed a household toward chronic food insecurity. In short, more overlap might be found between the two sets of "successful" indicators if combinations of indicators were tested in the quantitative analysis. A logical way to investigate this idea would be to perform a stepwise logistic regression, using the core set of quantitative indicators. Once the stepwise was complete, we could compare the "set" of indicators to that derived in the qualitative results.

A second reason why there might have been little overlap between the qualitative and quantitative results involves the fact that relatively few indicators were identified in the quantitative study. The low number of identified indicators might at first indicate that there is little potential for alternative indicators or, at least, for indicators used singly. However, further statistical tests indicates that most of the statistical tests of indicators reflected relatively low statistical power at the sample sizes tested. The implication of low power in a hypothesis testing situation is that a statistical test may not reject the null hypothesis (i.e., may not find a statistical association between an alternative indicator and the benchmark) when, in fact, it should. In short, a statistical test conducted under conditions of low power may not identify an alternative indicator as being successful when it truly is.

Power calculations for each one of our two-by-two contingency tables indicate that a vast majority of the chi-square tests were conducted under conditions of low power. The implications of this are clear: we can be relatively sure that the indicators that are identified as "winners" are indeed good indicators of the benchmarks. However, we cannot be sure that "losers" identified by the same process are truly "losers." Rather, under conditions of larger sample sizes, significant associations may have been found.

As a result, we can say very little about the overlap between results generated using qualitative and quantitative results, since our quantitative results most likely *understate* the number of statistically valid alternative indicators. We *do* know, however, that future analyses must consider the potential for combinations of alternative indicators and that they must use sample sizes that make it more likely that statistically significant alternative indicators are identified.

6.4 THE BENEFITS OF TARGETING

In this section, we undertake a number of simulations to illustrate the benefits of using targeting indicators. Note, however, that the benefits associated with an indicator will vary according to how it is used to improve the cost-effectiveness of the program. As such, evaluating the effectiveness of any given indicator requires a specification of the conditions and context in which it will be used.

Consider, for example, three different scenarios under which targeting might be used to improve the efficiency of a program:

1. *A fixed-budget scenario*: Under this situation, programmers have a fixed budget and can serve a fixed number of participants. Targeting is used to increase the proportion (and hence absolute number) of truly food-insecure households participating in a program. The total budget of the program remains fixed, but, relative to the untargeted situation, the total number of truly food-secure participants rises;

2. *A fixed-coverage scenario*: Under this situation, programmers use targeting to decrease the total number of participants in the program while still serving the same number of households that are truly food insecure. Relative to an untargeted program, the total budget of the program decreases, although the total number of truly food-insecure households that are served remains the same.
3. *A variable-benefits scenario*: This scenario is similar to the fixed-benefits scenario in that targeting is used to eliminate a large number of program participants who are not truly food insecure. Under this scenario, programmers use targeting to serve the same number of food-insecure households as in an untargeted intervention, but they increase the value of goods or services provided to each participant. There is no increase in the overall budget, but the benefit to each food-insecure household rises.

When is it worthwhile to target? In general, if the prevalence of food insecurity is very high, program leakage in an untargeted program will be fairly small. In this case, most participants will be truly needy and efforts to improve targeting are likely to have a marginal benefit. Since there are non-zero costs associated with collecting and acting on targeting data, it is possible for a targeted program to be less cost-effective than an untargeted program.

On the other hand, when the prevalence of food insecurity is relatively low or there is a particular interest in serving only a small number of the most food insecure in a population, then targeting indicators may be particularly useful. In this case, an untargeted program would be likely to have a high proportion of participants who are not truly food insecure and, therefore, a high degree of program leakage. In general, as the prevalence of food insecurity declines (or the concern for the most disadvantaged participants increases), the leakage of benefits to those who are not truly food insecure is likely to increase in an untargeted program. In these cases, the use of targeting indicators may be quite powerful in reducing program costs and maximizing its social impact.

6.4.1 *Illustrating the Use of Targeting Indicators to Reduce Program Leakage*

In this section, each of the indicators identified as "double winners" in the quantitative analysis are used to illustrate the potential reductions in program leakage that may be achieved with targeting. Table 6.14 presents this analysis as a comparison of the benefits of targeting using alternative indicators with the untargeted case, under both the fixed budget and fixed coverage scenarios.[22] The budgetary implications of targeting are assessed, given assumptions of per capita intervention costs of US$10 and a program size of 100,000 participants.

Consider first the fixed-budget scenario. Column 1 of Table 6.14 shows the percent increase in the number of true positives included in the program (i.e., truly food-insecure participants) as a result of using a targeting indicator. Column 2 shows the percent reduction in the leakage costs after a targeting indicator has been used. This value represents the decrease in misallocated program resources once the program has been targeted with an alternative indicator. Note that these calculations include only program costs; no provision is made in this analysis for the social benefits associated with decreasing food insecurity, a subject which will be treated in more detail in section 6.4.2 below.

Under the assumption of a fixed program budget, the results from Table 6.14 show that targeting with selected alternative indicators increases the number of true positives in the hypothetical program by as much as 26 percent in the case of the indicators of acute preschooler food insecurity and by as much as 97 percent in the case of vitamin A deficiency (based on data from round 1). Given the relatively low prevalence of vitamin A deficiency in the population (28 percent) and the resulting high potential leakage from an untargeted program, the results suggest that large returns may be possible from targeting on the selected indicators. These returns are the result of improved coverage of the truly food insecure

The fixed-budget scenario also suggests potentially large reductions in the costs of program leakage. Table 6.14 indicates that under the given set of assumptions, leakage costs may be reduced by as much as 35 percent, as in the case of alternative indicators of vitamin A deficiency.

Table 6.14—The benefits from targeting with selected indicators, compared to no targeting

Indicator	Fixed Budget Scenario: Percentage Increase in True Positives	Fixed Budget Scenario: Percentage Reduction in Leakage Costs	Fixed Coverage Scenario: Percentage Reduction in Budget	Fixed Coverage Scenario: Minimum Difference in Data Costs to Equate Net Savings[a]
Chronic Household Food Insecurity				
Households located in Shirapur	36.6	18.6	26.8	68,467
High number of preschoolers	31.0	15.7	23.7	99,700
Infrequent consumption of meat, r2	50.7	25.7	33.6	0
Frequent consumption of fats/oils, r2	37.1	18.8	27.0	66,026
Frequent consumption of sugar, r2	33.1	16.8	24.9	87,612
Frequent consumption of sorghum, r2	42.2	21.4	29.7	39,836
Frequent consumption of sugar, r3	44.2	22.5	30.7	29,712
Frequent consumption of fat, r3	41.4	21.0	29.3	43,577
Acute Household Food Insecurity				
High percentage of food consumed from gifts	55.7	16.0	35.8	30,007
High number of foods consumed weekly	63.4	18.0	38.8	0
Frequent tea with milk consumption, r2	42.6	12.2	29.9	88,983
Frequent consumption of sugar, r2	47.0	13.5	32.0	67,945
Frequent fat/oil consumption, r2	40.7	11.7	28.9	98,370
Frequent wheat consumption, r2	60.3	17.3	37.6	11,659
Acute Preschooler Food Insecurity				
Household did not give gifts, r2	26.3	10.3	20.8	n.a.
Vitamin A Deficiency (round 1)				
Number of preschoolers	57.9	19.6	36.7	126,667
Preschoolers with diarrhea	97.4	33.0	49.3	0
Vitamin A Deficiency (round 2)				
Number of preschoolers	80.1	20.6	44.5	44,311
Preschoolers with diarrhea	95.7	35.0	48.9	0

[a] Based on given assumptions of program size and cost structure and relative to the indicator that is found to produce the greatest reduction in the program budget.

n.a. = not applicable.

Columns 3 and 4 of Table 6.14 illustrate the fixed-coverage scenario. In this scenario, targeting indicators are used to reduce the number of program participants who are not truly food insecure and, thereby, reduce the program's overall budget. Through a reduction in the overall size of the program, as reported in column 3, targeting can result in program savings of between 21 percent (in the case of acute preschooler food insecurity) and 49 percent (in the case of vitamin A deficiency, round 1).

Given this set of program conditions, the results in Table 6.14 suggest that certain indicators can out-perform others in reducing program leakage. Recall, however, that the correct criteria for selecting targeting indicators is the size of the program savings *net of data collection costs*. The fourth column in Table 6.14 illustrates how data collection costs might inform the choice of one indicator over another. This column shows the minimum difference in data collection costs that would allow the indicator to be more cost-effective than the most successful indicator for each benchmark analysis (i.e., the indicator that provides the highest program savings for each benchmark analysis).

Consider the case of chronic household food insecurity. In this simulation, the indicator of "infrequent meat consumption" resulted in the greatest total reduction in program costs across all the alternative "double winners" tested. Using this indicator, program savings were 33.6 percent of the assumed budget of US$1 million, or US$336,435 (see column 3 of Table 6.14) . The next greatest reduction in program costs are obtained by targeting on the indicator "frequent consumption of sugar (r3)." Targeting with this indicator results in a savings of nearly 31 percent, or US$306,723. Column 4 shows the minimum difference in data costs that would equate the savings achieved using the two indicators (i.e., that would make us indifferent between the two indicators). For this case, the difference is $29,712. This indicates that the savings achieved using the sugar variable would be greater than the meat variable, as long as the sugar variable costs at least $29,712 less to collect. After this point, the meat variable is more cost-efficient.

If, however, the cost of collecting the two indicators were equal, then the "infrequent consumption of meat (r2)" indicator would always be preferred for targeting programs designed to address chronic household food insecurity. Column 4 contains similar comparisons for all the alternative "double winners" identified in the study. For example, the "frequent consumption of sorghum (r2)" indicator would be preferred only if the costs of data collection were at least US$39,836 less than that of the meat consumption indicator.

These examples are presented to underscore the fact that the appropriate criterion for indicator selection is savings *net of data collection costs.* Note, however, that the results in column 4 are artifacts of the assumptions regarding program size and costs that were adopted for this particular scenario. Varying the assumptions and matching them to the actual cost structure of a program is likely to change the relative performance of these indicators and the ultimate choice of the optimal indicator to use for targeting purposes.

6.4.2 *Accounting for the Social Cost of Food Insecurity*

The results in the previous section describe how targeting can reduce program leakage and thus decrease program costs. These analyses, however, are silent on the issue of social costs. Ideally, the choice of a targeting indicator should account for an indicator's ability to minimize the social cost of food insecurity. More specifically, food aid programmers would choose indicators that minimize the program and social costs, net of data costs.

Although it is difficult to determine a value for the social cost of food insecurity, it is possible to identify a range of social costs over which one indicator might out-perform another. In this case, selecting an indicator boils down to determining whether a given range of social costs for one indicator is more realistic than those associated with another indicator.[23] This assessment is not straightforward and it may not be always possible to identify a single-best indicator for targeting purposes. It may be possible, however, to identify a set of preferred

indicators. An indicator in this preferred set can produce significant reductions in program and social costs relative to the untargeted case.

To illustrate how the social costs of food insecurity might enter into the selection of a targeting indicator, we undertake a targeting simulation (see Table 6.15). For this exercise, we must make assumptions about the program, considering the targeting variables. We will assume a program size, a per capita intervention cost, and the cost of collecting each alternative indicator.[24] In this example, programmers are seeking an alternative indicator to identify chronically food-insecure households. The exercise assumes a program with a population of 500,000, in which budgetary resources are sufficient for 100,000 people to actually participate in the program. The per capita intervention cost is again assumed to be US$10. Two scenarios are shown. Scenario 1 presents an analysis of indicator performance under the assumption that the per capita social costs of food insecurity are equal to the per capita costs of the intervention. This is a lower-bound scenario, since it is unlikely that any intervention would spend more to resolve a food security problem than the problem was actually worth to society.

In this lower-bound scenario, we first consider the indicator that provided the greatest total savings (social plus program costs), as indicated in column 4 of Table 6.15. This is, again, the "infrequent meat consumption" indicator. Because program costs are fixed, the savings from targeting are derived from the increased proportion of the food insecure who are served by the program and, thus, the reduction in the social costs of food insecurity (the costs associated with false negatives). As indicated in Column 3, total social plus program costs of a program targeted using the infrequent meat consumption indicator amounts to US$2,185,000 under the stated assumptions. Compared to the costs in an untargeted program of US$2,347,000, the use of the infrequent meat consumption indicator implies a total savings of US$162,000, by far the highest savings of all the candidate indicators listed in the table.

Assuming that the cost of collecting information on the frequency of meat consumption is equal to US$100,000, the net savings from targeting using this

Table 6.15—Accounting for the social costs of food insecurity in assessing indicator performance (numbers in 000s)

	Program Costs (1)	Social Costs of False Negatives (2)	Subtotal (1+2)	Reduction in Program and Social Costs from Targeting	Data Costs Which Equate Net Savings[a]	Savings Net of Data Costs
Chronic Household Food Insecurity						
Scenario 1 (social cost=US$10.00/capita)						
No targeting	1,000	1,347	2,347	...	0	0
Live in Shirapur	1,000	1,224	2,224	123	61	62
No preschoolers	1,000	1,243	2,242	104	42	62
Infrequent meat (round 2)	1,000	1,185	2,185	162	100	62
Fats/oils (round 2)	1,000	1,231	2,231	116	54	62
Sugar (round 2)	1,000	1,244	2,244	103	41	62
Sorghum (round 2)	1,000	1,214	2,214	133	71	62
Sugar (round 3)	1,000	1,197	2,198	149	87	62
Fat (round 3)	1,000	1,207	2,207	139	77	62
Scenario 2 (social cost=US$76.25/capita)						
No targeting	1,000	10,271	11,271	...	0	0
Live in Shirapur	1,000	9,331	10,331	940	-196	1,136
No preschoolers	1,000	9,474	10,474	796	-340	1,136
Infrequent meat (round 2)	1,000	9,035	10,035	1,236	100	1,136
Fats/oils (round 2)	1,000	9,385	10,385	886	-250	1,136
Sugar (round 2)	1,000	9,486	10,486	785	-351	1,136
Sorghum (round 2)	1,000	9,254	10,254	1,017	-119	1,136
Sugar (round 3)	1,000	9,135	10,135	1,136	0	1,136
Fat (round 3)	1,000	9,207	10,207	1,063	-73	1,136
Acute Preschooler Food Insecurity						
Scenario 3 (social cost=US$10 per capita)						
No targeting	1,000	1,124	2,124	...	0	0
Perfect targeting	1,000	405	1,405	719	200	519
No gifts made	1,000	1,050	2,050	74	-445	519

[a] Based on assumed data collection costs for the indicator that produces the greatest gross total savings in each scenario.

... = Not applicable.

indicator is US$62,000. Given that assumption, column 5 of Table 6.15 provides the data collection costs for the other alternative indicators necessary to equate the net savings from targeting with that of the meat consumption indicator. The analysis shows that at the lower-bound estimate of the social costs (US$10 per capita), the "consumes fats and oils frequently" indicator can out-perform the meat consumption indicator only if it costs less than US$54,000 to collect. Similarly, the "frequent consumption of sugar" indicator could outperform the meat consumption indicator only if data collection costs are less than US$87,000.

Scenario 2 attempts to identify whether there is a level of per capita social costs of food insecurity such that no indicator can possibly out-perform the "infrequent meat consumption" indicator. The results show that the social costs of food insecurity would have to rise only to a level of US$76.25 per capita to clearly identify meat consumption frequency as the optimal targeting indicator.[25] At this level, column 3 suggests that the savings (in terms of both program and social costs) from targeting on the meat consumption indicator would rise to US$1,236,000 compared to the no-targeting case. Again, the next greatest reduction in total costs could be obtained by targeting on the "frequent consumption of sugar (r3)" indicator, which would result in a savings of US$1,136,000. In this case, the difference in savings across the two indicators is US$100,000.

Under the assumption that data collection costs for the "infrequent consumption of meat" indicator are US$100,000, it is impossible for the "frequent sugar consumption" indicator or any other indicator to provide a greater net savings. To do so, given the various assumptions under this scenario, data collection costs for the sugar consumption indicator would have to be zero. In this example, if the per capita social costs of food insecurity were thought to be US$76.25 or higher, the "infrequent consumption of meat" would be the optimal indicator.

If it is determined that the social costs of food insecurity are lower than the critical value of US$76.25, then there may not be a clear choice of indicators. It is important to recognize, however, that there are still benefits to be derived from

targeting on any of a number of indicators. Even under assumptions of minimum social costs described in Scenario 1, it is clear that a number of indicators can provide some degree of net savings and that the impact of targeting using any one indicator may still be positive.

6.4.3 *Comparisons to "Perfect Targeting"*

As stated previously, the use of the "gold standard" or benchmark indicator in selecting candidates for program participation represents a case of "perfect targeting."[26] The search for alternative indicators for targeting purposes is therefore justified only if the benchmark indicators of food insecurity are considered to be unreliable or too costly to use in an operational context. An indicator, for example, might be considered unreliable if it is subject to a strategic bias in the responses by those who perceive that some benefit might accrue to them if they misrepresent their personal information. Alternatively, the costs of collecting a "gold standard" indicator may be too high in the context of any given program to warrant its use as a screening tool.

In the latter case, where concerns are primarily cost-related, the performance of alternative indicators should be evaluated vis-à-vis the performance of the benchmark itself, in addition to comparisons to the no-targeting scenario. It is possible that, in spite of fairly high data collection costs, use of the benchmark indicator may still prove more cost-effective than any alternative.

Scenario 3 in Table 6.15 provides a comparison of the performance of an indicator that was technically successful at identifying preschoolers with acute food insecurity. The indicator, "household provided gifts to other households," is evaluated against the benchmark measure of child weight-for-height. The program assumptions are similar to those for the preceding scenarios: program size is 100,000, the cost of an intervention is US$10 per capita, and the social costs of food insecurity are also equal to US$10 per capita. In this scenario, the data collection costs of the benchmark (the perfect targeting case) is assumed to be US$200,000 (20 percent of the size of the program).

For this scenario, as indicated in the table, the potential savings from perfect targeting far outweigh the costs associated with collecting the benchmark indicator. The calculations shown indicate that there is no feasible value of social costs at which the alternative "gifts" indicator out-performs the gold standard indicator based on child anthropometry.[27] To do so, the data collection costs for the alternative indicator would have to be less than zero. Therefore, in this particular example, there would be no rationale for targeting on the basis of any alternative.

7. AN EVALUATION OF THE DATA COLLECTION PROCESS

An important component of this study is to understand the difficulties associated with each data collection method as well as the conditions that make each method feasible. During the data collection process the field investigators played a large role in informing our position on these issues. Day-to-day feedback from field investigators was encouraged and recorded as part of the research process. In addition, we organized a two-day conference in July 1993, in which we spent one full day gaining feedback from the data collection teams—both qualitative and quantitative—on a number of aspects that impinged on the reliability and accuracy of the data collected.

7.1 QUALITATIVE DATA COLLECTION

To what extent did the study find participation desirable, feasible, and practical? More specifically: (1) is the use of participatory research methods more empowering to respondents compared to traditional research methods, or does the use of participatory methods only empower the researchers?, and (2) can research can be designed to incorporate local knowledge, share information, let respondents benefit from our findings, and generally improve the quality of policy and program conclusions?

7.1.1 *Did Participation Empower the Villagers?*

Despite our best efforts, we have to conclude that the participatory research methods used in our study were no more empowering for the villagers than our survey methods. In this sense, the participatory methods we used are more accurately described as qualitative rather than truly participatory.

The participatory methods, however, did help to establish rapport with the villagers quickly. They were far more interactive than the survey, and lent themselves more naturally to a dialogue between respondents and researchers,

rather than simple question and answer sessions. In addition, the villagers widely agreed that the participatory methods (they called them "games") were of more interest than the survey data collection methods. Most villagers appreciated the transparency of the visual representations, as well as the opportunity to express themselves creatively through group activities (such as the village map and the food charts).

While certain definitions were not always determined by local people (e.g., "energy expenditure" and "very high risk families"), the concepts needed for the project exercises were adapted for local needs. For example, the local way of expressing percentages in terms of the number of paise in a rupee was frequently used. Open-ended discussions allowed researchers to gain a better understanding of how emic (locally defined) perceptions differed from etic (defined by outsiders) ones. However, we felt that respondents still provided information on the researchers' terms, most often using the researchers' concepts expressed in local language. It is for these reasons that we feel that the methods we used were no more participatory than the survey methods employed. If there is a need to distinguish this type of data collection from the survey, they are more accurately described as qualitative rather than participatory.

In some instances, however, the potential for nutrition education, community monitoring, and community intervention was clear. The visual representations typical of participatory methods gave the villagers the opportunity to reflect on the facilities available in their neighborhoods, on the diversity of their diet, and the seasonality of village phenomena. Some villagers were astonished by their own food charts; they had not imagined they ate so many kinds of foods. Some spontaneously asked, "Are we eating OK? What should we eat?" These experiences indicate that participatory methods carry great potential for starting an educational dialogue on nutrition.

7.1.2 *Feasibility: Problems with Participatory Approaches in the Context of Research*

The participatory methods were not without their special problems. As these methods are meant to elicit participation in group discussions about village problems, they tend to raise expectations that the research group will initiate a village development program. Questions that seem simple in the office, such as "Who in this village is hungry?" were difficult to ask (let alone answer) in the field as they carried political and economic implications for the villagers.

Even when investigators made it clear that they were not initiating a development program, the perception that benefits might accrue to "the food insecure" created an incentive to misinform investigators and bias responses. For example, the potential for receiving benefits produced apprehension in some women's groups as to whether or not identify certain households as food insecure. This exercise often led to responses such as "Who isn't?" or "Everyone"!

During the participatory exercises we also faced the dilemma of facilitating the participation of different caste groups and women, while not alienating dominant groups. We found that this dilemma could be resolved to some extent by dealing separately with different sections of the village as divided on caste lines. Even within families, however, it was difficult to obtain equal participation of all members. In certain households, men insisted on overriding their wives' responses. In other households, mothers-in-law gave all the responses even though their daughters-in-law were the cooks.

We noted that participatory methods are not necessarily rapid. Time is needed for establishing rapport, playing with children, helping with chores, sensitivity in broaching confidential topics, and in encouraging responses from shy or reluctant villagers. We found that each household exercise took over an hour to complete (equal approximately to conducting a diet survey) and the group exercises took approximately 2.5 hours. However, participatory data are more transparent and less likely to require extensive computer entry and analysis.

The adaptation of participatory methods for research in the area of food security is relatively new. Our experiences indicate that the participatory methods are more flexible than survey methods, more respectful to local knowledge, and quicker for establishing rapport between investigators and villagers. Our participatory methods did not save us much time in the field, but did save time in data entry and analysis. In addition, our participatory methods provided us with a means of obtaining a broad overview of village-level phenomena in situations where the research team is new to a village.

Finally, it should be noted that the quality of the participatory exercises rely heavily on the skills of individuals facilitating the exercises. Staff members must have a keen understanding of the objectives of the participatory exercise and how to elicit this information from villagers. They must be able to think on their feet and probe for clarifying answers. Furthermore, to make the process truly participatory investigators must be given the opportunity to follow up research plans with action plans designed by the participants.

7.2 SURVEY DATA COLLECTION

At the July workshop, both teams of survey investigators—nutrition and economics were active participants. Much of this section summarizes their perceptions on data collection under the various survey modules.

- *Dietary Modules*

Three survey methods were used to discuss dietary patterns of the study households: 24-hour recall, food frequency, and food charts (on a subset of 40 households). These methods were compared, in a subjective manner, by the enumerators (see Table 7.1). While it is impossible to compare the methods in an objective fashion—the methods all have different purposes—we found tables such as the one below, which was constructed by the nutrition enumerators themselves, to be extremely useful in deciding which indicators we could trust and which we could not.

Table 7.1 —Investigator perceptions on three methods of dietary analysis: 24-hour recall, food frequency, and food charts

Category	Food Frequency	24-Hour Recall	Food Chart
1. Time for data collection	Less time consuming	Time consuming	Time consuming
2. From whom	From the person who does preparation and marketing	The person who does preparation	The person who does preparation and marketing
3. What does the method tell us?	Seasonal information	Only one day of information (hopefully representative)	Seasonal information
4. Quantity	No quantification other than frequency	Quantification	No levels, just proportions
5. Chance of missing food items	No chance, because of prompting	Some chances	Some chances
6. Confidence in quality of response	Confident about most of the items. Not confident about a few items that are eaten rarely or occasionally	Confident Not confident about individual consumption	Confident, but often quantity gets mixed up with frequency, e.g., sugar, oil dhal
7. Level of interest on the part of respondent	Medium	High at the start (getting water volumes, etc.,) but slowly diminishes	High
8. Sense of participation	Low	Partial	Complete
9. Ability to understand	Good at the household level, pregnant, lactating and preschool children	Good at household Good for individuals if they carry tiffins (lunch boxes). Less easy for plate-individual consumption.	n.a.

n.a. = Not available.

The most difficult families to survey with the 24-hour recall methods were the better-off families who claimed they had no time to complete the questionnaire, tended to give food away, and consumed a wide variety of foods), and the extended families which had complicated eating arrangements.

- *Expenditure Modules*

Investigators thought that there might be different responses according to whether the respondent was male or female. The large number of food items necessary to get an accurate measure of total expenditure per capita (120 items) made this module very difficult to complete in a timely manner.

In addition, it was difficult to ask respondents about sensitive expenditures that may account for a significant proportion of expenditures such as cigarettes, alcohol, ganja, and lottery tickets.

- *Morbidity Module*

Respondents generally did not consider certain symptoms such as colds, coughs, eye infections, and minor ailments as sicknesses to be reported to the field investigators. At the other extreme, certain cases women complained about body aches, knee pain, and leg pains that had been on-going for at least ten years. In certain cases women were reluctant to discuss gynecological problems. Finally, note that disease and symptom terminology differed from village to village.

- *Breast-feeding Module*

In this module none of the questions were particularly difficult for the respondents to understand, and they gave confident answers. Probing was necessary on two questions in particular: (1) At what age did you start to give the child anything other than breast milk? and (2) At what age did you start to give adult foods?

It was easy for the mother to list the names of weaning foods given to the child during the weaning period.

- *Questions about Perceptions Related to Food Security*

This module was included to give a more qualitative feel to the survey, and to induce more answers on own-perceptions of hunger and food security. Some of the questions were straightforward for respondents to answer: number of meals adult has per day, number of meals preschool child has per day, etc.

Some questions proved difficult to administer. Table 7.2 highlights the problem questions.

Table 7.2—Problem questions on the food security perceptions module

Question	Problem
1. If you had an extra Rs 100, what would you buy more of?	Respondents do not understand where the Rs 100 appears from.
2. Which three foods would your family like to eat more of?	Respondents interrupt to say that they have no preferences, no money, and they eat whatever they have to eat.
3. Does your family keep poor health due to a lack of healthy foods?	Was easier for respondents to understand if we ask the same question, but in a positive sense, i.e., do you think "healthy" foods are important in maintaining good health?
4. How many days supply of basic food do you have?	A large number of days stock is misleading if the basic food is consumed with less frequency than the most basic staple; e.g., a 50-day wheat store might lead to the incorrect conclusion that the family is food insecure when they simply do not eat wheat very often.

8. LESSONS LEARNED FROM THIS STUDY

This study presented two distinct methods for developing alternative indicators of food insecurity. In this section we discuss our experience with these methods and the implications for use of each method by various organizations. Issues of process, program objectives, and available resources are discussed in the context of choosing a methodology for developing alternative indicators.

1. Qualitative Methods Are a Viable Tool at the Community Level.

Our work with qualitative methods suggest that they are a promising tool for small-scale organizations that do not have the human or financial capacity to engage in large-scale indicator development exercises. Indicators suggested through qualitative techniques, however, are not generalizable beyond the communities in which they are developed. Our qualitative experience suggests that many indicators represent coping strategies that are very location-specific; as such an in-depth understanding of the local culture is needed to identify and interpret any given indicator.

The location-specificity of these indicators is not likely to be a problem for small-scale nongovernment organizations that have long-term commitments to certain communities. We believe that these organizations can (and do) use many of the same types of participatory exercises we used, as well as the more traditional ethnographic methods to develop community-specific indicators. In addition, organizations will be able to develop new participatory methods that specifically meet their needs. In general, however, more attention needs to be paid to particular combinations of indicators that are strong indicators of food insecurity. Our study did not investigate locally determined combinations, but we anticipate that they would be much more valuable than single indicators.

If indicators are identified in a qualitative fashion they can be validated over time using an NGOs "inside knowledge" of the community as well as the community's assessment of how the indicator is working to target the food

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insecure. Given the location-specific nature of indicators it is unlikely that "successful" indicators can be shared with other organizations without some sort of validation (quantitative or qualitative) in the new location.

The qualitative methods we used to gather information about food security conditions were simple and feasible at the community level. They did not require large amounts of data entry and data analysis time. They will require adjustments for each new situation, however. In addition these methods require investigators with solid training in ethnographic/participatory methods. Investigators must have the capability to leave behind preconceived notions regarding food security relationships. They must learn about community perceptions about food security and observe patterns within the community. The skills necessary for this work were difficult to glean from traditional resumes; but they became more obvious once we worked with individuals in the field. Although it is desirable to have investigators with prior experience in participatory methods it is also possible to train a group of candidates in these methods and then choose the ones that show the most promise during the field training exercises.

2. Quantitative Studies Are Feasible for Programmers in the Field, But Programmers Need to Be Wary of Sample Size Issues.

Our chosen method to screen and test the alternative indicators was simple enough for a well-trained research analyst (or statistician) to carry out in-country. The most time consuming areas were (1) the determination of the most appropriate analytical method and (2) the data cleaning. If clean secondary data are available (e.g., national census or DHS survey with benchmark indicators) then it is feasible for staff analysts to undertake the same statistical tests of association that we did. If, however, it is necessary to mount a data collection and cleaning effort more personnel and funds will be needed. To the extent that indicator development exercises can be linked to the baseline data collection of a program's monitoring and evaluation system there may be opportunities to defray the costs of indicator development.

The methods we used were relatively straightforward for identifying statistical association between the candidate indicator and the benchmark. Nevertheless we found that issues of sample size were important enough to render many of our tests of association statistically powerless. Our survey, however, was not a small one; the total sample of 300 households represented over 17 percent of the total number of households in the four villages and included over 300 households. As such, we recommend the quantitative methodology for organizations that have access to large data sets (i.e.,. at least 500 observations and probably more) from the appropriate population. These data sets are more likely to offer adequate power to determine significant associations between the alternatives and the benchmarks (if they indeed exist).

This recommendation indicates that small-scale organizations may encounter analytical problems if they attempt the quantitative method we report here. It also means that large "top-down" organizations (with sufficient human resources and relatively large program mandates and data sets) are more likely to adopt this method with success.

Our recommendation is also based on the experience we had with this particular data set. In theory, sample size calculations can be carried out at the outset of any indicator study. However, it is difficult to make estimates of the variables needed for this calculation. Sample size calculations require estimates of proportion sizes as well as some indication of what difference in proportion is meaningful. For certain analytical problems (particularly medical ones), there is a good theoretical basis for estimating the size of certain proportions and the difference between proportions that is (biologically) important. With social science indicators, these proportions are difficult to predict and difficult to attach meaning to the size of the difference in proportions. As such, accurate sample size calculations are difficult to achieve with these data.

A priori there is no reason to believe that data from other populations will behave similarly to the data represented in this study. Therefore, a sensible option for those with secondary data sets is to do the quantitative analysis and check

whether there is sufficient power to determine if a nonsignificant finding is indeed a nonrelationship between the alternative and benchmark. This is the procedure we followed and we found that we did not have adequate power to test several of our indicators. This, however, does not invalidate the relationships we did find. It only tells us that we do not know whether an indicator "lost" because (1) it is truly not a good indictor or (2) it did not get a fair statistical test. The same indicator may indeed be a "winner" using a larger sample taken from the same population.

3. Does the Lack of Correspondence Between the Qualitative and Quantitative Results Mean that the Suggested Indicators Are Not Valid?

Our experimentation with quantitative and qualitative methods for indicator development indicated that there was little overlap between the results derived from each method. Does it mean that one method failed and the other one succeeded?

We believe that this particular experience should not be seen as a failure of either method. Rather problems with sample size in the quantitative survey and our inability to follow-up qualitatively on the role of combination indicators made it difficult to directly compare the results from each method.

Does it mean that the indicators suggested by the quantitative or qualitative method are not valid? No, it only means that we did not have enough statistical power (determined largely by sample size) to properly test many of the indicators suggested by the qualitative study. Some may have been validated statistically if the survey had been larger. On the other hand, some may not have been validated and this might mean that villagers' and researchers' have different perceptions about what food security really means. In either case this study in its present form cannot answer this question.

4. Qualitative and Quantitative Methods Are Complementary for Selecting Alternative Indicators.

The above recommendations are not meant to imply a lack of complementarity between the two methods. Admittedly small-scale projects may

not find the quantitative method we suggested to be useful. However, with larger "top-down" projects there are many opportunities to combine the use of qualitative and quantitative techniques that will improve the reliability of the alternative indicators. Since this was a study of methods, we ran the qualitative and quantitative sections simultaneously. However, this need not be the case for a true indicator development exercise. Specifically, qualitative techniques may first be used to narrow down the list of candidate indicators. The quantitative analysis can follow, and the results may be validated using qualitative techniques in the field. Qualitative techniques may also be used in the interpretation of indicators that arise from the qualitative analysis. Our experience indicates that a keen understanding of the local context is important for the interpretation of indicators suggested by the quantitative analysis.

5. Combinations of Alternative Indicators May Be Necessary to Improve the Ability of Alternatives to Proxy for Benchmark Indicators.

As stated above, our experience indicates that combinations of indicators may be necessary to improve the performance of alternative indicators. More specifically, using indicators in combination rather than singly might tighten the relationship between groups of alternative indicators and the benchmark indicator.

This suggestion comes primarily from our ethnographic observations. In most cases we found households to be food insecure when there were a combination of disadvantaging factors. However, due to lack of time and resources we have not explored the possibility of combinations in this analysis. Nevertheless, this avenue holds the greatest potential for increasing the performance of the alternative indicators. Future research efforts should address this possibility, keeping in mind that simplicity is the key to a successful targeting program on the ground. The number of "combined" indicators should not overly burden field personnel when they are carrying out the targeting.

6. Simple Indicators with Modest Association with the Benchmark Indicator Showed Program Savings.

Simulations using the indicators identified in the quantitative study showed that indicators with significant associations with the benchmark also produced substantial savings in terms of program costs. Alternative indicators that are feasible for use in the field can therefore reduce program leakages. The examples also indicate that the program savings can be quite substantial. We note however, that the correct criteria for indicator selection include (1) an estimate of the social costs and benefits of the intervention and (2) the relative cost of collecting the alternative and the benchmark. These net costs will vary according to each targeting situation. We underscore that program costs are not the only cost-related issues at stake. Rather, the costs of data collection and of making targeting "mistakes" must also be taken into account.

7. Qualitative Methods Are No More Participatory than Quantitative Methods if No Action Agenda Is Planned.

Finally, we must add that despite our best intentions the research-based participatory methods we used were no more empowering for the villagers than our survey methods. This is more a testament to the objective of pursuing a predetermined research agenda rather than a failure of participatory methods per se. Our experience leads us to believe that qualitative techniques are truly participatory when employed with action-orientation interventions.

9. CONCLUSIONS AND NEXT STEPS

The objective of this report has been to present two different methods to identify alternative indicators of chronic and acute food insecurity. A need for alternative indicators exists since many benchmark indicators (such as household income or dietary intake) are often too cumbersome to be of practical use in food aid targeting.

This study used data collected in four villages in the Indian Semi-Arid Tropics as way to illustrate two methods for identifying alternative indicators. Because the data were collected in only four villages it is unlikely that the results are generalizable to all of India or even the Indian Semi-Arid Tropics. With this caveat in mind the emphasis of this report is placed on our experiences with the methods. Given that the results are likely to be location and context-specific, less emphasis is placed on the indicators themselves.

The results from this study indicate that targeting with alternative indicators may be viable at the household and individual levels. Our experience also suggests that the method of indicator selection will vary according to the resources and objectives of the targeting organization. For example, targeting at the household and individual level is likely to be a component of an NGO's programming activities. Given that (1) NGOs often work intensively in a limited number of communities and that (2) financial and human resources are generally limited, the qualitative method appears to be the most viable option for these organizations. For organizations that plan to carry out a more centralized form of targeting, such as governments, large-scale NGOs, or international organizations, a combination of qualitative and quantitative methods might be more appropriate. Programmers in these organizations tend to have access to large data bases for their area of concern as well as the human resources to coordinate a quantitative study.

There are advantages and disadvantages to each method chosen. The qualitative method requires less time for analysis, but does require staff with special talents for interpreting qualitative information. Results, however, are not

generalizable and are thus very location-specific. The quantitative method requires staff with statistical skills as well as access to a large data bases that will increase the probability of sufficient power for tests of statistical association. The results from quantitative studies are more generalizable to similar populations, but can be puzzling if little is known about the program areas. As such, a combination of qualitative and quantitative methods is recommended even when the primary data collection exercise is a quantitative one.

SUGGESTED AREAS FOR FUTURE INVESTIGATION

1. Validate the quantitative methods developed here with a larger data set that provides more observations and hence more statistical power to test the alternative indicators.

   Our work was limited analytically by the lack of adequate power for our statistical tests. The same method should be attempted on a large data set to see if a more consistent set of indicators is derived across seasons and across different formulations of the same indicator.

2. Explore the power of combination indicators using the quantitative method.

   This exercise is a natural "next step" in determining the real usefulness of alternative indicators. Combinations are postulated to "tighten" the relationship between the alternatives and the benchmarks and therefore illustrate the possibilities for using combination indicators for targeting purposes.

3. Explore the relationship between indicators derived from the qualitative methods and those derived from the quantitative method (that demonstrate sufficient power).

The lack of sample size rendered many of the statistical tests powerless to determine the strength of the relationship between an alternative and a benchmark. Conducting the same type of comparison between quantitative and qualitative results will give researchers an idea whether there is a convergence between local perceptions regarding food insecurity and perceptions of the research community.

4. Explore the relationship between alternative indicators and indicators taken from the conventional poverty literature (per capita expenditures, per capita food expenditures, and the share of total budget spent on food).

   Lack of power made it difficult for us to assess the strength of an alternative indicator relative to more conventional poverty indicators. Nevertheless, this result is consistent with the body of research that suggests that the mapping of poverty into food insecurity is complex (Bouis and Haddad 1992).

5. Explore the robustness of alternative indicators over time and across different indicator formulations. Again, lack of power made it difficult to assess these relationships. A validation of these indicators is important over time, particularly in areas characterized by seasonality.

NOTES

1. Appendix 7.1 provides a more complete review of nutrition monitoring systems in India.

2. There are likely to be a number of exceptions to this general statement of relationships. As an example of one exception, although not in close proximity along the causal chain defined in Figure 2.1, demographic indicators such as education levels and household size are thought to be strongly associated with nutritional status outcomes.

3. To make a contingency table, observations are categorized by two dichotomous criteria. If the two variables are originally continuous variables, a "cutoff point" must first be chosen to transform the continuous variable into a dichotomous variable. The cutoff point determines whether an observation is qualified as a "1" or a "0."

4. There are diagnostic instances when sensitivity and specificity are not weighted equally. In this case, researchers might chose an indicator for its performance on sensitivity or specificity.

5. Note that in a field setting, it is possible for an alternative indicator to be more accurate than a benchmark indicator if it is more objective in its interpretation than the benchmark. Consider, for example, a situation in which individuals are likely to bias their responses to an benchmark query because they perceive that they will receive a benefit if a they give a certain response (e.g., underreporting income). An alternative indicator may be more accurate than a benchmark if respondents are less likely to bias a response to an alternative query (e.g., frequency of meat consumption).

6. Depending on whether the intervention alleviates all or only a part of the food security problem, the social benefit of an intervention consists of the social cost of the problem in the absence of the intervention multiplied by the fraction which the intervention actually addresses. Equation 2 assumes that the intervention solves the problem completely.

7. More specifically, we were constrained by our inability to find investigators that were fluent in Marathi and could carryout the nutrition surveys. Constraining the survey to four villages meant that fewer Marathi speakers were needed. The four-village survey was also more economical.

8. Attached laborers are persons who agree to work full-time for one employer for a specified period of time, usually a year or an agricultural season. The

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laborer typically receives meals, an in-kind payment of sorghum or rice, and a single lump sum payment. During the 1992-93 agricultural year, the going rate for an attached laborer was 2,000-3,000 rupees per year (roughly US$700-1,000). In Aurepalle, this arrangement is called *jeetam*. In Shirapur, it is called *chakari*.

9. Literally meaning, "dowry is like sweeping and cleaning someone else's mouth."

10. While recounting this story, the investigator commented that the definition of the *marathi* word for gift, *aher*, differs from the Western definition. In English, "gift" implies that something is given willfully; by contrast, in *marathi* "*aher*" is used for gifts that are compulsory and that give social respect to the givers and receivers.

11. Several version of the dependency ratio were tested:

dependency ratio1 = (# children + # preschoolers)/household size;
dependency ratio2 = # preschoolers/household size;
dependency ratio3 = # cannot work/household size;
dependency ratio4 = (# children + # preschoolers)/(household size - # preschoolers);
dependency ratio5 = # preschoolers/(household sizeR - # preschoolers);
dependency ratio6 = # cannot work/(household size - # preschoolers);
dependency ratio7 = (# children + # preschoolers)/(household size - # cannot work);
dependency ratio8 = # preschoolers/(household size - # cannot work);
dependency ratio9 = # cannot work/(household size - # cannot work);
dependency ratio10 = household size/(household size - # cannot work).

12. In actuality, an exact chi-square statistic can be calculated for each additional indicator. However, chi-square tables list critical values associated with incremental levels of probability. As such, we have reported the critical values that are associated with each range of probability levels reported in the chi-square table shown in Rossner (1995).

13. For analyses of the chronic indicators of food insecurity, 450 indicators are tested for each season, leading to over 1,300 indicators.

14. Among this group, we include per capita household expenditures, per capita household food expenditures, the share of the household budget spent on food, per capita area of agricultural land controlled by the household, per capita number of agricultural plots controlled by the household, per capita area of agricultural area cultivated, the dependency ratio (two formulations), and household size.

15. The caloric adequacy measures are based on (1) the dietary assessment using the 24-hour recall method devised by NIN and (2) the recommended energy intakes for Indians (NIN 1993). NIN's 24-hour recall method requires that the

weight of all ingredients used for each recipe consumed during the preceding 24-hour period be recorded. Nutrient conversion factors are used to convert food quantities into nutrient quantities. The total amount of each nutrient consumed by the household is obtained by summing the nutrient contribution by each ingredient identified during the diet survey, subtracting leftovers, food thrown away, and food given to pets, guests, and livestock.

To obtain a measure of dietary adequacy at the household level, the dietary requirement for each individual in the household is expressed in terms of "adult equivalents." The number of adult equivalents for an individual is the nutrient requirement (as determined by the individual's age, sex, physiological status, and activity level) divided by the requirement for a "reference person." Among the academic nutrition community in India, the reference person is usually taken to be a 60-kilogram man of moderate activity (ICMR 1994). Summing the total nutrient intake by the household and dividing it by number of adult equivalents gives a measure of household nutritional adequacy. This measure allows researchers to compare nutrient adequacies among households of different sizes and compositions.

16. Seventy percent of the recommended energy intake for the "reference" person is chosen, since it represents the energy requirement necessary for a low activity existence. More specifically, we used estimates of energy requirements (ICMR 1994) and applied them to a pattern of activities that would represent a life of minimal activity, that is, energy needs beyond basic physiological demands (8 hours sleeping, 1 hour walking, and 15 hours of standing or sitting quietly). For this pattern of activity, we calculate a calorie requirement of 2,015 kilocalories per adult equivalent. In turn, 2,015 represents approximately 70 percent of the 2,875 kilocalories necessary to support the reference man. Seventy percent of the requirement for an adult equivalent is therefore chosen as the cutoff for food insecurity.

17. Note that different questionnaires were administered that collected dietary information (see Table 4.2). The food frequency questionnaire inquired about the frequency with which certain foods were consumed. In contrast to the 24-hour dietary recall, no attempt was made to quantify the amounts consumed.

18. "Frequent" consumption is a relative term. Respondents were asked to state how often they consumed a certain food (e.g., more than once daily, daily, two-to-three times a week, once a week, etc.). As with all indicators, the cutoff for each food varies according to the frequency of responses for that food. "More frequent" can therefore mean one time (e.g., festival foods), a week for foods that are rarely eaten, or >1 a day for foods that are eaten more often (e.g., rice).

19. Note that if the second criteria is not included in the definition, then households that had low caloric adequacies in Round 2 (i.e., below 70

percent) and drop even further would be classified as food secure.

20. All preschoolers in each study household were tested for hemoglobin and serum vitamin A. One woman of reproductive age, preferably the mother of the preschooler(s), was tested from each household.

21. Iron deficiency was assessed with measures of hemoglobin. Hemoglobin concentration is one of the most widely used methods to screen for iron deficiency anemia. Hemoglobin, however, is technically an indicator of anemia, of which iron deficiency is one major cause. Low values of hemoglobin are associated with hypochromia, a characteristic feature of iron deficiency anemia.

22. Because the variable benefits scenario is similar to the fixed budget scenario in terms of its impact on program leakage, an analysis for this scenario is not presented in Table 6.14.

23. Note that It is possible to control for social costs by comparing the performance of indicators at varying cutoffs that equate the number of false negatives produced by each indicator. In this case, the social costs of food insecurity are equal for each indicator and comparisons of indicator performance can be made solely on the basis of program costs. The reasons for presenting a comparison of indicators at a fixed cutoff are presented in Section 3.

24. The same analysis may be done on an actual program if these figures are available.

25. The figure of US$76.25 was derived using an iterative process that attempts to set the social cost at a level such that the data collection costs of alternative indicators would have to be less than zero in order to out-perform the infrequent meat consumption indicator, in terms of net reduction in total program plus social costs. That level of social cost is sensitive not only to the sensitivity-specificity characteristics of each indicator, but also to the assumptions of program size, the cost of an intervention, and the US$100,000 data collection costs for the infrequent meat consumption indicator.

26. Note that use of the term "perfect targeting" is not intended to deny the possibility of measurement error in the direct, benchmark indicator, only to imply that benchmark is presumably the best possible measure of the food security dimension of concern and the standard against which the performance of other indicators are compared. The results reported in Table 6.15 suggest that the benchmark indicator would likely be preferable to alternatives, even in the case of fairly significant measurement error.

27. Again, while the method presented is valid and applicable across a range of possible program contexts, it is important to note that the analysis is intended for illustrative purposes only. The specific results presented in Table 6.15 depend on assumptions of program size, per capita cost of intervention and data collection costs, as well as the per capita social cost of food insecurity.

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Revised Final Report

APPENDIXES TO

ALTERNATIVE APPROACHES TO LOCATING THE FOOD INSECURE: Qualitative and Quantitative Evidence from South India

by

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April 1996

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APPENDIXES TO

ALTERNATIVE APPROACHES TO LOCATING THE FOOD INSECURE: QUALITATIVE AND QUANTITATIVE EVIDENCE FROM SOUTH INDIA

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APPENDIX 1

APPENDIX 1--Review of Nutrition Monitoring Systems in India

A large number of Indian nutritional assessment studies were undertaken in the period 1918-1972. Their coverage was, however, limited and they were not undertaken on a regular basis. This lack of comprehensive repeated assessments led the Indian Council of Medical Research to set up the National Nutrition Monitoring Bureau (NNMB) in 1972. Its defined mission was to:

- continuously collect and process information on dietary intakes and nutritional status of representative segments of the Indian population using standardized procedures and techniques,
- undertake periodic evaluation of ongoing national nutrition programs.

The NNMB consists of a Central Reference Laboratory (CRL) located at the National Institute of Nutrition (NIN) in Hyderabad and 9 peripheral units located in other Indian states. NIN provides overall technical direction, supervision and coordination of activities.

The CRL develops survey protocols, trains field personnel, selects population samples for monitoring, provides technical guidance to state units and analyses data for different agencies. CRL also undertakes evaluations of national nutrition programs such as the Anaemia Prevention Program, the Vitamin A Prophylaxis Program, and the Integrated Child Development Services (ICDS) program.

Each year each State unit collects food consumption data (household and individual based on 24 hour dietary recall), household demographic and socioeconomic data (family size, age and sex distribution, income sources, wealth, marital status, literacy) together with clinical and anthropometric measures (weight, height, arm circumference, and fat fold at the triceps) from 500 rural and 250 urban households. These data are processed and published as a yearly report detailing average nutrient consumption at individual and household levels, the extent of malnutrition (disaggregated by age, sex, and socioeconomic status), average anthropometric measurements, and the prevalence of clinical signs of malnutrition.

An evaluation of NNMB (Rao, P. et al. 1987) found that the current operations of NNMB were hampered by lack of internal coordination and excessive administrative bureaucracy. This led the NIN to initiate an

ambitious two phase project in 1992 to develop a nutritional surveillance model. The main objective of this model was to develop a nutritional surveillance model using simple and sensitive indicators that would be useful to both macro and micro planning.

Phase 1, being undertaken in Andra Pradesh, is designed to:

(a) Use primary and secondary data sources to illuminate the relationship between basic needs indicators, economic, environmental, and agricultural factors and food consumption and nutritional status.

(b) Develop a simple, quick collection, cost effective set of sensitive indicators to form the core of a nutrition surveillance system.

(c) Develop both computer software and hardware necessary to implement the system.

The 2 year Phase 1 stage is being undertaken in 10 villages in each of 8 districts in Andra Pradesh (2 from each of the 4 agro-climatic zones) where Integrated Child Development Services (ICDS) programs are operational. All households within a village are surveyed, data being collected with respect to individual and household dietary intakes (for 20% of households sampled), socio-economic characteristics (income sources, literacy, occupation), anthropometric measures and clinical measures of nutritional deficiency for all children at school entry, infant birth weights (within 24 hours of birth), growth monitoring and morbidity data (collected fortnightly) for children below 5 years, and community characteristics (sanitation, access to water).

To complement the primary data collection secondary data will be assembled with respect to rainfall levels, timing of monsoons, food supplies (production, market prices, subsidies, distributions systems), and national level data with respect to population characteristics (occupation, literacy, expenditure patterns, minimum wages etc).

By analysis of the data assembled it is hoped to identify simple, cost effective, sensitive indicators of health and nutritional status which can be built into a National Nutritional Surveillance model.

Phase 2 will essentially be concerned with model testing, evaluating both the feasibility and usefulness of the model with respect to problem identification, micro planning of intervention programs, and ongoing nutritional status monitoring. One aspect of this will involve testing the model in other States to ensure that it is reproducible. Given viability of the model NIN plan to build institutional capacity at the district level for data analysis, mechanisms at the National level to incorporate results into National Policy making and to examine the possibilities of model introduction within other countries of the region.

The Integrated Child Development Services, initiated in 1975 by the Government of India, while not having national population coverage,

serves as a de facto nutrition monitoring program with respect to preschool children, pregnant and lactating women. At inception it covered just 30 rural/tribal blocks in 3 urban slums but by 1992 had extended to 2460 rural/tribal blocks serving some 260 million people located across 250,000 villages and 236 urban slums (Tandon 1993). Currently it is the largest child development program in the world, with the expressed intent of reaching every Indian child below the age of 6 years by the turn of the century (Tandon 1993). The principal objective of the program is to reduce child mortality and achieve "optimal physical, mental and psycho-social development of India's children" (ICDS 1982). The program uses a three pronged approach: 1) nutrition supplementation to targeted children and mothers; 2) primary health care including growth monitoring of preschool children; 3) education (non formal for preschool children and nutrition and health education for pregnant and lactating women), targeted on underprivileged communities in less developed and remote areas.

As a program it has several unique features. It is designed to be a holistic approach to child development involving the full participation of mothers. Services are delivered at the community level through anganwadis (literally "courtyard and play center") using local women as honorary village level workers.

The ICDS program has resulted in some successes: the percentage of preschool children with more than grade 1 malnutrition has fallen, immunization coverage in ICDS areas has increased markedly, and use of antenatal services by pregnant women has increased. The program has not been without problems however. Centralized planning has led to a lack of coordination between actors at all levels involved in implementation of the program, a lack of recognition of community level workers, and erratic supplies of food for the supplemental feeding programs. A recent IFPRI evaluation comes to similar conclusions (Kennedy and Slack 1993).

Both the NNMB and ICDS have had coordination and efficiency problems in meeting their objectives of monitoring and reducing high levels of malnutrition in India. The need for cost effective, easily collected indicators has been identified by NIN as of paramount importance. The research undertaken as part of this study, to identify effective indicators which are simple to collect as part of an ongoing nutrition monitoring program, will support and complement the existing commendable efforts and achievements of NIN.

APPENDIX 2

APPENDIX 2--Indicators of Food Security and Nutrition From the Indian Literature

Article	Sample/Study Area	Nutritional measures	Results
The Impact of Maternal Work Status on the Nutrition and Health Status of Children. Abbi, R. P. Christian, S. Gujral, T. Gopaldas. Food & Nutrition Bulletin. Vol. 13, No.1, 1991	Chandrapur District, Maharashtra. 1,990 rural children aged 1 to 6 years.	Z scores: weight for age height for age Malnourished categories based on Indian Academy of Pediatrics for WAZ and Waterlow for HAZ.	A mother was considered to be working outside if she was away from the home for at least 5 to 6 hours whether or not she was involved in an income generating activity. Income of families with mothers working outside tha home were significantly lower than those with mothers who stayed at home. Otherwise households were similar - access to drinking water and sanitary conditions, family size. Children aged 0 - 36 months of working mothers were 1.7 times more likely to be malnourished by weight for age than children of non working mothers. (statistically significant). While for children aged 3 - 6 years the relative risk was 1.4 times higher it was not statistically significant. In terms of height for age the effect of working mothers was to increase the risk of malnutrition by 1.8 times for children aged 0 - 36 months and 1.6 times for children aged 3 - 6 years. Both impacts had statistical significance. Given the income differentials between households with working and non working mothers and the importance of child's age to the impacts an analysis of covariance was undertaken. Mothers work status still had a significant negative impact on both weight for age and height for age Z scores after controlling for log of income and age squared.

Article	Sample/Study Area	Nutritional measures	Results
Relationship Between Maternal and Infant Nutritional Status. Christian, S. Gujral, R. Abbi, T. Gopaldas. J. Trop. Pediatrics Vol. 35, 1989, pg. 71-76	Panchmahals District Gujarat State, Rural villages, 385 lactating women with infants from 0 to 6 months	weight for age height for age	2 methodologies, univariate analysis, followed by stepwise linear regression. <u>weight for age</u>: Univariate, no significant impact of mothers' age, parity, literacy, working status (in home or out of home), food practices during lactation (ie eat same, more or less than non lactation/pregnancy status) on weight for age of infant. Positive impacts on infant weight for age from mothers' weight, height, weight for height and increasing months of lactation. Stepwise regression, Maternal height, months of lactation and maternal weight for height, in that order, had positive significant impact. (Other variables including maternal weight not included in reg'n) R sq. = 8% <u>height for age</u> Univariate, no significant impact of mothers' age, parity, literacy, food practices during lactation. Positive impacts from mother staying at home, mothers' age, weight, height and weight for height. Stepwise regression, Maternal height and work status of mother (at home), in that order, had positive significant impact on infant height for age. R sq. = 4%

Article	Sample/Study Area	Nutritional measures	Results
Selected Socio-Economic, Environmental, Maternal, and Child Factors associated with the Nutritional Status of Infants and Toddlers. T. Gopaldas, P. Patel, M. Bakshi Food & Nutrition Bulletin. Vol. 10, No.4, 1988	Gujarat State: 10 urban slums in city of Baroda, 9 rural villages in the Panchmahals and Bharuch Districts. 786 children aged 0 - 3 years.	weight for age Nutritional status based on 50 percentile of Harvard Std. and classification of Indian Academy of Pediatrics. 5 strata of nutritional status, normal and grade 1 - 4 malnutrition	Univariate Crosstabs Analysis, using chi squared statistics, for infants (0 - 12 months) and toddlers (1 - 3 years). Infants: Those from families with higher per capita incomes (>100 rupees); with mothers aged 18 - 30 years, over 145 cm tall, weighing over 45 kg; and those who had no clinical signs of nutritional deficiency had significantly better nutritional status. Toddlers: Those whose families were Muslim, from castes other than the Schedule Castes and Schedule Tribes; had more than 9 members, higher per capita household income, more than 2 ha of landholdings (rural areas), access to potable water, access to sanitary toilet facilities; with mothers with some education, who stayed at home, weighed over 45 kg had significantly better nutritional outcomes. Male toddlers, and those without clinical signs of nutritional deficiencies were also better off. Socio-economic and environmental factors were more important to the nutritional status of toddlers than infants.

Article	Sample/Study Area	Nutritional measures	Results
Mothers' Nutrition Knowledge and Child Nutritional Status in India. Abbi, R. P. Christian, S. Gujral, T. Gopaldas. Nutrition Bulletin 10, No. 4, 1988	Panchmahals District Gujarat State, Rural villages 2,618 children aged 0 to 6 years.	Z scores of weight for age, height for age and weight for height.	40% of children were malnourished based weight for age below 70% of standard of Indian Academy of Pediatrics, and 41% malnourished based on height for age below 90% of standard based on Waterlow classification. Each mother was asked 9 questions related to nutritional knowledge. Valid resposes were: 1) soft and semi solid foods should be introduced before 6 months, 2) children should be fed more than 3 times a day, 3) a child should be given as much or more food during diarrhoeal episodes, 4) Diarrhoea should be managed by ORS or fluids, 5) ORS should be made with 3 tablespoons of sugar and a half teaspoon of salt per liter of water, 6) lack of food is cause of PEM, 7) more food is treatment of PEM, 8) correct interpretation of 2 of 3 growth charts presented to mother showing differing growth patterns, 9) accuracy of mothers' perception of own child's growth compared to weight for age measured at time of interview. Weight for age: Significant factors positively affecting child outcomes were valid answers in respect of introduction of soft and semi-solid foods, correct preparation of ORS, and correct interpretation of growth charts and her own child's growth performance (correct answers to 1, 5, 8, 9). Height for Age: The only statistically significant responses positively affecting height for age were questions 8 and 9, an ability to correctly interpret a growth chart and perceive her own child's adequate growth. Weight for Height: Statistically significant responses were in respect of the introduction of solid foods (1), preparation of ORS (5), and the correct interpretation of growth charts and own child's growth progress (8,9).

Article	Sample/Study Area	Nutritional measures	Results
The Role of Maternal Literacy and Nutritional Knowledge in determining Children's Nutritional Status. P. Christian, R. Abbi, S. Gujral, T. Gopaldas. Nutrition Bulletin 10, No. 4, 1988	Panchmahals District Gujarat State, Rural villages 2,665 mothers, 4004 children aged less than 6 years.	Cut off points based on Indian Academy of pediatrics. Weight for age Height for Age Weight for height	Authors used literacy, nutritional knowledge (calculated as score from 9 questions in previous study) and household head self reported monthly income. Methodology based on cross tabs with chi sq. stats. Literacy/illiteracy per se had no significant impact on any of the nutritional measures. Nutrition knowledge however had a significantly positive impact on all nutritional status measures with the exception of weight for age and height for age of children aged more than 3 years. (Nutritional knowledge was poor though, most scored 0, mean was 1.6) A covariance analysis was carried out to control for the significant positive links between income and literacy with nutrition knowledge score. Effect of nutrition knowledge was highly significant when controlling for literacy and income levels.

Article	Sample/Study Area	Nutritional measures	Results
The determinants of Individual Diets and Nutritional Status in 6 Villages of Southern India. Ryan, J. P. Bidinger, N. Prahlad Rao, P. Pushpamma Research Bulletin No.7, 1984, ICRISAT, Hyderabad	Aurepalle, Dokur (Andra Pradesh) and Shirapur, Kalman, Kanzara, Kinkheda (Maharashtra) . 938 children aged 1 -12 years.	Weight, height, and individual nutrient intakes.	Regression methodologies used. <u>Dependent Variable = Individual Nutrient Intakes</u> Increasing family size large farm status (ranging from > 2.1 to 8.5 ha depending on village) has a significantly negative impact on intakes of protein, energy, calcium, riboflavin, ascorbic acid, and lysine. Mothers education had a significantly positive impact on both β-Carotene and calcium intakes. Large farm status has a significantly negative impact on intakes of protein, energy, calcium, riboflavin, ascorbic acid, and lysine. Large farm status has a significantly positive impact on intakes of protein, energy, calcium, riboflavin, β-Carotene, ascorbic acid, and lysine. <u>Dependent Variable = Weight</u> Controlling for height, arm circumference, and age increasing family size and calorie intake has a significantly positive impact while large farm status has a negative impact. If height and arm circumference is omitted then the impact of family size become negative, and protein intake has a significant positive impact. <u>Dependent Variable = Height</u> Increasing family size had a stronger negative effect on height than on weight. Higher levels of participation in the labor market also had a significantly negative effect on children's height. Energy intake only had significant positive impact in a specification which did not control for weight. Birth order conversely only had significant negative impact, implying poorer height outcomes for later born children, when weight and arm circumference were controlled for.

Article	Sample/Study Area	Nutritional measures	Results
Nutritional Status of Preschool Children and the Associated Factors. Maya Choudhry and K. Visweswara Rao Indian Journal of Nutrition and Dietetics. Vol 20: pp 18 - 29, 1983	Rajastan State 65 rural (Naila village) and 150 urban (Jaipur city) children aged 4-5 years in Jaipur District.	Body weight (Gomez Classification, grade 111 severe mal'n.) height, head circumference, chest circum., fat fold at triceps, arm circum., arm muscle circum, weight for height, weight for height^2, chest to head circum. ratio, weight for head circumference.	Univariate analysis. Urban preschoolers had significantly better nutritional status outcomes for the following measures: Body weight (exception grade 1 mal'n), head circum., chest circum., fat fold at triceps, arm circum., arm muscle circum, weight for height, weight for height^2, chest to head circum. ratio, weight for head circum. Males faired significantly better than females for the following measures: body weight (grade 111 malnutrition only) head circum., chest circum.,arm circum.,weight for height, chest to head circum. ratio, weight for head circum. Boys were breastfed significantly longer than girls. Increasing levels of both mothers' and fathers' education, income and length of lactation significantly decreased the severity of malnutrition as measured by body weight. Increasing household per capita income also significantly improved arm circum., fat fold at triceps, weight for head circum., and weight for head circum.

Article	Sample/Study Area	Nutritional measures	Results
Nutrition, Infant Behavior and Maternal Characteristics: A Pilot Study in West Bengal, India P. Graves, American Journal of Clinical Nutrition. 29, pp. 305-319. 1976	Singur District, 39 well nourished and 23 under-nourished children, aged between 7 and 18 months, randomly selected from children attending the districts maternity and child health clinic.	Weight for age weight/height^2 *100 arm/head circumference ratio	Study examined whether differences could be detected in specific components of infant and maternal behavior between poorly nourished and adequately nourished children. Study excluded children exhibiting severe forms of mal'n (kwashiorkor, marasmus). Definition well nourished: Above 70th percentile weight for age on local Indian Standard (between 80 and 95 percentile International standards), *and* weight/height^2*100 > 0.15, *and* arm/head circumference ratio ≥ 0.31. Definition under nourished: Below 30th percentile weight for age local Indian Standard (between 60 and 65th percentile International Standard), *and* weight/height^2*100 ≤ 0.14, *and* arm/head circumference ratio < 0.28. Study include all undernourished attending clinic, 15 boys and 8 girls. Of 488 7 - 18 month old children in district, one third attended clinic. 3 times more undernourished girls were seen on nurse home visits than boys. Undernourished boys are brought to the clinic girls are not. Income/wealth (based on a 3 point scale which took account of salary, cattle owned, and land ownership) had no significant impact on under nutrition. Higher education levels (based on scale of 1 - 4, 1 both parents illiterate, 4 both parents literate and high school attendance for at least 1) had a significantly positive impact in reducing undernutrition. The families of the undernourished were also significantly likely to have more children. be nuclear, have mothers of lower weight who married younger and had the first child at a younger age,,

Article	Sample/Study Area	Nutritional measures	Results
The Relationship Between Childhood Malnutrition and Maternal Knowledge and Nutrition Wallia & Gamblir. Indian Pediatrics Vol. 12, No.7, Pg 563-568. 1975	Slum area of Chandigarh. 200 (100 well nourished and 100 undernourished) pre school children selected from a total of 692 pre school children	Undernourished defined as weighing < 70% of the 50th percentile of the Harvard Standard.	100 undernourished preschool children (age not defined) selected from total of 167 on basis of: Parental education below primary level or illiterate, Father semi- or unskilled worker, household size ≤ 6. 100 children selected from 525 well nourished children on same basis Significant differences were found in the introduction of milk supplements and semi solid supplements before age 12 months. Greater numbers of well nourished were receiving supplements before age 12 months than their under nourished counterparts. Vitamin A and are inadequate in the undernourished but adequate in the well nourished. Caloric intake of the under nourished is statistically less than the well nourished at 60% of RDA.
An Economic Analysis of Malnutrition among Young Children in Rural India J. Levinson. Cornell/MIT International Nutrition. Policy series, Cambridge pp. 44-62. 1974	523 rural Indian children, aged 6 - 24 months, residing within a 5 mile radius of Morinda but excluding residents of Morinda.	Indicator is a composite = Average of weight of child as % of ref. weight for age, height of child as % of ref. height for age, weight of child as % of ref. weight for height of child. Harvard reference standards.	OLS regression methodology. No predicted values used for endogenous variables. Caloric intake, and income are found to significantly increase nutritional status as measured by the composite indicator. Increasing diarrheal infections, increasing age (no squared term included) and being female significantly lowered nutritional status. When the regressions were estimated separately for Jats and Ramdasias the impact of the above variables were the same except for income which became insignificant in both cases. Coefficients are expressed as elasticities. In all cases, with the exception of sex the impact of the variable in question is larger for Ramadasias than Jats but no tests of statistical significance of these results was done. Caste was not included in the nutritional status regressions. It was included in an equation with caloric intake as the dependent variable but was insignificant.

APPENDIX 3

APPENDIX 3--VILLAGE DESCRIPTIONS

1. AURUPELLE

Location

Aurupelle is a village in Mahbubnagar district in the state of Andhra Pradesh. The village area spans 4000 acres and its 1992 population size was 42,000 (Unpublished ICRISAT data).

Village Infrastructure

The village has electricity although it is mainly used for commercial (primarily agricultural) purposes. Few houses receive it (Walker and Ryan 1990). There are 7 bore wells and 5-6 public wells. A government primary school is located in the village.

The village had two anganwadis (one for the scheduled caste and one for the backward caste) each with a teacher and helper. An auxiliary nurse midwife visited periodically to immunize children and pregnant women. She had to cover 22 villages and could not visit regularly.

Transportation and Communication

There is a regular bus service.

Education

The 40 year old school in the village only offers up to 7th class education. High school students have to attend another school in a nearby village. The village also has a pre-school which is located just a couple of minutes away from its center.

A teacher estimated that the literacy rate in Aurepelle was low: 22% for males and 6-7% for females. There were more boys than girls (3:1) in schools. Girls, especially the eldest ones in their families, had to help look after their siblings. Poor working mothers could not afford to send their daughters to school since they would have to give up working outside the home. Most believed that girls did not need as much education as boys. The dropout rate among girls from the lower socio-economic classes was high.

Health

There has been a private health clinic in Aurupelle since 1975.

There is also a primary health care clinic. As mentioned earlier, the village has two anganwadis (one for the scheduled caste and one for the backward caste) each with a teacher and helper. Under the Integrated Child Development Scheme (ICDS) supplementary food was provided to children under 6 years, pregnant and lactating mothers in the anganwadis. Each had about 70 pre-schoolers and about 15 pregnant and lactating women on its rolls. A number of women were unhappy about the ICDS Food Supplement Distribution. In particular, a couple of women complained that the upma was not properly cooked and was pest infested (had small insects). Moreover, the time of food distribution, 12-1 p.m. was inconvenient for working women. It was also claimed that the teacher did not teach the children anything except for a few songs. Doctors from the Primary Health did not visit the anganwadis to give immunization. An auxiliary nurse midwife visited to give immunizations but she could not visit regularly since she had to cover 22 villages.

A registered medical practitioner (RMP) worked out of Aurepelle. He catered to mostly clients from the backward and schedule caste group who could not afford to consult the private practitioner in Amangal. He gave tetanus toxoid injections, but no other immunizations because he had no refrigerator. He said that nearly 30% of the pregnant women in Aurepalle suffered from night blindness.

The traditional midwife (dai) conducted deliveries at home.

The commonly reported ailments in the village were constipation, ulcer, neurologia for men; white discharge, uterus bleeding, and urine--for women; and lung infection, stomach pain, and -- for children (1992 survey).

Religion

Most of the village residents are caste Hindus. Harijans are relatively more numerous in Mahbubnagar villages, particularly in Aurupelle (Walker and Ryan 1990).

Caste

There are around 14-15 caste groups in Aurepalle, people of the same caste usually lived in the same neighborhood.

Housing

Houses of the Vellammas, Vaishyas, and Raos (forward, dominant castes) were situated in the village center, away from the Mala and Madiga community. Most of them were large farmers involved in money lending activities. Some had shops (kirana); the two flour mills were owned by Vaishyas (Komatlu). The Gouds (toddy tappers) comprised 60% of the village, their houses were on the eastern side of the village. Their houses were smaller than those of the forward castes but larger and better built than those of the Malas and Madigas.

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The Mala section of the village had 30-35 small mud and thatch houses. They were mainly laborers involved in agriculture and construction work. Only a few had a small piece of agricultural land. In the rainy season some Malas grew vegetables like bottle gourd, ridge gourd and kovai. Most women went for paddy harvesting, transplanting, weeding, castor, jowar, and millet planting. If women did not find wage work, they collected firewood from the jungle and sold it in the village. The Malas had a common well and a small Chinnakeshavulu temple meant only for their community. They were considered to be slightly above the Madigas in the caste hierarchy.

The houses of the Madigas were essentially similar to those of the Malas and were built on the land the government had allotted to them a few years ago (a few Muslims also lived there). Madigas were laborers.

Credit and Indebtedness

The researcher noticed that poor families borrowed money or food from their relatives, neighbors, friends, shopkeepers, landlords, and moneylenders. This was a common practice among the Madigas, Malas, Kurumas (shepherds), few poor Kummeri (pot makers), one or two Gouds (toddy tappers) and other backward castes (e.g. barbers). These families borrowed small quantities of cereals or just a few rupees, enough for food for a day or two (usually 1 or 2 ser of rice/broken rice). This kind of borrowing without interest was called badal. If families bought grains for credit from the shopkeeper then they had to return the money within a few days. When families needed a larger amount of money or food they borrowed from moneylenders or large farmers. A loan with interest from moneylenders was called appu, while a loan of grains with interest from large farmers or moneylenders was called naagu. If a family borrowed 1 kunda of paddy for a period of 4 months then the family had to return 1.25 kunda of paddy, an interest of 100% per annum. Only a few Madigas and Malas borrowed food.

Elders explained that Harijans usually borrowed grains on interest when they did not have any source from which they could get grains. They knew that the large farmers have grains in their store house and would agree to naagu and they could return it next harvest. They tried their best to return it because the interest would pile up. Sometimes they borrowed grains from another landlord to pay back the naagu, just as they did with money. Ninety percent of the families borrowed grains for household consumption, 10% for ceremonies.

A branch of the Prathamika Agricultural Cooperative Society which was founded in Aurepelle in 1984 gave loans to all its farmer members. Long term loans for five to fifteen years was given for: sinking new wells, deepening old wells, purchasing sheep, electric pump and pipe lines. Short term loans (6 months) of Rs. 500-600 were given for growing crops to farmers with a minimum of ½ - 1 acre of land. If a farmer grew a good crop and repaid the loan within 6 months he was eligible for another loan of Rs. 1000 (in the form of fertilizer bags worth Rs. 250 and Rs. 750 in cash). After 6 months, an interest of 1%

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per month was charged. The interest rate increased to 18% a year after another 6 months. If the farmer failed to repay the loan within 3 years, he was given a "bank notice". The bank sent 3 notices to non-paying farmers after which the bank referred the case to Mehaboob Nagar court. Then the farmer was given a final notice and if he still failed to repay his debt then his property was ceased (japath). If the farmer could not redeem these items within a certain period of time, they were auctioned.

Although all member farmers were eligible for loans, most of them did not avail of these because they had to submit their land documents. They did not like to do this because if they did not repay within the specified time period then the officials confiscated their property.

Agriculture

Of the 4000 acres belonging to Aurepelle residents, 3500 acres were agricultural land (patta bhoomi) while 455 acres were grazing/dry land (gairan bhoomi). There were four types of soil:

Tella Bhoomi/Dubba or (white soil): Roughly 40% of land was of this type and it sold for Rs 10,000/acre. With irrigation, a good crop of jowar, millets, castor, horse gram (ulvalu), sunflower, and cotton could be grown on this land. Many of the farmers had sown castor and jowar in 1993 but due to meager rainfall, the seeds did not germinate which resulted in heavy losses for small farmers.

Erra Bhoomi (red soil): Nearly 30% of the soil was of this type, the per acre rate of land with this soil type was Rs 18,000. Farmers grew castor, jowar, millets, safflower, sunflower, groundnut, paddy and ginger (with irrigation facilities). Safflower and ginger were grown four to five years ago, but now only a few farmers grew these near their wells.

A farmer explained that for two to three years all farmers produced cotton because the market rate was high and many made a good profit. However, due to insufficient rainfall last year, the output was low. The market rate also declined and farmers incurred heavy losses. This year all farmers opted for castor which required less inputs and little rain than cotton. Unfortunately, this year there was no rain at all and the seeds failed to germinate .

Mixture of Ushika (sandy) and Nalla Bhoomi (good or black soil): 20% of the soils was of this type. The rate for this land was Rs 18,000-20,000/acre. The main crops grown were paddy, onion, and wheat. During the past 10 years, the production of wheat and onion have decreased considerably. The soil condition was good for paddy only with irrigation.

Nalla Bhoomi/ Regadi (good, black soil): Approximately 10-15% of the total land area. Only a few farmers had farms with this loose "dari" soil which did not need much rain and was good for all crops. There was much demand for this land. With irrigation facilities, the

land rate was around Rs.30,000-50,000 per acre. However, it was difficult to dig wells in this type of soil. Major crops grown on this soil were: green chilies, safflower, groundnut, rabi jowar (paira jonna) and cotton. A few farmers grew castor.

During the past two to three years, the production of major crops have decreased. There was no rain this year and the wells were almost dry. Moneylenders, some of whom had loaned out as much as Rs. 3 lakh, feared they would not recover their money. Last year most farmers could only grow enough for their yearly household consumption. This year they would not even get as much.

All farmers in Aurepelle depended on well water for irrigation. Almost all large and medium farmers owned wells, while only a few small farmers had them. Farmers who did not have a well depended entirely on the monsoon rains. However, for the past three years (1991-93) Aurepelle has had scanty rainfall. As of August, total rainfall for 1993 amounted to 252 mm (unpublished ICRISAT data). Water levels in the wells were very low and only a few farmers had money to deepen the wells.

The main crops grown in Aurepelle, paddy, jowar and castor, were planted during the rainy season and harvested approximately four months later. Castor and red gram harvest began in January, during the Sankranti festival and stores in farmers' homes were full in February and March. In April, rabi paddy (wyasinga panta) was ready for harvest and in May, the stores in all farmers' houses were full again. In June-July there were no stores in most farmers houses while preparation for kharif crop was taking place. Kharif paddy (kattera varisen) was ready for harvest in the end of August and was stored in the houses by September. For farmers, Dussehra was the biggest festival. By October, Pessarlu, paddy (kharif), jowar (jonna), millets (saddalu) were almost harvested. November was the most food secure month, when the household stores were filled with grain and pulses. In December only cowpeas (bobberlu) were harvested and stored in the houses.

Labor and Income

The Sarpanch as well as the village elders said that finding work was not a problem for the hard worker. There were various sources of employment: toddy tapping, agricultural labor, road repair, well digging, attached labor, and petty business. Working in the fields the whole day (transplanting, weeding, harvesting, and ploughing), constructing roads, or cutting stones was considered to be hard work.

On the average, irrespective of the type of work, women agricultural laborers earned Rs. 10 a day and men Rs. 15. For paddy planting and harvesting they were paid in kind, women usually earned 4 sers while men received 6 sers. Villagers explained that men worked longer hours (women went to the field after they finished their household chores) and performed more physically strenuous tasks such as ploughing. They received payment in cash or kind for plucking cotton or castor seeds.

A government employment program, the Jowahar Rozgar Yojan (JRY) provided Rs.1.6 lakhs. With this amount the Sarpanch renovated the government school building and constructed gutters and culverts. The Charaka (spinning) Program catered to women of the middle socio-economic groups who could not go out to work in the fields. As a woman remarked, "In the center we can avoid everyone's eyes." They were paid at the rate of Rs.1 for each spool, most made Rs.10-12/day.

Produce Trading

A few years back, merchants in bullock carts from nearby towns made weekly visits to sell cooking oil, garlic, ginger, onions, red chilies at wholesale prices. During the past four to five years the number of such merchants (Angadi bundlu) has decreased, a few visited once in 15-20 days and sold red chilies, salt and onions. Nowadays, with regular bus service, villagers bought all their goods from Amangal.

The village ration shop sold rice, sugar, and kerosene to white card holders (those who had less than 5 acres of land, usually small farmers and laborers, with yearly incomes less than Rs.12,000). On the other hand, red card holders (those with more than 5 acres) were not entitled to get rice. Most of the 13-14 grocery stores are run by Vaishyas.

Normally people bought their monthly ration, but some like the Mala and Madiga laborers could not afford to pay Rs. 70 for 20 kg rice and 1 kg sugar. Those who had the money obtained 2-3 ration cards and bought the extra rice. Some people were willing to pay a higher rate when they needed large quantities of rice for a ceremony. The ration shopkeeper said if any rice was left over he sold it to those who did not have a ration card (usually Malas and Madigas).

One or two castes, Madigas in particular, bartered their in kind wages (paddy for food items). Village elders explained that those who followed caste occupations like carpentry were comparatively food secure, as they were assured of getting grains for their services. In addition, they had other wage work.

The mill-owner pointed out that the preference for grains was season dependent: Sojalu (millet) which gave heat to the body was eaten in winter, whereas jowar which gave coolness to the body was consumed in summer (r3).

Some vegetables like brinjal, lady fingers, tomato, green chili, bottle gourd, and cucumber were available throughout the year. In the rainy season there were 7-8 vegetable vendors in the village. They sold vegetables which they had bought at whole sale prices from the farmers. They either exchanged vegetables for paddy/money or gave credit. In the summer (r3), only four vendors sold vegetables.

The cost of basic commodities in 1993 were: rice 5.5 Rs/kg; milk 4.8 Rs./liter; biscuits 0.5 Rs for 10 pieces; and eggs 1.1 Rs each (Unpublished ICRISAT data).

2. DOKUR

Location

Dokur is a village in the Mahbubnagar district of Andhra Pradesh. The village area covers some 3360 acres and the population in January 1993 stood at 2182 (Unpublished ICRISAT data).

Although dry the district supports a considerable amount of rice cultivation with the help of irrigation from numerous run-off collection reservoirs, tanks, and wells. Dokur itself is a tank irrigated village whose major crops are paddy, groundnut, sorgum, pigeonpea and castor. Tank collection refers to the catchment area where the water is collected for irrigation.

Village infrastructure

Dokur is a small village with only 313 households (1991) of which 24.3% are labor households.(Asokan et al. 1991). Labor households, as defined in the manual of instructions for economic investigators in ICRISAT's village level studies, are households receiving most of their income from daily labor or as agricultural servants. A labor household must i, have daily work as the first or second major source of income, or be regularly employed farm workers, and ii, operate less than 0.2 hectares of land. The population density is approximately 100 persons per square kilometer (Asokan et al. 1991)

The village has electricity for domestic and commercial purposes, though only a few houses have been electrified since the arrival of electricity in 1962.
There is a village panchayat (governing body) consisting of members and a president elected by the villagers every five years. The village president is responsible for the village development, he obtains Government funds for such purposes as education, sanitation, drinking water, roads and street lights. A village patwari, a malipatel and a police patel exist within the village. The patwari is responsible for maintaining land records, the malipatel is responsible for the collection of land revenues and the police patel for upholding law and order. There is a Village Development Officer appointed by the State Government who gives advice to the farmers and works as an extension agent of the Block Development Office. The Block Development Office is a government office set up to aid villagers in their agricultural and educational needs, the villages within a state are divided into 'blocks' of approximately 200.

There are various Government staff who work in the village, though according to our resident investigator, they are not of much help to the villagers, and many do not even know who they are or what their roles in the village are.

Communications

According to Ms Tanuja, one of our resident investigators, there is a limited bus service, which comes through the village only three times a day, morning, afternoon and evening. However 1.5 km out of the village there are more frequent bus services running about five times a day. The nearest railway station is in Devarkadra. Several houses now have televisions and most have radios. Newspapers are also received daily in the village. There are no telephones in Dokur.

Education

Despite the fact that there have been schools in Dokur since 1946 spanning grades 1-7 there is a literacy rate of only 20.5% (1991, every ten years the Government carries out a census, and based on that the literacy rate is calculated). For the past 7 years there has been a pre school situated 8 minutes walk from the center of the village. Both schools are government schools, so children way attend for free. There is also another school in the village, a convent school, which is privately run and to attend children must pay 20-25 Rs each per month. After finishing their primary education, children from well to do families go to other cities and towns for higher education. Few low caste children receive any higher education and girls are positively discouraged from attending school. Girls are required to stay at home and look after their younger siblings and help their parents with household chores (Mohan Rao 1994, personal communication)

Religion

Hindus form the largest religious group in the village though there are also some Muslim households. Religion plays a major role in daily life, villagers frequently have prayers in their houses, worship in temples and travel to pilgrim centers. People regularly gather in the temple at night to sing religious songs (Asokan et al. 1991).

Health

In 1967 a health clinic was set up in Dokur by the Institute for Rural Health Studies (IRHS). IRHS is an international and Indian collaborative project. There is a doctor at the clinic from Monday to Friday, however some villagers still chose to make the 60 minute journey to Deverkadra to visit a private medical doctor where they have to pay. IRHS consultations are free. The nearest chemist is an hours walk away. There is also a traditional doctor within the village whose cures many still believe in.

The most common reported health problems amongst men and women are fever and jaundice, with women also frequently suffering from stomach pain. For children diarrhoea, scabies and boils appear to be the most frequently occurring problems (Unpublished ICRISAT data).

There is no nutritional education program in the village although there is a vaccination program, which gives infants the necessary

inoculations, e.g., B.C.G. and D.P.T.(Tanuja 1994, personal communication)

Caste system

Many castes exist within the village among which the Brahmins, Reddys(Kapus), Vaisyas(Komati) and Velmas are generally more influential and rich. Mala and Madiga (scheduled) castes are ranked as low-caste people in the social hierarchy.

In general a family's traditional occupation is based on caste. Due to economic pressure, however, there is a trend to deviate from those traditional roles and adopt non-caste occupations, e.g. Boyas, traditionally hunters, may now be agricultural laborers.(Tanuja 1994. personal communication)

Early marriages occur frequently in the majority of the castes. The marriages are arranged within the same caste. According to our resident investigator Mr Mohan Rao, a dowry system is prevalent in all castes, with the amount of dowry normally dependant on the economic conditions of both families, a poor family may be expected to give 5,000 Rs whereas a for wealthy family the figure may be nearer 150,000 Rs. Educational status may also be reflected within the amount of dowry given, for example, a doctor may demand more, and in the same way a farmer with a considerable land holding may request more due his land affluence.

Despite changes in traditional roles caste norms are strictly followed in the village. The higher caste people do not allow persons from scheduled castes (Mala and Madiga) families to work in their houses, but do allow them to work in their fields. There are separate drinking water wells for higher caste and scheduled caste families. These wells were built by the Government and are maintained by the village panchayat (Asokan et al 1991).

Housing

Caste differences may also be recognized in the location of houses within the village. The houses of the scheduled castes are traditionally located a little away from the main village and houses of the other castes form clusters in the village. The poor and lower caste people generally live in smaller houses, with only 1 or 2 rooms, constructed with mud walls and a wooden or thatched roof; they normally have no water supply, electricity, or sewerage system.

Big land owners, however have houses with stone walls and strong roofs. The roofs are generally constructed with wood covered with mud that is sloped so that rain water will run off (Asokan et al. 1991). Their houses often have toilets and a personal supply of drinking water.

Only a small number of houses have been built by the Government for the scheduled caste families, usually homeless laborers, these are Pucca houses constructed from stone and with strong roofs (P. Tanuja 1994, personal communication).

Households store their food grains in gunny bags, cane bins and big clay pots.

Credit and Indebtedness

In 1991 more than 40% of households in Dokur are indebted to either village money lenders or institutional credit agencies.(Asokan et al. 1991). Money lenders play the more important role in providing loans, given in cash or kind with interest rates ranging from 18 to 36% (1991). Banks offer lower interest rates but villagers prefer loans from money lenders because no collateral is required and loans can be obtained quickly. Only a few farmers have taken loans from commercial banks and government agencies for crop production or to purchase milch animals (Bidinger et al. 1990)

Co-operatives

In the village there is a primary agricultural credit co-operative society attached to the district Central Co-operative Bank. This provides cash and kind loans on a short-term basis to aid small-scale farmers with their input costs. The loan is repayed by farmers after they have harvested their crops (Asokan et al. 1991).

According to Mohan Rao, resident investigator, in order for a farmer to be eligible for a loan he must join the society by paying a nominal membership fee. Loans are provided at an interest rate of 15%.

Agriculture

The village has predominately shallow to medium Alfisols (red soils). In addition to these Alfisols, sandy and gravely soils are also present. The moisture holding capacity of the soil is very poor, and thus run off and soil erosion are substantial. In Dokur land is the major asset, contributing 61% to the total assets of households in 1991.(Asokan et al. 1991). The average total assets of large farmers are around 3 times the village average. Production assets i.e., land, livestock, farm implements, and machinery, contributed around 68% to the average total assets in 1991. In October 1991 the value of dry land varied from Rs.1500 to Rs.4000 per acre depending on soil type, and its location whereas wet land irrigated from tanks and wells is valued from Rs.10,000 to Rs.20,000 per acre. Dokur has five tanks which irrigate 266 hectares of land. Tank water is mostly used for irrigating paddy. At the end of the postrainy season when the tanks are empty, tank beds are generally cropped. 48% of the gross cropped area is under paddy (Asokan et al. 1991).

As stated in Asokan et al (1991), the three main seasons are: kharif (rainy season) lasting from June to September, rabi spanning October to January and, summer (r3) covering February through to May.

Rainfall is erratic with an average of 75% falling between July to September. In 1992 the annual rainfall was 577.8mm (Unpublished ICRISAT data).

The six most common cropping systems as stated by Mohan Rao (personal communication 1994) are; (1)kharif or rainy-season paddy, (2)rabi or postrainy-season paddy, (3) rabi groundnut, (4) row intercropping sorgum/pearl millet/pigeonpea, (5) sole castor, and (6) castor/pigeonpea intercrop.

Farmers tend to mix sorghum with minor crops such as pulses, vegetables and fibre crops such as mesta, and sunhemp.

Landholdings are scattered and fragmented with a large proportion of agricultural land concentrated with upper caste and affluent farmers. The average size of large farms is 12 times the average size of small farms. Land-leasing decisions are influenced by resource position i.e. of land, livestock and labor of different farmers (Asokan et al. 1991).

Share cropping is a common arrangement in Dokur. The land owner bears 50% of the input cost, but bullock and human labor required for ploughing, sowing, and interculturing are supplied by the tenant. The tenant shares 50% of both the input and the main product.(Asokan et al. 1991)

Labor and Income

Labor income is predominately derived within the village from the agricultural labor market. There is a labor shortage in Dokur at times of peak activity, e.g., harvesting, but a surplus during periods of little agricultural activity. Almost all landless households, small, and medium farmers participate in the village labor market. A large proportion of agricultural work is seasonal, with the necessary tasks varying with the seasons. The labor demand is at its peak during the months of June, July, November, and December.

There is a growing tendency for laborers to migrate to cities in search of more regular employment that is not affected by the changing seasons. Often laborers acquire an advance from their prospective employers before leaving the village to pay off any outstanding debts (Mohan Rao, personal communication, 1994).

The majority of the labor force comes from the scheduled castes and they may be employed in two ways, either as daily rated labor is, or in permanent jobs such as regular farm servants who receive a fixed payment once a month. In the kharif season the principle tasks for men include field preparation and harvesting paddy, their daily wage is approximately Rs24. Women are employed in the kharif to transplant and weed paddy, their basic daily wage is approximately Rs18. During the rabi seasonal tasks for both men and women include harvesting and plucking groundnuts, the daily wage for both sexes is considerably lower than in kharif, with men earning on average Rs 15 a day and women a mere Rs 8. Children earn a similar wage to women. Although women earn on average only 60% of the male wage, their total earnings are proportionately more because more of them are employed (Unpublished ICRISAT data).

Under the Jajmani system some service-caste families receive payment for their services in kind.

As stated by Asokan et. al. (1991), households that possess smaller landholdings who have an excess of human and bullock labor often lease in more land in order to utilize their owned labor resources more effectively. Whereas villagers who work outside the village and farmers who have more land in relation to human and bullock labor, lease out their land. Thus large farmers lease in and small farmers lease out.

Produce Trading

There are several small shops in the village that cater to the consumption needs of the villagers,including also a post office, fair price shop, where people can buy supplies according to their ration cards, and flour mills. Most laborers and small farmers sell their kind wages and farm produce to these shops and purchase provisions from them.

There are a couple of village traders who purchase farm produce from farmers although most people do not sell farm produce to local traders as they offer lower prices than existing market prices which the farmer would get if he sold the same produce in a market town e.g., Devarkadra.

Markets serve also as meeting places rather than just locations for the sale and purchase of goods. Though most of the farm produce e.g., castor, groundnut, paddy and safflower are sold here, small quantities are also traded in the village shops. Most farmers retain all the sorghum and pearl millet they grow because the production of these crops is very low and barely sufficient to meet their home consumption needs. Bullock carts are used for transporting goods in large quantities to the market and there are some farmers who also let their bullock carts for transportation. In Dokur the charge for transporting a bag of farm produce to Devarkadra 5km away is Rs. 1.

The cost of basic commodities in June 1993 were, rice 5.50 Rs/kg, milk 4 Rs/l, biscuits 3.50 Rs/packet, and eggs 1 Rs each. These prices fluctuate with the seasons and inflation (Unpublished ICRSIAT data).

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3. KANZARA

Location

Kanzara is a village in the Akola district of Maharashtra. It is 8 km south of Murtizapur, the nearest market town. In 1992 the population was approximately 1600 (Unpublished ICRSIAT data). The village covers an area of 6 sq. km with the cultivatable area being 540 hectares (Kshirsagar 1983). The important crops cultivated in Kanzara are, cotton, pigeonpea, sorghum, mungbean, groundnut and wheat. Irrigation is provided by wells.

Village Infrastructure

Kanzara consists of 300 households, with a population density of approximately 160 person per sq km (Unpublished ICRISAT data).

The social organization of the village is centered around a Gram Panchayat which consists of 9 elected members. The secretary of the Gram Panchayat is also a village-level extension worker, working in association with the Block Development Office. This is a government office set up to aid villagers with their agricultural and educational needs. Villages within the State are divided into Blocks of approximately 200 for this purpose. (Kshirsagar 1983).

There is a adequate supply of drinking water, from 46 drinking-water wells which are individually or jointly owned. A few of these have been constructed by the Government through the Gram Panchayat. There are two bore wells, which provide water, and 25 biogas plants, supplying domestic fuel for cooking (Unpublished ICRISAT data).

There is electricity in the village for domestic, agricultural and commercial use. Mainly, power is used to electrify houses and lift water from wells for irrigation. Commercial flour mills use electrical power for grinding and milling villagers' foodgrains. The main foodgrains, sorgum and wheat, are threshed by power-operated threshers.(Kshirsagar 1983)

Communications

There is a frequent State Road Transport Corporation (SRTC) bus service through the village, with buses passing at least 5 times a day. The nearest railway station is at Murtizapur. There is a post office within the village, though there are no telephones, the nearest one being in Murtizapur. About 15 of the more wealthy households now have televisions and the majority of homes have radios. Recently a few of the villagers have started to receive Marathi newspapers occasionally.(Chopde, personal communication, 1994).

Education

Since 1992 there has been a school in Kanzara spanning grades 1 to 10. The school was first established in 1930. Prior to 1992 the school

finished at grade 7, at this stage children from affluent homes and some boys from poorer homes went out of the village for further education. Despite the fact that now the school extends to grade 10 many wealthy families send even their small children out of the village to larger towns to receive their education thus giving them a wider choice of schools, including an English Medium school. For lower caste girls education previously finished at grade 7, if not before. In order that girls should have access to higher education, in 1992 the existing primary and middle school was expanded to include a senior school. The administration of the school lies in the hands of the Zillah Parishad which is the district level administrative body. The village Panchayat also has financial obligations to the school, thus giving it a say in matters concerning school expenditure, development, teaching standard and, discipline.

There is an Urdu primary school, with a single male teacher, located in the village mosque.

Thirteen years ago an adult education school was set up by the Adult Education Program of the Central Government, there are two classes run, one by women for women, and the other by men for men. The teachers are trained by the Adult Education Program at Akola (Chopde 1981, Chopde personal communication, 1994).

Religion

Hindus form the largest religious group in the village. All the villagers are Hindus, except for Mahars and Muslims. Mahars adopted Budhism after independence (Kshirsagar 1983).

Health

There is no health clinic in Kanzara, the nearest one is 10 km away. Resident in the village is a nurse, who acts as a midwife. The nearest private medical doctor is a 90-minute walk away, at the same distance there is also a chemist. Occasionally a doctor visits the village to give examinations and carry out vaccination programs for small children.

The most common reported health problems in study carried out on 80 individuals for women were, vitamin A deficiency, anaemia and fever, men too complain of colds and fever. Amongst children the major health problems are vitamin A deficiency, worms, jaundice, diarrhea, polio, and rickets. Diarrhea and polio are especially a problem during the rainy season (Unpublished ICRSIAT data).

According to out resident investigator, Mr V.K. Chopde, much of the illness in the village is due to open drinking wells and poor sanitation e.g. inadequate sewerage system.

Caste

As stated in Kshirsagar (1983), there are 14 castes in Kanzara, with the Martha caste being the highest and Carpenter, Cached, Dhoti, and Mag the poorest. The Mali caste is the most numerous caste in the village, with the Martha caste being the second most populous. Politically these two castes are rivals. In general, caste relations have improved in recent years. Even though there are separate drinking wells for the scheduled castes, the concepts of the lower caste or untouchables are not so strongly enforced as they once were. Though the present relations between castes are fairly good and they are in social harmony, the introduction of the Panchayat Raj, which is a hierarchical administration system imposed by the Government, has disturbed the solidarity of the village.

Marriage is arranged by parents and/or immediate relatives. Recently the marriage age has advanced, although it still not uncommon for girls to marry at 14 and boys at 18. The dowry system is prevalent in all castes, this is a heavy burden for parents, because the prestige of the family is reflected in the dowry both given and received.

Housing

Traditionally, in Maharashtra, the houses of Mahars are located to the south and those of Muslims to the north of the village. The houses of the Hindu castes form clusters in the village. The majority of the houses are two-sloped roof houses, built mainly from mud with the roofs constructed of wood, bamboos, tiles, tin sheets and other materials. Household accommodation may vary from a multipurpose single room to a big house with three or four rooms.(Kshirsagar 1983).

Food stuffs are stored in bins, known as "Kangi" and gunny bags. Bins can accommodate 2 to 20 quintals of food-grains and are prepared from pigeon pea stalks or palm leaves (Chopde 1991).

Credit and Indebtedness

Kshirasagar (1983) reports that the capital market in the village is divided into two. The rural financial market, incorporating cooperatives, land development banks and other commercial banks and Government agencies. And the informal market, divided into the moneylender segment and interest-free advances from relatives, friends, and employees of regular farm servants. In 1983 official loans were the main source of credit for farmers in the village. The major share in total credit was advanced by cooperatives indicating a well-developed cooperative credit sector. The second important source of credit comes from moneylenders. Moneylenders are not anxious to lend large amounts due to the Maharashtra state Moneylenders Act of 1960 which specifies registration and the maximum interest rate of 16% per annum. However according to our resident investigator moneylenders often do not adhere to the rules, and the interest rates they charge are usually much higher than those specified by the State.

The preferred form of borrowing as stated in Kshirsagar (1983) is advances from relatives and friends. This borrowing is normally of short duration. Loans are generally taken to pay for marriages. However, in 1983 the average outstanding debt per household from this source was only Rs 40-60, this is due to the fact that once the money is advanced, friends and relatives cannot enforce prompt repayment, the general tendency is that relatives are repayed last in this segment of the rural financial market.

Integrated Rural Development Project

In 1981 the Integrated Rural Development Project (IRDP) was set up by the Government in order to provide loans to landless laborers and small-scale farmers. Many villagers used these loans to set up vegetable shops or buy seeds of a better crop hybrids. In 1981 a large farmer may have employed as many as 40 regular farm servants (RFS), by 1991 the number was closer to 10, this is due to the fact that more and more landless laborers are taking advantage of the IRDP loan. Thus, at certain times of the year, e.g., during harvest, there is a labor shortage in Kanzara, and labor from outside the village comes in. Also, with improved transport routes to the surrounding towns and cities it is easier for small-scale farmers to purchase necessities for their farms, and to gain information on how to improve their crops (Chopde, personal communication, 1994).

Co-operatives

The agricultural cooperative credit society was established in 1955 and works well. It is affiliated to the Akola District Central Cooperative Bank, Murtizapur. The nearest land development and other commercial banks are located at Murtizapur (Chopde 1991).

Agriculture

The staple food of the people of Kanzara is sorghum bread, with wheat bread being increasingly consumed by villagers. Pigeonpea is the most commonly consumed pulse and mungbeans, uradbeans, and chickpea are also eaten. Meat is eaten only occasionally. (Ms Vasantha, personal communication 1994). As cited in Kshirsagsr (1983), of the cultivated area 60-70% is medium deep vertisols. In 1985 the value of land was between 4,000 and 25,000 Rs per hectare. Well irrigation is used, with the wells ranging from 40 to 50 ft deep, groundwater depletion due to inadequate rainfall is a common occurrence in the village.

According to the farmers of the Akola region the classification of the seasons are ; the Unhala or the hot season (February-June), the Pavasala or rainy season (June-October), and, the Hiwala or cold season (October-January).The majority of the rain falls between June and September, in 1992 the annual rainfall was 846.7 mm.(Data sheets, collected by Chopde 1992) Irrigation is practiced largely in the Hiwala season for high-value and cash crops such as sugar cane, chilies, rice, wheat, and vegetables. In Kanzara about 90% of the cropped area is sown in the rainy season, with the most important rainy-season crops being

cotton, sorgum, groundnuts, mungbean, rice and pigeonpea. There is only a small area under postrainy season cropping.

Cotton is the most important cash crop with cotton and cotton mixtures occupy 55% (1991) of the cropped area of the village. The main food and fodder cropping systems are sorgum and sorgum mixtures and they occupy 20-25% of the cropped area.

Intercropping is very common in the village, being practiced mainly by small-scale farmers. The choice of cropping pattern is guided by, soil type, consumption needs of the family, fodder demands of livestock, cash requirements, and the availability of irrigation water. (Kshirsagar 1983).

There is a wide adoption of improved technology in Kanzara, such as the use of high-yielding hybrids, fertilizers, and pesticides. The use of this improved technology by so many farmers has been possible due to loans from the Integrated Rural Development Project. The majority of farmers in Kanzara use high-yielding hybrids of cotton, sorgum and wheat, whereas previously their use was restricted to large wealthy farmers. (Chopde, personal communication, 1994).

In the early 1960's the Maharashtra Government undertook a program of soil conservation through bunding, as a scarcity relief work. Scarcity relief are those projects carried out by the government in times of severe drought in order to provide food and relief for laborers who have no work. But in view of its importance and utility in controlling the run off water and conserving the soil, it was made a permanent feature of the agricultural development program. (Chopde, personal communication, 1994).

Leasing out land for fixed cash rent, and share cropping are common features of the village. In Kanzara large farmers account for a major share in the total leased-in and leased-out land. This is due to the fact that there are employment opportunities on various government projects,and small-scale farmers diversify the family labor through gainful employment rather than leasing-in land for cultivation.

In sharecropping, contracts are mutually settled by the landlord and the tenant. In, general the output is shared equally by the tenant and landlord (Kshirsagar 1983),

Labor and Income

30% (1992) of households in Kanzara are labor households, meaning those households which receive most of their income from daily labor or agricultural servants labor and do not operate more than 0.2 ha of land. (ICRISAT Manual for economic investigators) This is a high percentage of households in comparison with other ICRISAT Village Level Studies villages, and it is due to the high labor requirement of cotton. Despite the Integrated Rural Development Project loans many households are still labor households, using their loan they have bought land, yet

they still work as regular farm workers in order to supplement their incomes (Chopde, personal communication 1994).

The high labor requirement of cotton helps to sustain landless households in terms of employment and income. The important agricultural operations that must be done are plowing, harrowing, sowing, hoeing, weeding, picking(cotton), harvesting, and threshing. Of these, plowing, harrowing, and hoeing are performed only by male labor, whereas weeding and picking cotton are exclusively female tasks. Harvesting and threshing are carried out by both sexes.(Kshirsagar 1983). Average daily wages for men in 1992 were Rs 18, and for women, Rs 10 (Unpublished ICRISAT data).

Labor is divided among three categories of workers (i) family labor, (ii) hired labor on daily wages and, (iii) contract labor or regular farm servants. (Kshirsagar 1983).

There is a marked seasonal variability in the use of labor. The first peak occurs in the months of June, July and August, which is the period for sowing, fertilizer application, hoeing and weeding crops like groundnut, sorghum, cotton, pigeonpea and mungbean. This period is followed by a slack period in September, but then there begins a continuous labor demand for harvesting sorghum and groundnut and sowing of chickpea and wheat in the months of October and November, followed harvesting of cotton in December, January and February. The pattern of rainy-season cropping for both short and long-duration crops shows a first peak between June and August followed by continuous demand for labor until February (Ghodake et al.,1978).

Although there have been mechanical sorgum threshers in Kanzara since 1976 there has not been a significant labor displacement due to the fact that cotton, as the principal crop has a high labor requirement.(Kshirsagar 1983).

Crop production is the main source of income in Kanzara, contributing to almost half of the gross household income in the village. The percentage contribution of labor income is about 23 to 25 %.(Kshirsagar 1983).

Produce Trading

There are several shops in Kanzara where the basic necessities for domestic use can be bought. Generally farmers do not sell their farm produce to local traders, but take it instead to the regulated market at Murtizapur. Farmers use market days not just for the sale and purchase of consumption goods and livestock, but also as a meeting place. Rich farmers either go to Akola, the district headquarters or Amraoti, 70 kms away, to purchase marriage goods. (Kshirsagar 1983).

The cost of basic commodities in 1992 were, rice 7.5 Rs/kg, milk 8 Rs/l, biscuits 4.50 Rs/packet, and eggs 1.2 Rs each. (Village data sheets collected by V.K. Chopde 1992). These prices fluctuate with the seasons and inflation.

References

Data sheets with basic village information collected in 1992 by ICRISAT village level studies workers.

Direct interviews with Ms T. Vasantha and Mr V.K. Chopde

4. SHIRAPUR

Location

Shirapur is a village in the Sholapur District of Maharashtra state. The village area covers 1472.42 ha of which 90% is cultivable (Bhende 1983) while its population size as of 1992 was 4,500 (Unpublished ICRISAT data).

Village infrastructure

Shirapur is a relatively small village with about 450 households of which 32.7% are labor households. Its population density is approximately 110 persons per square kilometer .

The village has electricity for commercial (for running flour mills and irrigation) and domestic (10% of the houses have been electrified) purposes.

There is a village panchayat composed of 9 members who are elected every 5 years. One Agricultural Assistant/Gram Sevak is connected with the village panchayat as its Secretary and also as extension personnel of the Block Development Office (Bhende 1983).

Transportation and Communication

Buses run daily to and form the village [Walker and Ryan 1990]. None of the documents have additional information.

Education

The village school in Shirapur was established in 1885. Available education facilities are run by the Education Society and provide up to high school level (10th class) education (Bhende 1983). For the past 9 years there has been a pre-school situated very near the village center (just about a 4-minute walk from it).

Health

There is no health clinic in the village. The nearest clinic is located 11 kilometers away. There is no nutrition education program in the village although a vaccination program exists. Health problems commonly reported by both men and women are body pains, fever, and anemia. The former also suffer from coughs while the latter also have stomach aches. On the other hand, children have been reported to suffer from indigestion, coughs, colds and fever (1992 survey).

Religion

Most village residents are caste Hindus, majority of whose traditional occupation is farming. Few of the caste Hindus are Brahmins (Walker and Ryan 1990).

Caste System

Many castes exist within the village although the Marathas are the most dominant group. The most obvious caste distinction is between Harijans (Mahar, Huler, Cobbler, and Musician) who are regarded as socially inferior and the upper castes although there are no physical barriers that separate their respective communities. In public places, both lower and upper castes are fairly free to mingle and the relations between them are friendly so long as each caste respects the status quo (Bhende 1983).

Housing

Sections of the village (wada) were divided along caste lines, which in many cases coincided with socio-economic status. Majority of the cultivating and labor households stay in congested places. About 15-20 houses were constructed by the government for scheduled caste families (Bhendi 1983). In most cases, however, it was difficult to predict the economic status of households by just looking at their houses.

The houses have a typical construction pattern: stone walls and mud roofs. Most households did not have a kitchen garden (except for a curry leaf tree) because it would have been costly to maintain since a pot of water costs a rupee. Households store their foodgrains either in gunny sacks or in containers made of pigeonpea stalks (kanqi). Some farmers store foodgrains in open storage bins (ambar) built into the end of their living rooms (Bhendi 1983).

Credit and Indebtedness

According to farmers, 90% of them were in debt (karjbajari) to either a bank or to a local money lender. Small farmers borrowed money from every possible source for various reasons, especially for agricultural needs and marriages. Government banks do not provide loans for non-agricultural uses.

Farmers with large landholdings had access to bank loans from the co-operative society bank (sthaniya sahakari pat sanstha) managed by local governing members. Although anyone with productive land could become a member, farmers with large irrigated land (samarth gat), had more opportunities than farmers with small, dry landholdings (asamarthh gat). The loan each member was entitled to was determined by the type of soil, crops and yield. Members of the former group obtained one or two large loans a year. The loan was given prior to planting and had to be repaid within a year. Collection started soon after harvest. Most people's experiences with bank loans have been negative. A key informant estimated that 90% of small farmers who had taken bank loans had become bankrupt.

Local money lenders charged anywhere from 5 to 15% per month (60-180% per annum). The rates varied according to the borrower's ability to repay the loan, their loan repayment record, the amount needed, and

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assets which could act a collateral (Taran). Transactions were based on personal knowledge and trust (vishwas).

Often the cumulative interest was higher than the principle sum borrowed. Money lenders rarely repossessed a farmer's assets. Generally the "needy" farmer promised to return the money soon after the harvest by selling his crop at a low rate or paying in kind. Thus "ordinary" (Sadharan) small farmers remained in debt.

Agriculture

In Shirapur, cultivable land is only 90% of the total geographical area. The village has deep black soils which have a very high moisture retention capacity. Land values range from Rs. 2000 to Rs. 15000 per hectare depending upon soil type, fertility, and location. Land distribution is somewhat uneven. Approximately 50% of the cultivator households operate less than 4 ha. lands while about 6.5% of cultivator households operate more than 16.2 ha. lands, covering 17% and 36.85% of the total geographical area, respectively (Jodha et al. 1977 cited in Bhendi 1983).

The village has a bimodal rainfall pattern with the two peaks being in June and September (Bhendi 1983). In 1992 the annual rainfall was 319.4 mm (1992 survey).

Rich farmers with rainfed or irrigated land grew jowar along with sunflower (karadi), chickpea (marbare), as rabi crops for the January/February harvest. Toor, matki, pearl millet, groundnut, sesame, black and green gram, and sunflower were kharif crops (sown in June and harvested in October).

Prior to the drought in 1972 and chronic low rainfall thereafter--the 1992 kharif crop failed because of insufficient rain--sugar cane was the main cash crop. Now, sunflower is the major cash crop because it requires little water. Moreover it grows well on relatively unfertile soil and a good harvest could be sold at Rs. 1000/kg. Most farmers grow equal quantities of sorghum (used for home consumption and for fodder) and sunflower.

Few farmers cultivate fruits like pomegranates and bernuts, as well as cash crops like sugarcane. In 1991 a government of India scheme started to give 100% subsidy for fruit crops (except grapes); 25 farmers with irrigated land or wells benefitted. Money was paid in four installments for digging pits, for planting, for fertilizers and for building a compound wall. In 1992 an additional 25 farmers took advantage of the same scheme. As these crops' yields were good the previous years, other farmers took up fruit farming without subsidy. Another programme run by District Cooperative Bank (Jilla Sakhari Madhyawarti Bank) during the past 3 years has given a subsidy for growing pomegranates.

It is expected, however, that regular canal irrigation (water was released twice into the canal--once in 1992 for 3 days and again in 1993 for 4 days) would lead to changes in crop yields and work opportunities.

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At present, about half of Shirapur has received water. It is hoped that by the end of 1993, 75% to 100% of the village would benefit from regular canal irrigation.

A key informant said regular canal irrigation would lead to tremendous development. He estimated that 100 bundles of jowar stalks would yield 200 kg of jowar grains. Farmers would continue to grow it for 2 to 4 years and then switch over to cash crops such as sugarcane and fruits as the soil will no longer be suitable for jowar. However, the long growth cycle (11 months) of sugarcane poses a problem for small farmers as their money would be tied up for a whole year. A large farmer with several income sources could afford to wait but the small farmer needs a steady income to meet his expenses.

Labor and Income

Farming and agricultural labor are the main sources of livelihood in Shirapur. Based on a 1975 census, 50-62% of households were cultivators. Some households cultivated land on either a share cropping basis or a leasehold basis, resulting in fewer than 25% landless labor households. Traditionally, output sharing has been on a 50:50 basis although if the tenant uses the landowners' bullocks he gets only 15-20% of total output. The sharing of output on irrigated land is 66:33 between landlord and tenant (Bhendi 1983).

On rainfed lands, work has been seasonal, with labor demand peaking during planting or harvest seasons. Women planted, weeded, and harvested pearl millet, groundnut and wheat while men harvested jowar and "raised soil" at sugarcane roots. Generally, men earned Rs. 25/day and women Rs. 12/day (previously, men were paid Rs. 20/day and women Rs. 10/day). Wages were gender differentiated in all activities except for piece work, e.g. pulling 100 bundles of jowar earned Rs. 20 at a rainfed farm (loose soil) and Rs.30 at an irrigated farm (packed soil).

Farmers with irrigated lands or 2-3 wells, hired laborers on a contractual basis to work for a year. Contract laborers could not work for anyone else. They received the promised share of grain or cash regardless of the total production. If the yield was less, the owner paid cash instead. In addition, large farmers, such as the owner of a 40 acre bernut field who employed 150 women for 15 days to harvest bernuts, provide seasonal employment.

People also carried out their caste occupations. Many Harijans believed that they did not have equal job opportunities, employers were reluctant to hire them as they were not strong and well built (they attributed this to their poor diet). Once they had a job they faced further discrimination such as not being allowed to drink from the common water pot. Government jobs which required contacts and paper work, were inaccessible to them.

Future Income Opportunities

The government has been constructing a 60-80 kilometer long canal from the Ujani Dam on the River Bhima. Since 1978, this has provided sporadic, well paid employment (Rs. 40 to 50/day) with 25% of the wage workers having worked on the canal.

When canal construction ends, it is expected that "more water will lead to more work," especially since about 75% of farmers in Shirapur will gain access to canal water.

Canal irrigation is predicted to affect bank transactions since farmers with sandy soil would become viable members with larger shares and receive larger loans. Medium quality (halki jamin) sandy soil is best suited for canal irrigation because all the excess water drains easily. The price of such land is expected to increase drastically (from the present Rs.15,000 to Rs. 20,000/acre to about Rs. 40,000 per acre). However, the price of black soil would still remain slightly above that of sandy soil since it is more fertile. Nevertheless, there would be some problems too, black soil could become water logged and a "white salt" deposit could form on the soil. Farmers would have to make furrows to drain excess water.

It is expected that mechanization would occur and more farmers would use tractors. Additional construction would take place and provide jobs for many. In short, Shirapur's future is expected to be bright (Shirapurche nashib ujadnar). People hope to have more money to build or renovate their houses, to buy and improve their lands.

Produce Trading

There are fair price shops and flour mills in the village (Bhendi 1983). After the harvest of the sorghum crop, some small farmers sold their grains to local shops when the yield was low and it was not worth transporting the grain to market. They also sold sorghum to repay a loan to the shop keeper or to raise money for an emergency. If the price of local sorghum is high, they may sell this and purchase hybrid sorghum instead.

A small grocer estimated that 10% of the people, mostly wage workers, bartered jowar for small quantities of sugar, tea, groundnut, pulses, coconut, and cooking oil. This is also a fairly common post harvest practice by small farmers.

Women, on the other hand, exchanged work such as cleaning a big court yard for small quantities of jowar. The cost of basic commodities in 1993 were: rice 8.00 Rs/kg; milk 8 Rs/ liter; biscuits 4.50 Rs./packet; and eggs 1 Rs. each (1993 survey).

APPENDIX 4

APPENDIX 4--MANUAL FOR SURVEY DATA COLLECTION

4 ICRISAT-IFPRI SURVEY ON ALTERNATIVE INDICATORS INSTRUCTIONS FOR ALL ENUMERATORS

(Draft: January 1, 1993)

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1.1 BEFORE THE SURVEY: GENERAL INSTRUCTIONS FOR ALL ENUMERATORS

1.1.1 FILL IN ALL SPACES ON EACH QUESTIONNAIRE.

Every cell should have an answer. This will avoid confusion in the data processing steps.

It is important to fill in the village code, household number, and respondent ID number ON EACH PAGE as they will be separated at a later date for data entry.

For columns, rows, or boxes where a code is repeated over and over, you may save time by writing the code and then an arrow over the remaining cells. for example:

Livestock	No. owned	No. sold
bullock		
he buffalo		
she buffalo		
poultry		

1.1.2 TIME STARTED AND TIME ENDED BOXES

We are trying to ascertain how much time it takes to collect each type of information (and therefore how much it COSTS to collect the data). Therefore time started and time ended boxes must be filled in on every schedule.

If you stop an interview mid way through a schedule, note down the time that you stopped and the time that you began the survey again.

Please be pedantic about wearing your digital watch and noting the timings. This is extremely important information.

1.1.3 CODES TO USE THROUGHOUT THE STUDY:

VILLAGE CODES:

1 = Dokur
2 = Shirapur
3 = Kanzara
4 = Aurepalle

ENUMERATOR CODES:

Nutrition Enumerators

1 = Anuradha	5 = Neeta
2 = Sujatha	6 = Jyothi
3 = Vijaya Lakshmi	7 = Leena
4 = Vasantha	8 = Anita

Economics Enumerators

10 = Bhasker Rao
11 = Ladole
12 = Chopde
13 = Nageswar Rao
14 = Mohan Rao

1.1.4 RESPONDENT ANSWERS:

It is important to distinguish between "No", "Don't know", "Not applicable" and 0 (zero) on the survey forms. Although it may be your practice to write "----" to indicate any one of these things, please adhere strictly to the codes listed below. Disregarding this will mean that many of the answers you collected will be regarded as "missing data" (or blank spaces).

1	=	"Yes"
2	=	"No"
8888	=	"Don't know"
9999	=	Not applicable
0	=	Zero numbers of _____ (indicates a specific VALUE).

Please note that a "/" or a "----" are unacceptable codes.

1.1.5 UNCODED ANSWERS

Answers may not always correspond to a pre-determined code. If this happens, write in the answer, but do not assign a code to it. We will compile a list of all the uncoded answers after returning from the field. The new codes will then be added to the survey forms.

1.1.6 RESPONDENT ID

On the header (above the matrix on each page) record the member code of the individual who answers the questions on the survey. If another respondent takes over for a particular section, be sure to indicate this on the respondent ID space for the appropriate schedule.

1.1.7 RESPONDENT FATIGUE

We will be visiting every household a total of about 5 times each round. Therefore, if a respondent is getting tired, complete the schedule/module you are on, end the interview, and come back later to finish it.

1.1.8 EDITING YOUR INTERVIEW

Edit and check your completed questionnaires at the end of the day. Clean up unclear handwriting (you should always PRINT), expand comments and remarks, and note down in your carry note pad any missing pieces of information that you must return to collect. It is absolutely required that we correct questionnaire errors and clear up ambiguities <u>before we leave the field</u>.

1.9. KEEPING A FIELD LOGBOOK

All enumerators are expected to keep a daily logbook which lists their work activities. Entries should include what households were surveyed, what schedules have been completed, and what difficulties they may have faced during the day. This field logbook should be presented to Kim or Dr. Yasoda at each visit and will be passed in at the end of each round.

2. BEFORE THE SURVEY: EXPLANATION OF SAMPLE TERMINOLOGY, AND UNIQUE HOUSEHOLD AND INDIVIDUAL ID CODES

1.2.1 Sample Terminology

In these study villages there are two distinct sets of households which ICRISAT has studied in the past: 1) the "Old VLS sample" (1975 to 1984) and 2) the "New VLS sample" (1989-1990). We will include both groups in our sample, plus some new households which have never been surveyed by ICRISAT ("Non VLS" sample). The number of Non VLS households chosen for the sample will depend on the number of households which we are able to get from the two VLS groups.

Please note that because many years have passed since we originally surveyed the OLD VLS families, these households will include two types of families:

1) the "original" VLS household (with the same head of household as in 1984) and

2) the "spinoff" households.

"Spin-off" households are households which contain at least one member from the original VLS household and now cook separately from the original VLS household. For example, a child (male or female) of 10 years in 1978 is now 24 years old, married and lives apart from his/her parents. If his/her family cooks separately from his/her parents they are a "spin-off" family. Otherwise, they are considered part of the original VLS family.

1.2.2 Unique Household and Individual ID Codes

Each household and each household member within a household will be identified by a unique numeric code. For households, the unique identification code will be comprised of 4 digits: the 1 digit village code plus the three digit household code. As an example, household number 041 in Dokur (village code = 1) will be identified uniquely by the number 1041. Individuals within this household will be uniquely identified by adding their member code to the 4 digit household number. The head of household in household number 1041 will be identified by the 6 digit code 104101 (1041 for the household and 01 to identify the individual within the household). His spouse would be 104102 and his children's numbers would start at 104103.

1.2.3 Classification Scheme of Household Numbers

All households in each village will be assigned a number between 1 and 999. The range of the household number indicates which part of the sample (Old VLS, New VLS, Non VLS, or Spinoffs) the household comes from.

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Table 1 shows the appropriate ranges for the different types of households comprising the sample.

TABLE 1: HOUSEHOLD NUMBERS BY VLS CLASSIFICATION

Sample	# HH range
Old VLS	1-99
New VLS[1]	101-199
Non VLS	201-299
Spin-offs from Old VLS	300 + Old VLS HH Number, 400 + Old VLS HH Number, 500 + Old VLS HH Number, ...etc.

[1] Households included in the OLD VLS are numbered between 1 and 99. Similarly when the NEW VLS sample was drawn in 1989 these households were numbered between 1 and 48. Since this study uses both OLD VLS households and NEW VLS households, the NEW VLS households have been renumbered to avoid the problem of non-unique household numbers. Specifically, 100 was added to the originally assigned NEW VLS household numbers. As a consequence, a new series of NEW VLS household numbers (between 101 and 199) was obtained. For example, a household which is labelled as #35 in the NEW VLS data set has become #135 in this study.

Also note that 12 households per village were carried over from the OLD VLS sample to the NEW VLS sample. These households will have two household id's (one from the old survey and one from the new survey). For the purpose of this study, we will use the new VLS household ID number to identify this family.

New households which are added for the purpose of this study will be numbered starting with 201.

Spinoff families are identified by the 300-900 series. For example, an OLD VLS family, #35, has two children, which have now formed separate families. These "spinoff" families are numbered 335 and 435. The "35" identifies the old VLS family from which they came and the "300" and "400" indicates that they are spinoffs.

For this study, we will assign the family in which the original VLS head of household resides the original VLS household number. For example, an OLD VLS family (# 21) has two children both who are grown and have their own families. One family lives separately and therefore is assigned #321. The original head of household from the old VLS household lives with the second child's family. This family therefore retains household #21.

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3. BEFORE THE SURVEY: INSTRUCTIONS FOR DETERMINING SAMPLES IN EACH VILLAGE

1.3.1 Summary Table

Criteria For Selection of Households			Dokur	Shirapur	Kanzara	Aure-palle
NO PLANS TO MIGRATE FOR 12 MOS	OLD VLS HOUSEHOLDS	Children less than 18 yrs.				
	SPINOFF'S FROM OLD VLS HOUSEHOLDS	All households with children less than 18				
	NEW VLS HOUSEHOLDS	All households, regardless of family composition				
	NON-VLS HOUSEHOLDS	1. More than 2 "young" children				
		2. Landless or "small" farmer				

DEFINITIONS:

A HOUSEHOLD is a group of individuals who eat together from the same pot. Two groups of individuals who live in the same dwelling, but always cook separately, are defined as TWO households. A group of individuals who live in separate dwellings, but eat from a common pot are defined as ONE household..

A YOUNG CHILD or PRESCHOOLER is a child less than or equal to 6 years old.

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1.3.2. PROCEDURE TO DETERMINE WHETHER A HOUSEHOLD FITS THE SELECTION CRITERION

A list of sample houses has been prepared for each village. The list will consist of four sections: 1) OLD VLS Households 2) New VLS Households 3) Spin-off Households and 4) Non-VLS Households to be selected.

A. Either an Economics or Nutrition enumerator will visit each of the OLD VLS and NEW VLS families on the list. He/she will approach the head of the household and tell them of our plans for the study. The investigators will ask if the young children of the household and their parents have plans to migrate in the next 12 months. If so, do not survey this household. This is because we only want to survey households for which we are fairly sure that we can get data in all rounds.

   If the family has no plans to migrate and has children less than 18 years old (if it is an OLD VLS household), then read the consent statement and obtain written consent for participation. If they consent then they will be included in the sample.

B. After the OLD VLS, NEW VLS, and SPINOFF Families have been visited, count the number of families in the sample. If there are less than 80 families in the sample, it will be necessary to add a RANDOM selection of NON VLS households which:

   - have at least 2 children under the age of 6 and
   - are either landless or small (according to VLS definition).

   For each village there is a list of NON VLS households which can be used to obtain the required 80 households per village [2].

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[2] The procedure for determining the list of NON VLS households was as follows:

1. The '92 Census of Young Children and Adolescent Women was used to identify households with more than 2 children less than or equal to five years of age.

2. From this list, the project supervisor randomly chose the households. If the household was identified by the economics enumerator as either a "landless"

4. BEFORE THE SURVEY: INSTRUCTIONS FOR ASSIGNING UNIQUE AND CONSISTENT MEMBER CODES

It is extremely important that all enumerators use the same member code to identify each individual within a household. We must have unique identifiers for each person so that we can merge individual records from different schedules.

As explained in Section 2, each individual in the survey will be uniquely identified by a combination of his/her village, household and member codes. To ensure that 1) all enumerators are using the same ID codes to identify each individual and 2) to enable us to link records collected in this survey to the OLD VLS and NEW VLS records a Household Composition Master List Form has been devised. A MASTER LIST must be filled out for each household surveyed.

1.4.1. INSTRUCTIONS TO FILL OUT THE MASTER LIST FORMS

Round 1 Instructions

1 After it has been determined that the household meets the criteria and consents to participate, write the household number and head of household name on the wall charts in the office to indicate to the village research team that the household is included in the sample.

2 For the OLD VLS households, each economics enumerator will copy the name, age, sex and member code of all household members from the 1984 record for their village onto the MASTER LIST forms provided for each household.

3 Both the economics and nutrition enumerators may begin to survey the households. To assure that all enumerators are assigning the same member code to the same individual, both the economics and nutrition enumerators should fill out and review the Master List form for each family after the first visit.

4 Upon review, they should add the names of the household members who are not included in the 1984 records under the appropriate panel (either "Economics Information" or "Nutrition Information"). This information should be cross checked with the 1992 census

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or "small farm" household then it was put on the list of potential NON VLS households to survey.

3. This list comprises the households from which the NON VLS households may be selected. The final number chosen will depend on how many OLD and NEW VLS families we have already selected

information which is available in the village office. Enumerators should add comments which explain why family members have permanently left or have formed a "spin-off" family.

5 Member codes need to be filled in under the "Economics" and "Nutrition" panels. Original member codes for individuals appearing in the 1984 lists should be retained.

6 In addition, unique member codes must be assigned to members of the family which were not in the 1984 data set. Either the economics or nutrition enumerator may assign a unique member code to each "new" individual appearing on the Master List. In assigning new member codes, enumerators should begin with the number which represents the lowest numeric member code which has not yet been assigned to ANY PERSON, REGARDLESS OF THEIR CURRENT STATUS IN THE FAMILY. This means that if the last two persons in the '84 register have migrated out (member codes 07 and 08, for example), these member codes should not be re assigned. New member codes should begin with number 09.

7 Enumerators should verify that the same individuals appear in the "Econ Information" panel as in the "Nutrition Information". If there is a discrepancy in information between the two panels the enumerator should 1) inform the rest of the village research team of this discrepancy and collectively rectify the discrepancy and 2) assign a unique member code to this individual.

8 Investigators should also compare the ages of all individuals included in the sample. If there is a discrepancy in the ages of individuals less than 18 years old, THE TEAM must rectify these discrepancies. If necessary, go back and interview the mother together and gain agreement on the age. It is particularly important that the ages of all children less than 10 be precise.

9 For NEW VLS households follow the same procedures to assign new member codes. For NON VLS households, the only cross-check is between the nutrition and economics enumerators columns.

10 Families composition may be complicated by the fact that they 1) eat separately but jointly own assets or 2) eat together but have separate assets require some extra work. For complicated joint or spin-off families, map out the set of relationships on a piece of paper and attach it to the appropriate Master List sheet. Be sure to show all relationships (ie. who is married to who, who eats where, who lives where etc.). An example is shown in the next section.

Rounds 2 and 3

1 Before visiting the household review the MASTER LIST form for the family in question, recording it on your carry note pad.

2 Use these notes during the interview to probe the respondent when you are filling in the first module (Module E1 for economics enumerators or Module N11 for nutrition enumerators).

3 After finishing the interview record the changes to the household on the MASTER LIST. If there is a new member to the household, add his/her name, following instructions 5-9 in the previous section, and note in the comments section that they joined this family in Round 2 (or 3). If someone migrates out or leaves the family DO NOT ERASE INFORMATION FROM THE MASTER LIST. Rather, write in the comments section the reason for their departure, the timing of their departure (ie. the round), and whether it is permanent or temporary.

4 As in the previous section, instruction #7, enumerators should verify that the same individuals appear in both the economic and nutrition panels on the MASTER LIST FORM.

1.4.2. EXAMPLE OF PROPERLY COMPLETED MASTER LIST

The example on the following pages will help to clarify these points. In Round 1, the nutrition enumerator has noted that two additions have been made to family #35 since 1984. Sridevi has married into the family and a son (Shanker) was born. The enumerator has assigned member codes beginning with number 07, even though member 06 does not reside with the family any more. This will avoid future confusion as to the actually identity of member 06.

You will note that these rules apply to spin off families as well. On the next page of the example, you will see the correct entry for a spin off family. From the original family composition member #06 has formed his own family, #335. On the Master List for household number 335, Vijay retains the same member code (#05) even though his household number has changed. Vijay's wife and children have been added to the Master List of the SPINOFF FAMILY (NOT THE ORIGINAL VLS FAMILY). Note that Viveka has been assigned #09 and their children numbers 10 and 11.

Below is an example of what should be on the back side of the Master List. Here the enumerator has mapped out the family composition, making it very clear who heads the spin off families and where the original head of the OLD VLS household resides.

In Round 2 the investigators update the Master List. On the following page you will see an "updated" Master List. On this page the nutrition enumerator has shown an addition to the family and has commented that this occured during Round 2. All such additions should be recorded as such, with the date of addition in the comment section.

II. INSTRUCTIONS FOR COMPLETING ECONOMICS SCHEDULES 1-10

Before going on the interview:

1. Consult the Master List filled out last round and note the composition of the family. Write this down and use this information to prompt the respondent on the first module.

2. Fill in the date of interview during the last round. Use this date as a reference for all questions that refer to events happening "since I last interviewed you/since last round."

3. Take the copy of Module 7 from the previous round with you to recall which crops were recently planted. Use this to help prompt the respondent when discussing yields, sales, in kind payments etc.

2.1. INSTRUCTIONS TO COMPLETE MODULE E.1: HOUSEHOLD ROSTER

Column 1: Serial Number (For your reference only)

Column 2: Names

For Round 1

PRINT the names of all individuals who are residing in the household during Round 1. If guests are staying more than one week include their names on the household roster.

For Rounds 2 and 3

PRINT all names of individuals who have either left the household or entered the household since you last interviewed the household. If individuals have left the household, fill in their name, member code and reason for the change in status (Cols 2, 3 and 13). If an individual has joined the household fill out all columns.

Column 3: Member Code/ID

Write in the correct member ID code for the individual AS IT APPEARS ON THE MASTER LIST.

For OLD VLS and NEW VLS households it is <u>crucial</u> that the ID codes are identical to those used in the previous VLS surveys. If they are not identical, we will not be able to match up individual records across the 1984, 1989, and 1992-3 surveys.

To ensure that member codes are correct, use the Master List Forms to check that member codes are consistent with previous (1984 or 1989) records as well as with codes used by nutrition enumerators (See Section 4). THIS IS EXTREMELY IMPORTANT.

Columns 4 and 5: Age

Write the age of an individual in years if he/she is above the age of four, in months if he/she is below the age of four.

Always use your local calendar to assess ages. Ages will be more difficult to assess for adults. Correct assessment of age is especially important for children for this study. Therefore, DO NOT RELY ON YOUR VILLAGE LISTS TO OBTAIN AGES.

Column 7: Relation to Head of Household

The proper codes are shown at the bottom of the survey page. Co-sisters and co-brothers are to be coded as "11", "other relatives". They should be distinguished from "own" brothers and sisters which are coded as "10".

Columns 9, 10, and 11: Spouse ID, Father ID, Mother ID

Write the member code of the individual's mother (father, spouse) in this box. Be careful, this is easy to get wrong if you hurry. DO NOT use this space to indicate who the individual is the mother of (father of, spouse of).

Column 12: Degree of Disability

This question refers to an individual's physical ability to do work, not his/her actual practice. For example it may be that a woman is physically capable of "doing any farm or domestic work", but does not do any work because she can afford to hire labor. For this situation, write code "1", since she is PHYSICALLY CAPABLE of doing any labor (but chooses not to).

For codes 2-5 elaborate in the comments space on why the person is PHYSICALLY INCAPABLE of doing the work in question.

Column 13: Change in Status

Fill in for Rounds 2 and 3 only. If an individual has left or joined the household since the last round, please write the code which describes the reason for the change in status. If the answer is "other" use the comments space to elaborate on the reason.

2.2. INSTRUCTIONS TO COMPLETE MODULE E.2: MIGRATION

Column 1: Names of family members residing outside of Village

Write the name of all family members that 1) have appeared on the Roster (Module E1) during any of the previous rounds AND 2) have resided outside the village <u>for one week or more</u> during the period in question ("since last round").

Even if an individual has spent as little as 7 days living outside the village since the last round, complete this section.

Column 3: Purpose Code

Use the following definitions for assigning "purpose of migration" codes:

Code No.	Code Name	Use code when migration is for the purpose of:
1	Employed	Employment in seasonal or casual work
2	Seeking employment	Seeking ANY KIND of employment, seasonal or salaried
3	Service	Employment in a salaried job
4	Education	Self-education (not education of off spring)
5	Domestic/family reasons	Delivery, family visits, festivals, family sickness
6	Health reasons	Own health reasons
7	Other	Any other, eg. legal disputes, etc.

2.3. INSTRUCTIONS TO COMPLETE MODULE E.3A: EDUCATION

Page 1

Columns 1 and 2: Name and Member ID

PRINT the names of all individuals who were included in the household roster during any round.

Column 3: Enrolled in School during Round X?

Enquire whether the individual has enrolled in school since you last interviewed them in the previous round. If they have enrolled, write "1", otherwise write "2". If the answer is "1" (yes), proceed to columns 4, 5, and 6. If the answer is no, proceed to column 7.

Column 4: Has the Member "Stopped out" from school?

Ask whether the person has stopped out of school since you last interviewed. "STOPPED OUT" indicates that the member has attended school for less than one week (during the period in question) while SCHOOL WAS IN SESSION. If the school is not in session due to holiday (or any other closure) and the student plans to return once the school is open again then he/she is not considered to be "stopping out."

Columns 5 and 6: Reasons for Stopping Out of School

Column 5 should contain the primary (or most important) reason for the student stopping attendance (stopping out). Column 6 should contain any secondary (less important) reasons for stopping out.

Column 7: Has the member enrolled in school since Round 1?

If the answer to column 3 was "no", ask whether the individual (member) has enrolled in school since you last interviewed them. Write "1" for yes and "2" for no.

2.3. INSTRUCTIONS TO COMPLETE MODULE E.3B: EDUCATION

Columns 1 and 2: Member ID

PRINT the names of all individuals who have joined the household this round.

If possible, directly ask the individual in question whether they can read or not. Often the head of household does not know whether the children or daughters-in-law can read. School-going children often know if their siblings can read.

Column 3: Total Years Spent Studying

Write the total number of years that the member has spent STUDYING, regardless of the number of grades (standards) he/she has passed. If a person has had a professional tutor, but did not attend a "proper school", count these years as years of study. This may be in the case for some adults who were of school age before a school was built in the village. DO NOT COUNT THESE YEARS OF STUDY if the member did not have a proper tutor or simply "worked on his own". Only serious, full-time study with a tutor should be counted.

Column 4: Highest Grade Attained

Write the code which represents the highest grade (standard) the individual has finished.

If a member has not studied in a "proper" school, write code "0" (no formal schooling). If a member has only studyied with a tutor write "0".

If a member is attending adult education write code "9".

Column 6: Can Read?

Do not assume that if someone has spent some time in school that they can read. It may be the case that someone could read very poorly years ago, but cannot read now. Ask this question separately from the 'Years in school' question.

Column 7-10: Parent's Highest Grade Attained/Can Read?:

If the parents of the individual are there, ask them these two questions directly.

Do not collect this information for the children of the head of household as it will already be recorded on the lines with their parents names.

2.4. INSTRUCTIONS TO COMPLETE MODULE E.4A: INDIVIDUAL OCCUPATION

Column 2: Member ID

Write the member code of ALL individuals present in the round who are engaged in wage labor or salaried labor. If an individual is retired from a position there is no need to include this work activity here, even if he/she receives a pension from this job. Pension information will be collected in Module 9.

There is no need to include preschool children (< 6 years) in this section.

Columns 3, 5, 7, 9: Primary (secondary, tertiary, quaternary) Income earning Activity:

Write the activities in order of income earning importance to the respondent. The income activity which the respondent would choose to give up last should be the PRIMARY INCOME EARNING ACTIVITY. Conversely, the income source that the respondent would choose to give up first should be listed last.

Both part time and full time work should be listed.

Columns 4, 6, 8, 10: Activity Code

Study the activity codes carefully. If you are in doubt about how to classify an occupation ask Kim as it is important that all enumerators classify activity codes in the same way. The following explanations may help to differentiate between codes 5, 6, 7, and 10.

Code 5: Be sure to differentiate "toddy sales" (which should be coded as "5") with "toddy extraction" (which should be coded as "7"--other traditional caste occupation.

Code 6: ("rural crafts caste occupations") includes any craft occupation that is determined by caste, eg. weavers, potters, goldsmiths. Other examples may exist.

Code 7: ("Other traditional caste occupation") Any other traditional caste occupation that does not involve making a craft, eg. dhobi, toddy extraction.

Code 10: ("Service"). Non-caste occupations that require individuals to sell their services for non-agricultural or non-manual labor tasks, eg. tailor or cook.

2.5. INSTRUCTIONS TO COMPLETE MODULE E.4B: WORK REGULARITY - WAGE/SALARIED WORK

Column 2: Member ID

Write the member code of only the individuals who are engaged in wage labor or salaried labor. There is no need to include preschool children (< 6 years) in this section.

Columns 4-9: Employed > 15 days during this month?

Write "1" if the member was employed more than 15 full-time labor days during the month in question, write "2" otherwise.

Column 10: "During any of the unemployed periods were you looking for work?"

Ask this question if the answer to ANY NUMBER of the previous columns (Month X to Month Y) was "2" ("no"). If the respondent was searching for work during ANY of the unemployed periods write "1". If the respondent was searching for work during ALL unemployed periods, the answer is still "1".

Column 11: "Were you employed this month as much as you wanted?"

This question pertains to the month during which the interview is conducted.

2.6 INSTRUCTIONS TO COMPLETE MODULE E.4C: WORK REGULARITY - SELF EMPLOYMENT/COTTAGE INDUSTRIES

Self employment is defined as income generating, non-salaried, non-wage work in which the individual does not report to any employer (or "boss). Examples of self employment are: toddy sales, weavers, dhobis, potters, carpenters, etc.

For this survey DO NOT consider agricultural cultivation as self-employment on this schedule.

Livestock rearing and dairying should be recorded as self-employment if the livestock are sold or rented out or the dairy products are sold. Otherwise do not count them, since they are not directly income generating activities.

If you are in doubt, take the information down and ask Kim later

Column 2: Member ID:

Write the member code of individuals who are self-employed. .

There is no need to include preschool children (< 6 years) in this section.

Columns 4-9: Employed > 15 days during this month?

Write "1" if the individual worked more than 15 full-time labor days during the month in question. Write "2" otherwise.

2.7 INSTRUCTIONS TO COMPLETE MODULE E.5: HOUSING

During Round 1, fill out all questions by asking and observing the facilities at the house itself.

During Rounds 2 and 3, transfer the information from the previous round into the first column. Use this information to help you during the next round of questioning. Make sure you ask ALL THE QUESTIONS DURING EACH ROUND. Changes may have occurred since the last time you visiting and we are trying to CAPTURE THESE CHANGES.

Question 4: Number of separate rooms?

A room is defined as a roofed structure which is enclosed by four walls. The walls need not reach all the way to the ceiling. A room, for example, which is partitioned by a six foot wall can be considered two separate rooms.

Question 5: Roofed area

Local terms for area must be converted into square feet or square meters. Use the following local terms to convert into square meters:

VILLAGE	LOCAL TERM	
Dokur	Sandalu	Lotu
Aurepalle	Aras	
Kanzara	Ada	Tinsheet
Shirapur	Tinsheet	

Question 9: "Are livestock allowed in the house?"

Livestock means all kinds of animals, including poultry. If any kind of animal is allowed in the house DURING THIS SEASON, write "1".

2.8. INSTRUCTIONS TO COMPLETE MODULE E.6: LAND

A Plot is defined as an area that is characterized by different soil and irrigation conditions. Therefore, one large, continuous field with 3 different soil conditions is considered 3 plots, not 1. Similarly, one continuous area of land with irrigable and non-irrigated sorghum on it is 2 plots, not 1. It does not matter how many crops are grown on the plot.

Round 1:

For each plot, fill out all information in the matrix containing "walking time" and "no. of fields crossed to reach the road".

Rounds 2 and 3:

For each new plot acquired (rented in or bought) fill out the matrix mentioned above. For all "old" plots fill out the matrix at the top of the module

Column 1: Names of Plots

This is for your reference only. Write the names of the plots which the farmer currently has possession of. This includes borrowed, rented or share cropped plots.

Column 5: Type of Soil

Write the LOCAL NAME for the type of soil, not the scientific name.

Column 6: Soil Code.

Write the code for the type of soil, using the "scientific codes" shown in the box below the matrix.

Column 7: Irrigation Type:

Write the type of irrigation which is available for use on the plot, even if the irrigation is not currently being used. If the plot is NOT IRRIGABLE write "0." If it is irrigable (with any apparatus), but not IRRIGATED, then write the code for the irrigation type.

IRRIGABLE = land which by decision of the farmer can be irrigated, may or may not be irrigated at the moment.

IRRIGATED = land which is CURRENTLY irrigated.

Land may therefore be IRRIGABLE, BUT NOT CURRENTLY IRRIGATED. If the difference between IRRIGABLE AND IRRIGATED IS NOT CLEAR ASK KIM.

Columns 10 and 11: Plot Area Cultivated and Plot Area Fallowed

Write these areas with one decimal place.

Write 9999 if the answer to the tenancy question was "4" or "5".

Check to see that "area cultivated" and "area fallowed" add up to "plot area".

Column 11: Number of Fields Crossed to Reach Road:

Write the number of farmers' fields that must be crossed to reach a road (paved or otherwise) or bullock cart pathway. For this question, consider a field to be any number of plots owned by a single farmer. For example, if one farmer owns 3 plots and they stand between the respondent's plot and the road, the answer will be "1" (field) (not 3 fields) since the farmer will have to secure permission from only 1 farmer (not 3) to cross to the road.

Column 12: Walking time from village in minutes

Write the walking time from the plot to the center of the village. Do <u>not</u> write the walking time from the house to the center of the village.

2.9. INSTRUCTIONS TO COMPLETE MODULE E.7A HOUSEHOLD INCOME GENERATION - CROPS PLANTED

Column 1: Crop Names

Write the name of all crops planted during the period stated, even if multiple crops are planted on the same plot. For example: if sorghum and pigeon pea are cropped on the same plot, write each on a separate line. Conversely, if rice is planted on 3 separate plots, it should only appear on one line in this matrix.

If two types of seed are used for a crop (eg. hybrid sorghum and local sorghum) write them on separate lines and answer "1" under column 8.

Column 2: Crop Codes

Write in the correct crop code as given in appendix 1.

Columns 3, 6, 7, and 8: "Irrigation", "Fertilizer", "Manure" and "Hybrid/Improved Seeds"

Write "1" if the total area planted to a particular crop if fertilized (manured, or irrigated,). Write "2" is some of the area is, and "3" if none of the area is. This question should be asked for each crop which was planted. When recording the answer only consider whether the TOTAL AREA planted to the crop is using the technology in question. It does not matter whether the crop is planted on different plots.

For example, paddy is grown on three different plots. Two are irrigated and one is not. Paddy will be entered on one line only. Under the column for "irrigation" the answer will be "2".

2.10 INSTRUCTIONS TO COMPLETE MODULE E.7B: HOUSEHOLD INCOME GENERATION - PRODUCTS HARVESTED

Column 1: Names of Agricultural Products Harvested By the Household

Write the names of all agricultural products, including by-products such as fodder, which have been harvested BY THE HOUSEHOLD. If the household is renting out (or sharing out) land then do not include crops which are harvested on the shared out land. If the household is "sharing in" land (ie. they are land tenants) then write the names of all products harvested on the shared-in land.

There are some crops which will not be completely harvested at the time we are surveying. The yield for the following crops should be collected in the following round after the harvest is complete:

Pigeon Pea, Cotton, Caster, Chilies, Brinjal, Fodder

If there are other crops that are not in this list but have not been completely harvested at the time of the survey, please note them down and inform Kim and the other investigators.

Column 2: Crop Codes

Write the appropriate VLS Crop code. Codes are given in Appendix I.

For fodder crops, join the crop code and the fodder condition code together to make a 4 digit fodder crop code. The crop code should come first. For example, for rough dry fodder which is derived from a sorghum crop write "CDZA". The CD stands for hybrid sorghum and the ZA stands for rough dry fodder. It is important to differentiate fodders since different fodders will fetch different prices.

Column 3: Yields

Write the quantity of crop yielded (and the appropriate units) since you last interviewed the farmer. Check that the YIELD harvested is greater than or equal to the amount SOLD plus the amount PAID IN KIND/PAID TO SHARECROPPER.

Check your xeroxed notes from last round to inquire about crops which were not fully harvested during that time. If they certain crops were sown, make sure that the harvest of this crop is included in this round.

Column 4: Sold

Write the quantity of crop which was sold during the time period in question. This quantity should be smaller than that written in the YIELD column.

Column 5: Paid in Kind to Others/Paid to Land Tenant (Sharecropper)

Write the quantity of crop which was given as in kind wages (for labor or crafts) or which was given to the landlord during the time period in question ("since the last round").

If the respondent is a landlord DO NOT WRITE IN THE QUANTITY OF CROP RECEIVED AS RENT. Crops RECEIVED as rent should appear in 1) the next column "Product Received in Kind" and 2) in Module 10A: Food Expenditures under the column "Own Production/In-Kind Wages/Sharecropping/In Kind Loans."

Check that PAID IN KIND quantity should be smaller than that written in the YIELD column.

Column 6: Received in Kind for Wages, Rent, and Crafts:

Write in the quantity of crop which was received by the household in exchange for labor, crafts or rent (received in kind).

Column 7: Comment Space

Use this space to make any calculations that will assist you in writing the correct amount in the "yields" "stores" or "paid in kind" section. For example, this space may be used to convert bags of grain into kilos.

2.11 INSTRUCTIONS TO COMPLETE MODULE E.7C: HOUSEHOLD INCOME GENERATION - NON-LIVESTOCK ASSETS

Column 3, 4, 5, and 6: "Have you USED (owned, bought, sold) this asset in the Past 4 months/since I last interviewed you?"

Write "1" if the household members themselves have used the asset in question during the past 4 months (if Round 1) or since the last interview (if Round 2 or 3).

Remember that a household can USE an asset even if it does not OWN it. Therefore, it is important to ask separately whether the item has been used or owned.

Please note that it is possible for someone to respond "1" or "2" to any combination of questions (own, used purchased or sold). Therefore, there are no obvious unacceptable combinations for these columns.

For sharecropping situations please follow these special rules:

If the respondent is a landlord: write "1" if the landlord-household has used the asset on land that is not shared out (ie. on the land that the respondent household is actually farming). Write "2" if they are not using the asset on land that they are farming. If the respondent's land is shared out, write "2" if the tenants are using the asset on the respondent's (landlord's) land.

If the respondent is a tenant: write "1" only if the household has used the asset on land which the respondent is currently farming (including shared in land). Write "2" otherwise.

2.12 INSTRUCTIONS FOR MODULE E.7D: HOUSEHOLD INCOME GENERATION - LIVESTOCK OWNED

Column 3, 4, 5, and 6: "Number of livestock owned, sold, purchased or died"

Write the NUMBER of livestock owned, sold, purchased, died or born. Write '0' if the household has none of this livestock.

Please note that this matrix is a different from the "Non-Livestock Assets." This matrix requires a quantification of livestock owned, not just "Yes" or "No" that livestock is owned.

2.13 INSTRUCTIONS FOR MODULE E.8: CONSUMER DURABLES

Column 3, 4, 5: "OWN (Acquire or Sell) _____ Asset"

Check that the complete answer you get for each durable makes sense. For example, note that if a household does not currently OWN a durable, it cannot have ACQUIRED one in the last year unless it has SOLD it. For example:

ASSET	OWN	ACQUIRE	SELL
radio	2	1	2
cycle			

The above combination should not be possible. If you get this set of answers for any durable, probe to find the source of the inconsistency.

Question: Have you added onto your house since I last interviewed you?

If the household has replaced or repaired an existing piece of the house with the same quality item then write "2" (no). If the household has replaced an item in the house with a better quality item (ie. better walls, roof, door etc.) or added a new structure to the house, then write "1" (yes).

2.14. INSTRUCTIONS FOR COMPLETING MODULE E.9: INCOME TRANSFERS

An income transfer is money which is not derived from the sale of goods (agricultural or otherwise) or services. "Transfers" can be gifts, lottery winnings, government hand-outs. There are many other examples. If you are unsure whether a form of money is transfer, then take down the information and ask Kim later for clarification.

Do <u>not</u> include money from loans, section 9.5 ("loans received") collects this type of information.

Please note that LOTTERY WINNINGS should be entered under the category "gambling."

Question 9.1: Do you have money savings?

This is a sensitive subject so do not ask this question in front of villagers that are not part of the household. You may have to probe in a subtle way for this information.

Please note that "savings" is money that can be liquidated immediately if necessary. Therefore, loans given to relatives are not considered savings. In addiiton, chit funds which have already been auctioned are not savings either. A chit fund which is still pending, however, is considered savings.

Question 9.2: Location of Savings

If the household has money savings, write the code for the appropriate location.

Section 9.3: Transfers RECEIVED FROM Others--"Did you Receive Money from....."

Ask whether the household has RECEIVED money or goods from any of the sources listed.

When asking whether the household has received any transfers, please note that it is impossible to have received a loan in the last month, but not in the last 4 months (or "since Round 1"). Therefore it is unacceptable to obtain the following pattern of codes for 'Did you GET MONEY from the following sources':

In the last 4 months?	In the last month?
2	1

Section 9.4: Transfers GIVEN TO others:

As explained above it is not possible to obtain the following pattern of codes for the 'Did you GIVE FUNDS to others in the form of' question:

In the last 4 months?	In the last month?
2	1

Section 9.5: Loans Received

As explained above it is not possible to obtain the following pattern of codes for the 'Have you taken a loan from the following institutions' question:

In the last 4 months?	In the last month?
2	1

2.15 MODULE E.10A: HOUSEHOLD FOOD EXPENDITURES

For this module ask the respondent if the household has purchased or used each food. Then ask "how much" and "during what period" (ie. frequency of purchase/use). For round 1, information on food expenditures is sought for the 'khariff season'. Specifically, in each village:

VILLAGE	ROUND 1 RECALL PERIOD	ROUND 2 RECALL PERIOD
Dokur	"Transplanting Season" May-August	Sept-December
Shirapur	"Khariff Season" June-September	October-January
Kanzara	"Khariff Season" June-August	Sept-December
Aurepalle	July-October	December-February

Column 2: Food Codes

For foods not on the list of foods, write the names (in local terms and ENGLISH terms wherever possible) on a blank line at the end of the module. Do not assign new codes or alter the name of an existing food.

Column 3: Purchased Foods

Write the quantity, units, frequency of purchase and rate of purchase for each food which the household consumed during this round. Write "0" in the quantity column if none of the food is purchased.

If the household purchased the food last round, but consumed part of it this round and part of it last round, then write the quantity that was consumed this round.

If the respondent cannot tell you the rupee rate of the food item, but knows the total cost of the purchased food, then you may use write the total instead. Make sure you get the corresponding quantity column filled out.

Column 4: Own production/in kind wage received/received from sharecropping/gifts/stocks

Write the quantity of food used from any of the following sources:

1) Own production during the period reported in Module 7B.
2) Kind wages received by the household
3) Food received as sharecropping payment from land tenants
4) Kind loans

Column 4: Stocks?

A stock is a food that has been harvested (or received) in one season and saved for consumption during another season. For example, rice that is harvested during the khariff season, but is saved for consumption during the summer is a stock.

It is possible to save foods from own production, in-kind wages, gifts, kind loans or in kind payments from sharecropping tenants from one season to another. Therefore any of these foods consumed may be A STOCK. If so, then write "1" in the stocks column. If the food eaten was not a stock then write "2".

An example is shown below. Suppose in the third round you find that a farmer kept 50 kg of rice from his own production during the khariff season and consumed it during the summer. In addition, suppose they received 35 kg of jowar as kind wages. The correct entry would be as follows:

Names of all FOODS PURCHASED or CONSUMED FROM: OWN PRODUCTON / IN-KIND WAGE/ GIFTS/ SHARECROP / KINDLOAN	Food Code (do not put in new codes)	OWN PRODUCTION/IN-KIND						
		Quant	Unit Code	Freq code	Rs. rate per unit	Source code 1=OWN PRODN 2=INKIND WAGE 3=GIFTS 4=SHARECROP 6=KIND LOAN	STOCK? 1=YES 2=NO	TOTAL VALUE OF OWN PRODN/ IN KIND WAGE/ GIFTS/ SHARECROP/ KINDLOAN(Rs.)
Rice	2	50	K	R	9	1	1	
Jowar	3	35	K	M	12	2	2	

If a food has multiple sources (eg. the household got it from own production, in kind wages, and as sharecropping), then use separate lines for each entry. You will have to write in the new entries at the end of the schedule. An example is shown below. Please note that the

answer for "Stocks?" can be either "1" or "2" for any source (own production, in kind wages, gifts, etc).

Names of all FOODS PURCHASED or CONSUMED FROM: OWN PRODUCTION/ IN-KIND WAGE/ GIFTS/ SHARECROP/ KINDLOAN	Food Code (do not put in new codes)	OWN PRODUCTION/IN-KIND						
		Quant	Unit Code	Freq code	Rs. rate per unit	Source code 1=OWN PRODN 2=INKIND WAGE 3=GIFTS 4=SHARECROP 6=KIND LOAN	STOCK? 1=YES 2=NO	TOTAL VALUE OF OWN PRODN/ IN KIND WAGE/ GIFTS/ SHARECROP / KINDLOAN(Rs.)
	2	50	K		9	1	1	
						2	1	

Finally, cross-check the STOCKS answer with information from Module 4A (INDIVIDUAL OCCUPATION), Module 4B (WAGE/SALARIED WORK), Module 6 (LAND), and Module 7B (PRODUCTS HARVESTED). For example: food from own production is recorded, but no agricultural work is recorded in past four months (4A), no crops have been harvested (7B), no wage work was done (4B), and no sharecropping was recorded (6), then it is likely that the food was consumed from STOCKS. In such cases it is necessary to probe carefully to make sure that stocks are accounted for.

Columns 3 and 4: Unit Codes

Obtain as accurate description of unit codes for food items as possible. This is necessary since we will convert food expenditure information into household calories availability. To do this we will need all unit codes to be translated into grams. Example:

FOOD	Food Code	PURCHASED			
		Quantity	Unit	Freq code	Rs. per unit
Biscuits		20	N	D	1

This household eats 20 biscuits a day at 1 Rs per biscuit, but it would be helpful to know the type of biscuit bought (large/ small, creamy/dry etc.) - please comment in FOOD NAME column.

For unit codes "N", "B", and "D" we will have to get average weights for each food item. Ask the nutrition enumerator for help with weighing the item with their scales.

Meals Purchased:

Ask the respondent whether the household has purchased any meals from hotels during the last round. If the answer is yes, then ask how often (frequency) and how much the meals cost. Write these answes on the purchased side.

Meals Given to Guests and Workers,

We need to estimate the cost of food consumed BY THE HOUSEHOLD. If we do not subtract the cost of meals provided to others we will overestimate the cost of household food consumption.

Ask the respondent if the household has provided meals for guests or workers. If the answer is yes, then ask how often they provide meals (ie. inquire about the frequency).

Ask for the value of this meal (ie. what would it cost to purchase the same meal in the village?). Enter this value in the column "Rupee Rate".

Meals Received as Payment or as Guests in Other's Homes:

We need to estimate the cost of food consumed BY THE HOUSEHOLD. Therefore, if we do not add the cost of food provided outside of the house we will underestimate the cost.

Ask the respondent if the household has received any meals in other people homes or as payment for work. If the answer is yes, then ask how often they receive meals (ie. inquire about the frequency).

Ask for the value of these meals (ie. what would it cost to purchase the same meal in the village?). Enter this value in the column "Rupee Rate".

Meals prepared at home and taken to work should not appear in these rows. The LOCATION of consumption is unimportant, rather we are interested in the IDENTITY of the consumer of that food in relation to who provided the food for preparation.

Household food expenditure = Reported total food expenditure - value of food given away.

= (value of foods purchased + value of home-produced food + value of food purchased in hotels + food received as guests) - (food expenditure to guests and workers)

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2.16 MODULE E.10B: HOUSEHOLD NON-FOOD EXPENDITURES

For this module ask the respondent if they have purchased each item. Then ask "how much" and "during what period" (ie. frequency of purchase/use). For round 1, information on non-food expenditures is sought for the 'khariff season'. Specifically, in each village:

VILLAGE	ROUND 1 RECALL PERIOD	ROUND 2 RECALL PERIOD
Dokur	"Transplanting Season" May-August	Sept-December
Shirapur	"Khariff Season" June-September	October-January
Kanzara	"Khariff Season" June-August	Sept-December
Aurepalle	July-October	December-February

Column 2: Non-Food Codes:

For non-foods not on the list of non-foods, write down the names (in local terms and ENGLISH terms wherever possible), but <u>do not assign new codes</u>, this will be done later on.

If a the correct name of the item does not appear on the list write it on a blank line at the end of the module. DO NOT alter any of the existing item labels as it will cause confusion during the data processing steps.

Column 3: Non-Food Items Purchased

Follow the same procedure as that outline in Section 2.16 for Food Expenditures.

The "FREQUENCY" column and either the RUPEE RATE or the TOTAL PRICE columns should ALWAYS BE FILLED OUT.

Sometimes it is not possible to get a "quantity" for each item since there are not any natural units for the category in question (eg. electricity, or "woman's clothing"). In this case, it is okay to record the total price of the purchase and leave the quantity and units column empty. DO NOT LEAVE THE FREQUENCY COLUMN EMPTY.

For some items it may be easier to club all the types of expenditures together. For clothing, transport, and shoes, it may be easier to for respondents to give the total expenditure rather than break it down into components (chidren's shoes, adult shoes

etc.). If it is easier for the respondent accept the information in this format.

2.17 MODULE E.18: COMMUNITY LEVEL INFORMATION

1 This module is to be filled out completely during round 1. During rounds 2 and 3, the enumerator should only collect information on rainfall, market prices, and labor wages.

2 The sections on educational and health facilities requires that the enumerator seek out knowledgeable KEY INFORMANTS in each village.

Education key informant=village schoolteacher.
Health key informant=village health care worker.

3 To collect agricultural market prices go to the nearest food market either inside or outside the village and record the average price per unit of the foods marked.

4 For labor wage information, record the average daily wage received by MEN and WOMEN for the 3 most common tasks in the current season (e.g. planting, weeding, plowing, clearing etc.).

5 Information to be recorded from secondary sources. Copy this information onto the questionnaire from other sources.

III. INSTRUCTIONS FOR COMPLETING SCHEDULE NUTRITION SCHEDULES

3.1 OVERALL SCHEMA FOR NUTRITION DATA COLLECTION

	Dokur & Kanzara	Aurepalle & Shirapur
Module 11: Dietary recalls	all individuals	all individuals
Module 12: Food Frequency	all women kids < 6 years	all women kids < 6 yrs
Module 13: Anthropometry	all women kids < 6 years	all individuals
Module 14: Morbidity	all females > 10 years all children < 6 years	
Module 15: Breast Feeding	all mothers of partially or completely breastfed children	
Module 16: Reproductive History	all females married or engaged	
Module 17: Vitamin A Freq	all children < 6 years mother of the child	
Ethnography	none	Case studies
PRA	none	Selected exercises

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3.2 Module N-1: 24-HOUR DIETARY RECALL

The objective of this module is to produce information on "usual" (or "normal") food intake using a 24-hour recall method. Two dietary recalls (visit "1" and visit "2") will be taken for each household in the sample during each round. The first visit will require recalls on the household and selected individuals within the household. The second visit will only require household information. The details of these dietary recalls are summarized in the the table below.

ALL VILLAGES	OBTAIN DIETARY RECALLS ON:
Visit 1	Household All Individuals
Visit 2	Household

In addition to the directions above, the two dietary visits must occur on certain days. These days will differ across villages. The choice of the survey days is based on local market days, wage days, fasting days, etc. Use the following table to organize your dietary recall visits:

Village	Either Visit 1 or Visit 2	The remaining visit
Dokur	Sun-Wed	Thurs-Sat
Shirapur	any two days	any two days
Kanzara	Sat-Mon	Tues-Friday
Aurepalle	any two days	any two days

As the aim of dietary surveys is to obtain "normal" or "usual" dietary intake of the household, **avoid interviewing a household if on a previous day ("the reference day")**:

1. They had festival or birth, marriage or death ceremony
2. The family went to birth, marriage or death ceremony
3. Most of the members of the family had gone out for eating at least one meal (If one or two members had some meals out, canvass the interview).
4. The family had more than two guests in the house.

The above four situations will not provide reliable data for a "normal" day. Therefore, only start a diet survey in a house after ensuring that the previous day was a "normal" day according to the above four criteria.

3.2.1 INSTRUCTIONS TO FILL OUT SCHEDULE N-1, PAGE 1

The first page of the module should be filled out completely for all villages

Ask to interview the person who cooks or serves the food. If that person is not available do not interview any other person for this module. Come back when you can speak to the cook/server.

Respondent's Identification

Once you've ascertained that you have the right respondent, fill in the necessary I.D. information (i.e. Name of village, Name of respondent, Household Number, respondent I.D. No.).

Date and Day of Interviewing

Write the date of interview following the day-month-year format (eg. 30-7-92). Circle "1" if it is the first visit to the household to collect dietary information this season or "2" if it is the second visit. Write the time you started the interview.

2.3 Matrix on Page 1: Household Roster of Those Present at Yesterday's Meals

Column 1: Serial Number of Persons (for your reference only)

Column 2: Names of Household Members Who Have Taken Food Yesterday

Write the names of persons who ate food in the house yesterday. Probe for the names, making sure none are missed. Get the names of relations or guests if they ate in the house on the previous day. The order of writing the names is as follows. Head of the House hold, his wife, children (follow the order of birth), his parents and other members. In a joint and extended families, write names family unit by unit.

Eg. Head of the household
His wife's name
His first son
Eldest Daughter-in-law.
First son's children: 1.
2.
3.
Second son:
Second daughter-in-law
Second son's children: 1
2
Un-married first daughter

Un-married second daughter
Brother of household head

If there are more than 10 members attach an extra sheet and collect these names.

Column 3: Relationship to Household head

This space is for your reference only. Write whatever symbol or note in this column which you will need to identify the individual correctly in column 4.

Column 4: Member Code (Not to be completed during interview)

After the interview is finished, assign the appropriate member codes to the names of persons written in column 2. Consult the Master List for this household and find the member code assigned to each individual. Write the same member code into this space. It is important that these numbers match exactly so that we may later merge the economics records with nutrition records. You need not do this while canvassing the interview, but please take time to do this properly later in the day (DO NOT WAIT).

Column 5: Sex

If you are unable to ascertain the sex by name you must ask.

Column 6: Completed Age

For children less than 6 years report their age in months. For all individuals older than 6 years age in years is sufficient.

Many parents in this area are not be able to accurately report their children's ages, much less their own. For this reason we have devised methods to ascertain adult ages and children's ages.

Even so, our experience shows that different enumerators can get different age answers for the same person, particularly older adults. If this occurs for individuals that are less than 18, it is necessary for you to rectify the age difference completely, even if it means going back and interviewing the respondent together. If differences exist for persons over 45 years of age, do your best to rectify the age difference, but stop once you get difference down to 5 years.

ASSESSMENT OF CHILDREN'S AGES

Ask to see the date of birth certificate. If that is not available use the local events calender to ascertain the age of the child:

1) Identify a festival or special event ("a reference event") which may have occurred around the birthtime (eg. Sivratri or Groundnut sowing).
2) Ascertain whether the birth occurred before or after this event.
3) Pinpoint the birth between this reference event and another memorable event which occurred before or after the reference event. For example, since Sankranti follows Sivratri validate point (2) above by asking "Before or after sankranti?".
4) Pinpoint the date by asking how many days before or after the reference event.
5) Ascertain the number of years since the birth by asking how many reference events have occurred since then?
6) Be careful in calculating the age from the number of reference events which have passed since the birth. If, for example, a child was born 15 days before Sankranti and there have been 4 Sankranti's since the child was born, the child is THREE YEARS OLD, not four.

For children older than 6 years, age in years is sufficient. Modify the above procedures to ascertain the year of birth. Write all comments used to calculate the age on the schedule itself. Do not erase them once the calculation is complete. This information may be needed later.

COLUMN 6 SUMMARY: FORMAT FOR RECORDING AGE

AGE GROUP	FORMAT
0-72 months	completed months
> 72 months	completed years

AGE OF ADULTS

In the case of adults, if the respondent has difficulty giving a precise answer, try to get the age by asking the age at some important events in their life. For example, for females you can assess the age at the first birth and then assess the age of this child. Adding the two numbers will give you the present age of the woman. The protocol for this is given in detail in Section 3.7: Instructions for Collecting Reproductive History. Several examples are also given.

Write comments on the schedule itself and if necessary show how you calculated the age. Do not erase comments, they may be useful later.

Column 7: Occupation

Write the occupation of the member with as much precision as possible. For agricultural laborers, write the tasks which the person is doing during this round (eg. weeding, planting, preparing land etc.). For domestic labor differentiate between labor which fetches water and wood and labor which is less active.

Column 8: Occupation Classification

After the interview classify the occupations into three categories according to energy expenditure: heavy, moderate and sedentary. Typical occupations are classified below. More occupations will be classified once we collect the data. If you have doubts about the classification ask Kim.

HEAVY	MODERATE	SEDENTARY
Stone breaking	Seeding/transplanting	Barber
Dirt Digging/Land Prep for agriculture	Crop cutting ("harvesting")	Shopkeeper
Carrying heavy loads	Carpenter	
Rickshaw pulling	Blacksmith	Teacher
	Washerman	Service occupation
	Housewife attending to all household chores	Housewife who has help from others to do household work
	Mason	
	Tending Cattle	

Column 9: Special Conditions

If any of the members on this schedule fall into any of the following age groups. Ascertain the following:

(a) Young children - find out whether the child (of any age) is breast fed completely or partially. Completely breast fed means the child receives no other food than breast milk. Partially breastfed includes all breastfed children that are receiving foods in addition to breast milk, regardless of age.

(b) School going children - find out whether the child ate any supplementary food in the school yesterday.

(c) Adult married females - find out whether she is currently pregnant or breast feeding any child, or both.

(d) Sick or fasting individuals. Write in the comments section the duration of this condition.

Place the appropriate code in the column:

1. Breast fed completely (for children)
2. Breast fed partially (for children)
3. Pregnant (for women)
4. Lactating (for women breastfeeding a child for < 1 year)
5. School lunch (for school-going children)
6. Pregnant and lactating (for women)
7. Extended Lactation (for women breastfeeding a child for > 1 year)
8. Fasting
9. Sick

Column 10: Missed a (Major) Meal

A major meal is one in which a cereal preparation is consumed. If an individual eats only one major meal from the home pot and eats other meals in restaurants ("hotels"), relatives homes or anywhere else, then it should be recorded that he/she has "missed a meal." In this case, write "1" in this column, indicating that the individual has not taken all of their meals at home this day. The adult consumption unit for this individual (see next item) should be coded as as 50% of the regular adult consumption unit.

Column 11 : Adult Equivalents / Consumption Units

Consult Appendix 2 and write in the proper adult equivalent.

3.2.2. INSTRUCTIONS TO FILL OUT PAGE 2 OF MODULE N-1: THE 24 HOUR RECALL

The 24-hour recall method requires the respondent to (1) recall the names of food preparations/items that the respondent has brewed or cooked during the last 24 hours (i.e. yesterday); (2) recall all leftovers, food brought from outside, food eaten from hotel or shops, and food eaten from fields or jungle; and (3) recall how much each member ate from each preparation (regardless of source).

For the first recall day collect individual consumption records (column 7, page 2) for all individuals. For the second recall visit collect only household intakes.

If columns 8 and 9 are equal to "0" (ie. there are no leftovers since the preparation is completely eaten) AND there is no food given to pets AND "leftovers out"), you need not fill out column 6 (total cooked volume).

Column 1: Names of Food Preparations

Fill out column 1 entirely before proceeding to other columns. Only after you have filled in column 1 entirely proceed to the other columns.

To fill out column 1 ask for the names of all the preparations eaten on the previous day (the "reference day"). Write the names of all preparations eaten in the household, including all solid, semi-solid, and liquid foods. For food prepared at home (that which is cooked at any time during the reference day), collect the names of morning preparations first, followed by noon, afternoon, evening and night preparations. Leave four lines blank in between each preparation so that there will be plenty of space to record the "recipe" in the next column.

Probe your respondent for food taken from the following sources:

"Left Overs "In" From the Day Before":

Food which is not cooked or bought on the reference day but consumed on this day. This may have been saved from the day before or any other day.

Food brought from outside:

Raw food or cooked food items which the family received from relatives/neighbors/landlords on the reference day and eaten on the same day.

Food consumed from shop/hotel:

Food which is eaten from any such places with or without payment of any money.

Food consumed from fields or jungle:

Food which is brought and eaten from such places with or without any payment.

Preparations should be recorded in the following order:

1) "Left overs In"
2) Cooked or bought at the four calls (morning, noon, evening, and night).
3) Raw foods eaten.
4) Special preparations for specific groups.

Use extra sheets to accommodate all the foods and ingredients used on the reference day. Number the successive sheets (eg. Page 1 of 4, Page 2 of 4 etc). If there are more than 10 members present at yesterday's meals you will need to attach extra sheets and fill in the appropriate reference codes. Number these pages.

Column 2: Food Stuffs Used To Make Preparations

Write the names of all ingredients except spices used in each preparation/item (regardless of source). Record the variety of all foods. For example, include the variety of fish or type of pulse (eg. green gram, black gram) or type of green leafy vegetable used (eg. amaranth, spinach, etc.). Probe for the condition of the food item, for example "parboiled", "milled", or "broken".

Don't forget to ask whether oil or fat was used in preparation. Always probe by asking **'What else?'**.

Column 3: Food Codes

For foods other than "leftovers" or "food brought in", use the food codes given in the Appendix 3. For a food that qualifies as a "leftover in" or "brought in" (Column 4 below), add 9000 to the appropriate code and write it in this space. Leftover rice, for example, would be coded as 9102 (9000 + 102).

Column 4: Leftovers from the Day Before ("Leftovers In"--see above definition)

Write the volume of "leftovers in" or "cooked food brought in" which were consumed on the reference day. Use columns 5 and 6 to record the "recipe" (Quantity of food used and total cooked volume) used to make the leftover dish. Write zero in this column if the preparation was cooked on the reference day. An example of this is shown in the instructions for "Column 7: Individual Consumption" below.

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Column 5: Quantity of Food Used (Raw Ingredients) For Preparations Made on the Reference Day

Columns 5 and 6 are used to record the "recipe" of the preparation in Column 1. These two columns will allow us to obtain the nutrient density of each preparation. Column 5 and 6 should always be filled in, whether you are collecting individual intakes or household intakes, whether the preparation was cooked on the reference day or on the day previous ("leftovers in").

Ask the respondent to name all the raw ingredients used in each preparation. When possible, obtain the weight (in grams) of each solid ingredient used in the preparation. **Record the weight from the respondents memory only if it seems that the respondent knows exactly how much was used.** For example, respondents may be able to give correct weights if they purchased the food on a weight basis for a particular purpose and then used it completely.

Most often the respondent cannot recollect the exact weight of the food used. In this case, ask her to show you the exact quantity with 1) her own household measures/vessels and 2) the raw ingredient from her home. For solid foods, weigh the food using a food weighing balance and record the weight of the ingredient. Do not accept answers such as "seer", "kilo", "padi" etc. For liquid foods, ask her to use water to show the quantity in her vessel. Pour the quantity shown to you into the dietary vessels of known volume and record the volume.

If the respondent does not have raw ingredients to show you the quantities give her some of the same food and ask her to show you the amount. Weigh it and record the weight. Try to learn what foods people commonly cook in these villages and carry samples so that the actual weight may be ascertained.

In the unusual situation that the appropriate raw ingredients are not available you will need to estimate the volume of food used (as opposed to weight). For solids, this procedure is not preferred since it requires an extra conversion to get the quantities from volume into weights (grams). At all costs, try to avoid this situation by carrying basic staples and other common foods with you.

If you are without the food in question, you can obtain the volume of food used by asking them to show you the volume with their vessels or your vessels. It is preferable to have them show you the volume using their vessels as it is difficult for individuals to estimate volumes in unfamiliar vessels.

In the case that the respondent will not bring her vessels follow this procedure:

For solid foods ask the respondent to identify the vessel that looks like the right amount of raw ingredient used. Provide her with a grain food or water and ask her to fill the vessel to illustrate the

volume. Ascertain the volume using your dietary vessels of known volume. If the quantity is "heaped" above the brim of the vessel, level it, and put the excess in a smaller vessel of known volume. Get estimates of the volumes of cut vegetables, cut meat and fish without the bones. Convert it to weight using conversion tables later on. Conversion tables are given in Appendix 3.

For liquid foods ask the respondent to choose the vessel which is closest in size to the one that she uses. As above, ask her to use water to show you the amount used. Transfer the water into a smaller vessel of known volume and record the volume.

A summary table below show the preferred methods for ascertaining food qualities.

SUMMARY TABLE: FORM FOR OBTAINING FOOD QUANTITIES

	SOLID FOODS	LIQUID FOODS
BEST PROCEDURE	weight using actual food	volume using their vessel AND your vessel
NEXT BEST PROCEDURE	volume using their vessel AND your vessel. Convert to weight later.	
LAST RESORT PROCEDURE	volume using only your vessel. Convert to weight.	volume using only your vessel

For items such as fruits, buns/bread/biscuits find out the number consumed. Later, purchase the same from the local market and assess the weight of the item.

Column 6: Total Cooked Volume:

Record the total volume of all preparations cooked on the reference day or the day previous in the case of "leftovers in".

It is preferable to have the respondent show you the total cooked volume in their own vessels since it is difficult to estimate volumes in unfamiliar vessels. Therefore, ask the respondent to get the vessel in which she prepared the food item. Ask her to pour water into the vessel and show you the total cooked volume. Transfer the water to your dietary vessels of known volume and note down volume. If the vessel is still full with today's meal, come back later in the day to assess the total cooked volume. This is very important, so don't be lazy about returning to the house later in the day.

If the respondent will not show you the volume with her own vessels, use your dietary vessels to ascertain the total volume. This is not the preferred procedure, however, since it is too difficult to properly assess volume in unfamiliar vessels.

In the case of "roti's" ask for the total number cooked. In the case of fruits, buns, etc. find out the total number consumed by the family.

Column 7: Individual consumption:

For "visit 1" record individual consumption for all individuals.

Find out the individual consumption of each food preparation. Record the amounts as volumes. Determine the complete allocation of each preparation before going to the next one. Do not skip around.

When obtaining individual consumption, ask how many times the individual consumed each preparation. Probe to find out how many times each individual consumed servings from this preparation and verify the amount each time. Record the volume of the serving and enter each serving of the preparation on a separate, but adjacent line, regardless when the serving was taken (morning, day or evening meal). For example, if an individual (member code 01) consumed a particular morning preparation of dhal in the morning (75ml), at midday (of 75 mls), and in the evening (100 mls) record it as:

Name of Preparation	Food Stuffs Used To Make Prep	Food Code	Left over Vol	Quant Used	Total Cooked Vol	Individual consumption (mls)			
						Ref No	1	2	3
						Mem Code	01	02	03
L.O. Rice	Rice	9102	960	1000	3050		0	700	260
B.I. Rice	Rice	9102	400	2000	6050		400	0	0
Rice	Rice	102	0	500	1500		250	0	300
Dhal with amaranth	red	130	0	50			75	50	0
	amaran	150	0	25	450		75	0	50
	oil	313	0	10			100	0	0
Roti	jowar	121	0	750	10		2	0	2
Bun	Bun	150	0	60	2		0	1	1
			0						

In the case of rotis, biscuits, fruits" etc. ask for the number of pieces consumed by the individual (See example above).

As above, encourage the respondent to show volumes using her own vessels, glasses, or serving spoons. Using water and your vessels of known volume, record the actual volume.

If the respondent doesn't have her own vessels or refuses to bring them, use the dietary vessels to ascertain individual consumption. **THIS IS A LAST RESORT PROCEDURE, HOWEVER.** As above, ask her to pour water into the vessel to illustrate the level consumed. Measure the volume of water by pouring into small vessels of known volume.

Column 8: Food Given Away

Ask for the amount of food served to guests, food given away to outsiders (beggars, neighbors) and food to pet animals. In order to record the sum of these values, write clear notes in the margins about the volume given to each guest. Tally these up and add to the food given to outsiders and pets. Record the amount in volume or numbers. This amount will be regarded as the food not consumed by the members of the household. Later, this amount will be deducted from the total household food intakes when computing per capita intakes and household intakes.

Column 9: Left Overs from Reference Day Preparation (or "Leftovers Out")

Ask for the volume of the preparation which members did not consume on the reference day, but saved for some later consumption. Have the respondent show you in her vessels and ask her to indicate level by pouring water into it. This amount will also be regarded as the food not consumed by the members of the household and deducted from the total food while computing the per capita intake.

4. CONSISTENCY CHECK:

Repeat the process for all preparations, individual by individual. When you have finished determining the allocation of food, quickly take a check of the "total cooked volume" column. If you have recorded individual consumption for the entire household, quickly add the amount (volumes or numbers) recorded in columns 7, 8 and 9 (i.e. individual intake, food given away, and leftovers) and compare it to the volume given in column 6.

If the food is a "leftover in" or "brought in" compare the sum to the value in column 4. If this amount is not close to the total volume/number given earlier by the respondent (column 5), probe for the sources of inconsistencies. The total cooked volume will be a more accurate measure than the sum of the individual consumptions. Therefore, if inconsistencies exist after extensive probing, leave the answer as is. DO NOT change the total cooked volume unless you have found an error in the measurement of the volume.

5. RECORD THE ENDING TIME AND TAKE A FINAL CHECK

Check all the columns before leaving the house to make sure they are correct. Remember you cannot supply answers after you leave

3.3. INSTRUCTIONS FOR MODULES 12: FOOD FREQUENCY

3.3.1 GENERAL INSTRUCTIONS

Collect this information any day within 7 days of VISIT 1 of the diet survey. DO NOT complete this schedule on the same day as a diet survey.

For this module interview the food preparer in the household. Record the name and member code of the person who **responds to the questions**.

3.3 2. Matrix on Page 1: Frequency of Food Consumption By Food Type

Column 1: Household Food Frequency

Ask about the frequency with which the food in question is served in the household **DURING THE SEASON OF THE SURVEY** and assign the appropriate frequency code. Household food frequency should reveal the frequency of consumption of the majority family members. If, for example, a particular food is eaten daily by pre-schoolers and once a month by other family members write "7", the code for "once a month". The household food frequency information should be based on food cooked in the household as well as all food that is habitually eaten outside the household (eg. food provided at work place, school).

Use the code 9999 if the household has never heard of the food in question.

Columns 2-7: Individual Food Frequency

Complete these columns as above for all children less than 6 years, pregnant, and/or lactating women.

3.4. INSTRUCTIONS FOR MODULE 13: ANTHROPOMETRY

4.1 GENERAL INSTRUCTIONS

For each household collect anthropometry information (height, weight and mid upper arm circumference) according to the following chart:

VILLAGE	COLLECT ANTHROPOMETRY ON:
Dokur	children < = 6 years females > 10 years
Shirapur	all individuals
Kanzara	children < = 6 years females > 10 years
Aurepalle	all individuals

Since anthropometry is collected "in batches" keep careful watch over the amount of time it takes to collect this information in each village.

4.2 MATRIX 1 and MATRIX 2:

Follow the procedures given in the UN Manual: How to Weigh and Measure Children. Take special care to assess ages of young children correctly, using the appropriate local events calendar.

3.5. INSTRUCTIONS FOR MODULE 14: MORBIDITY

Before writing or asking anything record the **TIME STARTED.**

3.5.1 GENERAL INSTRUCTIONS

For each household collect morbidity information for all children less than or equal to 6 years and all women above the age of 10.

3.5.2. MATRIX 1: CHILDREN LESS THAN SIX YEARS

Column 1: Names of all children less than 6 years

Record the names of all children, whether or not they were sick during the past 7-14 days. Use this list to probe about sickness in the household. First ask whether the eldest child was sick. Then ask if the second child was sick and so on. DO NOT issue a general question "Was anyone sick last week?" and expect the mother to remember. Instead, inquire child by child.

Column 2: Member Code

Record the appropriate member code in accordance with that given on the Master List for that household

Column 3: Was the child sick/disabled in the last 7 days?

Write 1 if the child was sick within the past 7 days. Write 2 otherwise.

Column 4: Was the child sick/disabled in the last 14 days?

Write 1 if the child was sick within the past 14 days. Write 2 otherwise. As shown below, if the answer to column 7 was "1" then the answer to this question must also be "1". The following combinations of answers for Columns 3 and 4 are the only possible answers.

Name	Member Code	"...sick in the last 7 days?"	"...sick in the last 14 days?"
Ladole	04	1	1
Lahta	05	2	1

Column 5: Symptoms

If the answer for either of the previous columns was "1", ask what symptoms were exhibited during the sickness. Record the symptoms of each **episode** of sickness on the same line. Write the name of the most severe symptom first (Symptom 1). Write the appropriate symptom code next to the name. If there is no appropriate symptom code then write 99 and we will devise a code for the symptom later.

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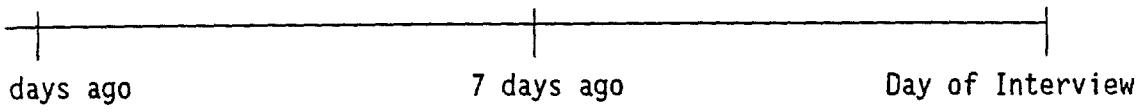
Write the names of any other symptoms which occurred simultaneously (and which were associated) with the first symptoms in the "Symptoms 2-4" columns. Record the symptoms in order of severity.

It is possible for symptoms to last differing amount of time during the same episode. For example, one can have fever for 7 days and vomiting for 3 days during the same episode of sickness (or "period" of sickness). These symptoms should be listed on the same line since they are probably caused by the same thing (See Figure 1).

Separate episodes of illness for the same individual should be recorded on separate lines (See Figure 2). In addition, the answers in Columns 3 and 4 should be specific to each episode of sickeness. For example, a person had fever and vomiting within the last 14 days. The fever lasted 7 days and the vomiting lasted 3 days. Then the person got better for 7 days and then got scabies for 6 days:



The proper form of recording this example is shown in Figure 2. Line 1 of this example shows that Ladole was sick WITH FEVER AND VOMITING within 14 days of the interview. A "1" is therefore entered under column 4. However, since this sickness did not extend into the period described by the "the last 7 days", so a "2" is entered into column 3. Line 2 states that he was sick WITH SCABIES during the last 7 days. Since the last 7 days are included in the last 14 days, a "1" is shown in both columns. This examples illustrates that the answers to columns 3 and 4 may be different for a single individual with multiple episodes of sickness.

Continuing with this example, even if a child had fever, vomiting, and scabies during the same period, scabies must be listed on a separate line as the cause of scabies is different from the fever. The entry for Lata in Figure 2 shows the correct form of recording.

If the sickness persists until the day of the interview, record only the number of days which the symptoms have been exhibited, even if it's possible that the sickness may persist beyond the date of the interview.

5.3 MATRIX 2: WOMEN GREATER THAN 10 YEARS OLD

Columns 1-4: Complete as above.

Column 5: Symptoms--Number of Days Disabled

Enquire about the number of days that the individual was unable to carry out her usual activity due to the sickness in question. Note the number of days that the person was "disabled" in the column provided.

3.6. INSTRUCTIONS FOR MODULE 15: BREAST FEEDING

Complete this survey if there are any partially or completely breast fed children in the household. Fill out a separate form for each mother in the household. If a mother is breast feeding two children at the same time, also fill out two different forms (this is because weaning foods may have been different for different children).

All questions should be directed to the mother of the child who is breastfed. Write the respondent ID number of the mother of the breast fed child.

Matrix 1: Breastfeeding Habits

Column 1: Name of the breast fed child

Write the name of each breast fed child.

Column 3: Does the child eat anything other than breastmilk?

Write "1" if the child eats ANYTHING other than breastmilk, regardless of the quantity. This includes small bits of biscuits or whatever foods the mother gives.

Column 4: Does the child mostly eat adult food or breast milk?

If the answer to the previous question is "2" skip this question and write 9999 in the remaining columns. If the answer to the previous question is "1" then fill out the remaining questions.

We are trying to determine whether the child gets most of its nutrients from breastmilk or from adult food. Try to emphasize the word (or concept) of "mostly". Leave the definition of "mostly" up to the mother. However, you can asses this by asking questions such as "How many feeds a day" "How many other meals eaten each day?" and finding out the quantity the child eats in a day.

Column 5: At what age did you start to give anything other than breast milk?

Enter the age in months at which any food other than breast milk was given. This includes top milk, biscuits, buns, plain rice etc., regardless of the quantity given.

Column 6: At what age did you start to give adult food ?

Enter the age in months at which adult food was first given. This is the age at which the child began to eat most of the food which was cooked for the adults of the family. You do not need to record the age at which the child was exclusively consuming adult food, only the age at which it BEGAN to consume adult food.

Matrix 2: What are the weaning foods that you gave to your children?

For this question we are interested in the mother's practice, not her knowledge. Therefore, write the names of all weaning foods that the mother has given to the pre-school child. If the mother has not yet weaned any children write 9999.

3.7 INSTRUCTIONS FOR MODULE 16: REPRODUCTIVE HISTORY

Complete this survey for all married or engaged women, regardless of age.

Column 3: Age

It's difficult to use local calendars to assess the age of adults. It's unlikely that we will get the precise age of the woman, but get the best estimate that you can. Proceed by trying to pinpoint some memorable event in their lives at which they may have known their age, then add up the years since this event. Sometimes the gaps between memorable events must be assessed to count the total number of years which have passed since this event has occurred. This is a difficult process so take your time with the following:

1. Assessing age at marriage

Most rural women in the areas we work in cannot identify the age at which they were married. Therefore follow these steps:

a. Find out the age at which the woman attained maturity (puberty). If she cannot tell the age, assume the age was 13.
b. Find out how many years before or after marriage the woman matured. Most women can remember this fairly accurately.
c. With these two pieces of information one can approximate the age of the woman at marriage. For example, if the woman's marriage was 3 years after puberty, we would approximate here age at marriage to be 16.

2. Assessing age at the birth of the first child

After finding out the age at marriage, find out how many years after marriage she had her first child. Add this to the age of marriage. For example, is the age at marriage was 16 years and she gave birth three years later for the first time, the age of the first birth is 16 + 2 = 18 years.

3. Assessment of adult female age:

a. Assess the age of the woman at marriage and age at the first child birth by following the steps above.
b. Find out the age of the first child and add this figure to the mother's age at the first child to arrive at her present age.

For example, if the age of the woman at the first child was 18 years and the current age of the first child is 14 years, the woman's present age is 18 + 14 = 32 years.

In the case the woman has no children use your local calendars to determine how many years have passed since she was married and at this to her age at marriage.

Columns 4 and 5: "Number of years after maturation.....

Write the number of years after maturity at which these events happened. If the event (eg. marriage) happened before maturity then write the number of years which preceded maturation with a minus sign ("-"). If it occurred after maturity simply record the number of years (no need for a "+" sign). For example, if a woman married two years before maturation write "-2". If the event happened in the same year the woman matured write "0". If it happened 2 years after maturity write "2".

Column 5: How many pregnancies have you had?

Write the total number of pregnancies, regardless of the outcome (abortion, miscarriage, still birth).

Column 8: Which pregnancies resulted in a live birth?

The numbers above the grid signify the order of all pregnancies, including miscarriages, abortions, and live births. Write a "1" in the box if that pregnancy resulted in a live birth, regardless whether the child is alive or dead right now. Write "2" if the pregnancy resulted in a miscarriage, abortion, or still birth.

Column 9: Number of hours spent doing domestic work?

It is difficult for woman to answer this question straight away so use the worksheet on the next page to record the woman's daily activities. Then, count up the number of hours devoted to domestic work. This includes cooking, cleaning, fetching water, fetching firewood, shopping, child care repairing the house (or any other activity that isn't income generating). This does not include: agriculture or non-agricultural work outside of the house, livestock tending, shopkeeping (even if the shop is at the house) or visiting with neighbors or relatives, leisure hours at home. the time spent for domestic work needs to be collected from all married or engaged women.

Column 10: Caretaker during the mother's absence?

Find out who takes care of the child in the absence of the mother and code appropriately. If the mother does not work outside the house, code it as 6. In case the mother has no preschooler or is childless write 9999 in this column.

3.8. INSTRUCTIONS FOR MODULE 17: QUALITATIVE DIETARY INFORMATION

As with the Dietary Recall and the Food Frequency modules, these questions should be asked of the household food preparer.

3.8.1. Page 1: Questions on Consumption Patterns

Ask all questions taking ample time to probe if the respondent does not at first understand the intent of the question. Write any related comments onto the schedule page.

3.8.2 Page 2: Revealed Food Preferences

Column 3: Which three of these foods would you like to eat more of if you could?

Read out the names of all the food listed in the schedule and ask the respondent to choose 3 foods that she thinks her family would like to eat more of. Write the food code number next to the foods which the respondent chooses. Write a "9999" next to all other foods.

Column 4: Why don't you eat more of these 3 foods now?

Of the three foods that the respondent chose in the previous question, ask them why they did not consume as much as they wanted. If the reason they give is not coded, record code "7" and then explain in the margin. Make sure your explanation is clear and complete.

3.9. INSTRUCTIONS FOR MODULE 19: VITAMIN 'A' FOOD FREQUENCY

Complete this schedule for:

1. ALL children between the age of 1 and 6 years old, regardless if blood has been collected from the child or not. If there are multiple pre-school children in the household complete multiple schedules.

2. ALL woman from which blood samples are taken. If no woman in the household gave blood, collect the information from the mother. If there are no children in the family collect the information from any woman in the household which is of child bearing age.

Column 3 and 4: Frequency of the Child/Mother/Woman

Fill in the child's (woman's) name and correct member code.

Ascertain how many times per day, week or month the individual consumes the food in question DURING THIS SEASON, NOT DURING THE YEAR. Enter the number in the appropriate column. For example, if the person eats dhal with greens twice a week the correct entry is:

Foodstuffs	Daily	Weekly	Monthly	No. meals/day
Dhal with greens		2		
Milk				

Ascertain how many times a day the individual consumes the food per frequency unit reported. In the above example, we know he/she eats dhal with greens twice monthly but we need to know how many times per day. If he/she eats twice monthly, each time for two separate occasions the correct entry is:

Foodstuffs	Daily	Weekly	Monthly	No. meals/day
Dhal with greens		2		2
Milk				

If a food item is prepared on a particular day and eaten for successive days (eg. gogu chutney may be prepared one day and eaten for the next 3 days), write down the total number of meals it is eaten in all three days and write it down in the appropriate column.

For vegetable frequencies, only count servings of preparations in which the vegetable is the main ingredient. For dhal preparations containing tomatoes, do not consider them as 'tomato' preparations.

If foods are rarely (eg. once in two or three months) enter them as fractions. For example if a food is eaten once in two months write '.5' in the monthly column (1 serving every 2 months). If it is eaten once in three months write '.3'. If foods are never eaten code them as '0'.

Columns 3 and 4: Serving Size

Ask how large the serving sizes are, using your dietary vessels to help the subjects recall portion sizes. Record the quantity in either ml, numbers or grams (for fruit).

For now, leave the 'S' 'M' and 'L' columns blank. We will standardize these portion sizes later.

IV. PROTOCOL FOR COLLECTION OF BLOOD SAMPLES

We will collect blood samples from all household pre-schoolers and their mothers. Before the blood collection starts, prepare lists of all individuals in the village who meet this criteria. List their names, household numbers, ages, and sexes.

If possible call the mother to bring her child to the village office. Thoroughly read and translate the consent form to the mother and ask her for permission to take blood from herself and her children. If she has any worries about safety or confidentiality have her talk to Kim or the physician present. If a mother refuses to participate, do not press her to do so. It will only hurt the study if you do so.

The NIN personnel will collect small capillary tubes for vitamin A assessment and filter paper samples for hemoglobin analysis.

The nutrition enumerators will be asked to assist in making the mothers and children comfortable as well as keeping records and calling families.

Finally, since the threat of AIDS is real in India we ask that all members of the research team be responsible for the following:

1. When collecting or handling human blood samples, all project individuals are required to wear disposable gloves which are provided.

2. When collecting blood samples, technicians should be particularly careful with used lancets and syringes. A simple "needle stick" can lead to infection. Therefore, used lancets and needles should be placed into a hard case container which prevents accidental punctures.

3. All refuse (cotton swabs, parafilm liners, disposable syringes, disposable gloves, etc.) should be collected into plastic bags and brought back to Hyderabad for incineration. NO REFUSE SHOULD BE LEFT IN THE VILLAGE OR GIVEN TO VILLAGERS.

IV. SCHEDULED WORKPLAN

Date	Activity
May-June 92	recruit nutrition enumerators
	on-site ethnography training of all personnel
	pre-testing economics schedules
	conduct village census of young children
July 92	train nutrition enumerators in survey techniques
	pretesting nutrition and economics surveys
	field ethnography training of selected personnel
August 92	begin round 1 in Dokur
	PRA workshop
September 92	begin round 1 in Shirapur, Kanzara
	ETHN 1/NIN 1 in Shirapur
	clean Dokur data
November 92	begin round 1 in Aurepalle
	ETHN 1/PRA 1/NIN 1 in Aurepalle
	clean Shirapur (1), Kanzara (1) data
January 93	begin round 2 in Dokur, Kanzara
	enter Aurepalle (1), Kanzara (2)
February 93	begin round 2 in Shirapur
	ETHN 2/PRA 1/NIN 2 in Shirapur
	enter Dokur (2)
March 93	begin round 2 in Aurepalle
	ETHN 2/PRA 1/NIN 2 in Aurepalle
	enter Aurepalle (2)
June 93	begin round 3 in all 2 villages
	ETHN 3/PRA 2/NIN 3 in Aurepalle, Shirapur
July 93	begin round 3 in remaining 2 villages
August 93	enter round 3 data

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Date	Activity
September 93	enter round 3 data/data cleaning
October 93	data cleaning
November 93	data analysis
December 93	data analysis
January 94	final report
February 94	final report

LIST OF RESPONSIBILITIES

	Dokur	Shirapur	Kanzara	Aurepalle
Economics Surveys	Bhasker Rao GDNR/YMR	Ladole	Chopde	Nagesewar Rao
Nutrition Surveys	Anuradha Vijaya Lakshmi Sujatha	Jyothi Leena Anita Vasantha	Anita Jyothi, Leena	Anuradha V. Lakshmi Sujatha
Male Anthropo-metry	9999	Ladole	9999	Mohan Rao
Ethnography	9999	Neeta	9999	Vasantha
PRA		Neeta Ladole Vasantha	9999	Vasantha Mohan Rao Neeta
Supervision of Data Quality	Kim Yasoda	Kim Yasoda	Kim Yasoda	Kim Yasoda

APPENDIX I: CROP CODES

Bajra/Pearl Millet	CA	
Bajra/Pearl Millet(HYV)	CB	
Jowar/Sorghum-local	CC	
Jowar/Sorghum-HYV	CD	
Maize (Local variety)	CE	
Maize (HYV)	CF	
Ragi/Finger Millet	CG	
Other minor millets	CH	
Paddy (local variety)	CJ	
Paddy (HYV)	CK	
Wheat (local variety)	CL	
Wheat (HYV)	CM	
Rice (local variety)	CN	
Rice (HYV variety)	CQ	
Meales	CQ	
Other cereals	CX	
Redgram (Tur)/Piegionpea	PA	
Greengram (Mung)	PV	
Blackgram (Urad)	PC	
Bengalgram (Chenna)/Chickpea	PD	
Redgram dhal	PF	
Greengram dhal	PG	
Blackgram dhal	PH	
Bengaldram dhal	PJ	
Guar	PK	
Cowpea	PL	
Soybean	PN	
Other pulses	PX	
Other dhal	PZ	
Groundnuts	BA	
Sesamum	BB	
Castor	BC	
Mustard	BD	
Linseed	BE	
Linseed Oil	BL	
Caster (HYV)	BM	
Sunflower		BF
Safflower		BG
Safflower oil	BS	
Groundnut oil	BH	
Other oilseeds	BX	
Cotton (local)	DA	
Cotton HYV	DB	
Other Fiber Crops	DX	
Sugarcane		SA

Sugar	SB
Gur (jaggery)	ZB
Other sugar products	

Onion	VA
Chillies	VB
Brinjal	VC
Cabbage	VD
Tomato	VE
Cauliflower	VF
Leafy vegetables	VL
Potato	VP
Carrot and Raddish	VR
Fennel	VS
Tubers	VT
Other vegetables	VX

Grapes	FA
Lemon	FB
Orange	FC
Mango	FD
Coconut	FE
Toddy Trees	FG
Other fruits	FX
Banana	FH
Papaya	FP

BY PRODUCTS

Rough dry fodder	ZA
Fine dry fodder	ZB
Green fodder crops	ZC
Grass and other green fodder	ZD
Grass and other dry fodder	ZE
Cabes	ZF
Gur (jaggery)	ZG
Oil	ZM
Mineral and minor feeds	ZJ
Crop byproducts not used as fodder but used as fuel, etc.	ZK

APPENDIX II: CODES USED FOR MODULE 11
ADULT COEFFICIENTS, OCCUPATION CODES, AND SPECIAL CONDITION

CATEGORY	Adult Coeff.	Occ	Special Condition
Children (partially breat fed) up to 11 months	0.3		
Children 12 months- 35 months	0.4		
Children 36 months-4 years	0.5		
Children 5 years-6 years	0.6		
Children 7 years-8 years	0.7		
Children 9 years - 11 years	0.8		
Adolescents 12 years to 20 years	1.0		
Adolescent pregnant woman, sedentary worker	1.0	3	3
Adolescent pregnant woman, moderate worker	1.1	2	3
Adolescent pregnant woman, heavy worker	1.4	1	3
Adolescent lactating mother, sedentary worker	1.1	3	4
Adolescent lactating mother, moderate worker	1.2	2	4
Adolescent lactating mother, heavy worker	1.5	1	4
Adolescent lactating mother more than one yr, sedentary	1.0	3	7
Adolescent lactating mother more than one yr, moderate	1.0	2	7
Adolescent lactating mother more than one yr, heavy	1.2	1	7
Adult male (sedentary worker)	1.0	3	
Adult male (moderate worker)	1.2	2	
Adult male (heavy worker)	1.6	1	
Adult female (sedentary worker)	0.8	3	
Adult female (moderate worker)	0.9	2	
Adult female (heavey worker)	1.2	1	
Pregnant woman (sedentary worker)	0.9	3	3
Pregnant women (moderate worker)	1.0	2	3
Pregnant woman (heavy worker)	1.4	1	3
Lactating woman (up to 1 yr) sedentary worker	1.1	3	4
Lactating woman (up to 1 yr) moderate worker	1.2	2	4
Lactating woman (up to 1 yr) heavy worker	1.5	1	4
Lactating mother more than one yr, sedentary	1.0	3	7
Lactating mother more than one yr, moderate	1.0	2	7
Lactating mother more than one yr, heavy	1.2	1	7
Individuals who have "missed a meal"	0.5		

APPENDIX 5

APPENDIX 5--MANUAL FOR COLLECTION OF PARTICIPATORY RURAL APPRAISAL EXERCISES

DRAFT
April 9, 1996

Participatory Rural Appraisal Protocol
ICRISAT-IFPRI Alternative Indicators Study

Summary of Ethnography and PRA Work

Activity	Number of Activities per round	Village	Respondents	Round	Investigator	Starting Dates RD1 RD3	RD2	
Case studies	6	Aurepalle	Case Study Households	1,2,3	Vasantha	Nov '92	March '93	July '93
Case studies	6	Shirapur	Case study Households	1,2,3	Neeta	Oct '92	Feb '93	Aug '93
Food Charts	40+6	Shirapur	Case Study Households + 40 other survey hh's	2,3	Vasantha Neeta [JR]	XXX	Feb-March '93	June July '93
Food Charts	6	Aurepalle	Case Study Households	2,3	Vasantha	XXX	March-April '93	July '93
Women's Activity Charts	6	Aurepalle	Case Study Households	2,3	Vasantha	XXX	March '93	July '93
Women's Activity Charts	6	Shirapur	Case study Households	2,3	Neeta, Vasantha	XXX	Feb '93	Aug '93
Seasonality Charts	4	Aurepalle	2 caste grps 2 gender gps*	2,3	Mohan Rao, Vasantha, Raju	XXX	March '93	July '93

Seasonality Charts	4	Shirapur	2 caste grps 2 gender grps*	2,3	Neeta Vasantha	XXX	March-April '93	June
Village Maps	2	Aurepalle	2 gender gps* by community	2,3	Mohan Rao Vasantha	XXX	March '93	July '93
Village Maps	2	Shirapur	2 gender gps* by community	2,3	KGK, VBL,	XXX	April '93	Aug '93

* male groups -- YMR, VBL, KGK,
female groups -- Vasantha and Neeta, plus various notetakers (KA, TVNA, DVL)

GENERAL INSTRUCTIONS FOR CONDUCTING PRA EXERCISES

Each one of the exercises described below has an associated worksheet to record the information obtained each activity. Please fill out all the pertinent information on the worksheets, particularly the information about the group characteristics (name, caste, occupation) and comments on why a certain number of beans might have been placed on a spot on the sheet.

In addition, since this study is concerned with comparing methodologies to identify the food and nutrition insecure it is important that you record observations about the process of conducting PRA exercises. These comments will be important to us when we make the final evaluation of the usefulness of each exercise in identifying the food insecure. Below is a list of considerations on PRA methodology and process which you should address while you are filling out your worksheets. Please use the last sheet on each worksheet to address each of these concerns (use extra sheets if necessary):

1. Record the problems encountered in communicating questions and study concepts to the respondents (eg., the confusion between "food availability" and "food consumption", the 1-10 or 0-1 scale, work available and work on their farm, the confusion between consumption of vegetables and vegetable growing season).

   Identify ideas that were easy to convey and those that you had difficulties with. Describe how you overcame these problem (eg. comparison of the more familiar paisa in a rupee to the number of beans out ten). Describe "sensitive" topics and how you managed (or didn't manage) to get the information you wanted (eg. why people didn't want to answer who got less food when there were food shortages in a household).

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2. Describe in detail the strategies used to establish rapport. Describe difficulties (or failures to) establish rapport as well.

3. Give details on participation. For example: were participants- hesitant, comfortable, uncomfortable, enthusiastic, bored, or interested (these are only examples, make up your own descriptors)? Did participation vary as the activity progressed? What was it like initially, after the activity was well established, and towards the end of the activity. Did every person in group participate? Were some people hesitant, shy or dominant (please specify who they were)? What did you do to encourage participation?

4. Did the group reach a consensus? Describe the process by which consensus was reached. Were there differences of opinion? Who had conflicting/varying views? Describe the dynamics of the negotiation (ie. how it proceeded over time) which were necessary for allotting a specific number of beans.

5. List the questions and clarifications asked by the participants, as well as their comments on the activity and methods.

1. Village Mapping in Rounds 2 and 3 in Shirapur and Aurepalle

Objectives:

To identify households that the community perceives to be (i) "very high risk" and (ii) at "no risk" of food and nutrition insecurity. By "high risk" we mean families which struggle to provide enough food for their families.

The criteria for selection into these two groups will be determined by the villagers in this exercise. Do not lead the group by using your own criteria to define high and low risk families. Instead, use the local terms written in the protocol below.

1.1 Instructions for Completing the Village Map Identification with Male and Female Subjects in Round 2:

We will not be able to fit a whole village onto a single map. Therefore in Aurepalle and Shirapur it will be necessary to draw several "sub-maps" of the villages. The "submaps" should be of neighborhoods within the village which are small enough that villagers are familiar with all the households and all the facilities available in the area (eg. water pumps, shops etc.). Figure 1 shows the type of picture you are aiming for, although remember that you must not lead the villagers or tell them how to draw the map. Please follow these steps for each sub-map drawn:

(1) A few days before the map is to be drawn, randomly select two groups (10-20) one of men and one of women from the neighborhood to be mapped (the group should include survey households as well as non-survey households). Visit each member of the group and

explain what you would like them to participate in. If they agree to help draw the map, arrange a time and place that is good for everyone in the group to meet in a few days to draw the map. Make sure that the place you choose is cool and comfortable.

(2) On the first visit in round 2 try to keep the number of participants to a manageable number (but do not turn people away). Have the villagers draw a complete map of their neighborhood. Make sure that all survey households are covered in the sub-map. It is important to include all structures (not just houses) that the VILLAGERS think are important to them (please note this does not mean to include all structures that YOU think are important!). Allow the participants to decide on the shape and size of the structures, even if it doesn't look the way you think it should. It is not important identify all the individuals in each household.

(3) At the end of the exercise either you or one of the villagers should copy the map onto paper.

(4) When you get back to the office draw, make a copy of the map so that you have 2 paper copies.

(5) In the next week, conduct separate "identification" excercises with a men's group and a women's group for each sub-map. Specifically, return to the neighborhood with 1 map on paper to get each group to:

(a) check the accuracy of the map (i.e. that no household has been left off) and

(b) identify households which are "very high risk" and "no risk".

For half of the sub-maps conduct the identification excercise with women first; for the other half conduct the excercise with men first. This is to avoid any bias in the identification steps (wives, for example, may tell their husbands the "results" of their identification and they may subsequently tell us the same thing the next day).

In Aurepalle, use the following script to explain "very high risk":

In Shirapur, use the following script to explain "very" high risk:

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(6) For each exercise record which houses have been identified as "high risk" on the pro-forma. For each house, record as much information as possible as to why each of the households is considered at "very high risk". Write this in the comments section. In the box below this record general observations on why households are considered at "no risk" by the villagers. Pay attention to disagreements, and why they arise. Also note if there is overwhelming consensus on the emic reasons for classifying households into either of these categories.

(7) While doing this please remember that this exercise is designed to find out local perceptions about the village. Therefore, if you find discrepancies between households identified by the male and female groups, do not attempt to get the group to "correct" them. Each group could very well have different perceptions about who is food insecure. Be sure to probe gently and neutrally to find out why each group has shown something the way that they have.

1.2 Instructions for Completing the Village Map Identification with Male and Female Subjects in Round 3:

For round 3, we want to use the same map that was obtained during round 2 to get an update.

(1) Organize a time to meet people from the each neighborhood. As usual you will need to pick a time which is convenient and set the meeting place ahead of time. It does not matter whether the same participants from round 2 are there.

(2) At the appointed time take the map made during round 2. Explain that you want them to help you update the map and that you want to discuss their neighborhood.

(3) Give them time to study the map and identify all the relevant land marks (water taps, shops, etc.). To get them started you can show them the meeting place for the exercise and point out houses/structures that are nearby. Ask them to look for their own houses.

(4) Get them talking about the structures (ie. physical attributes) of their neighborhood. Ask questions about structures, not particular families. Try to avoid talking about family characteristics as a lead in to a discussion on food security.

by checking on the status of the households identified as at "very high risk" and "no risk" in round 2. Has their situation improved or deteriorated? Why? Note any new households that have moved into the village. Pay particular attention to any households that have gone from "no-risk" in the round 2 to " very high risk" in round 3, and vice versa.

2. Food Charts in Rounds 2 and 3 in Shirapur and Aurepalle

Objective:

(1) To make food charts with 40 randomly selected survey households from Shirapur during rounds 2 and 3.

(2) To make food charts with all case study households (6 in Aurepalle and Shirapur each) in round 2 and 3, bringing the total number of food charts to 52.

Data obtained from the food charts will be used to create a few simple "household indicators" of food security, based on people's own perceptions. It is important, therefore, that the process of doing a food chart among households be relatively consistent. Therefore investigators must follow the steps listed below. It is also important that the food chart reflect current household food consumption patterns, since you will repeat the exercise later, during round 3 (a different season). Therefore, instructions to the informant(s) should stress that you wish to have information about current consumption.

For "current" consumption we mean during the season of the survey:

Round 2: October-February ("winter")
Round 3: March-June ("summer")

Be sure to use LOCAL terms to explain the time period.

The key informant should be the food preparer(s), usually the mother, daughter-in-law, or grandmother. Other household members can be present and participate, but the best informant is the person in charge of or "controlling" the food supply. It would also be helpful to have the person who does the food marketing present.

Instructions:

1. Tell the key informant and others present that you want to "make a picture" of the foods that the family is consuming now -- during the present season. Tell them that they will make a second picture during another season. Tell everyone that they can help to make this picture, but that the cook/food preparer will be the primary person to answer the questions.

2. Ask the informant to list all the foods/drinks that people in the family are currently eating this during this season. Probe to make sure that you have all of the foods that they eat during the season. The note taker should write all of these on the form provided. WRITE THE FOODS (INCLUDING SPICES) IN THE ORDER THAT THEY SAY THEM. THIS IS VERY IMPORTANT. RESIST THE TEMPTATION TO AGGREGATE the food items they list -- if they mention 2 different

types of Sorghum, record 2 types, do not aggregate to a single category called "Sorghum".

3. Spread a large piece of paper on the ground in front the informant(s); have your "tools" ready (large beans, markers, notebook).

4. Begin with the first food mentioned and proceed in the order that they were mentioned. Tell the informant that you want to put something on the paper that represents the item. Take out the small samples of food that they have mentioned and put them in a line lengthwise on the paper. DO NOT USE THESE FOODS TO PROMPT THE RESPONDENTS ON WHAT FOODS TO INCLUDE ON THE CHART.

   Put all of the samples in a line about 4 inches from the bottom edge of the paper. Although all foods and spices should be listed in the "free listing" section of the form, you may combine all the spices together on the chart paper.

   If they have mentioned a food that you are not carrying have the family provide a small amount of the food if possible. Please note that many poor families will not have the food available so do not press them to provide it. If the food is not available have one of the adults or children or other on-lookers draw a picture on the paper to show the item. If they are uncomfortable holding a pen you may draw a picture.

6. Once the line of foods is complete, ask the informant to identify the foods the family <u>currently</u> eats the most of (in terms of <u>weight</u>), and then the food that they eat the least of.

7. Explain that you want the informant to place 10 beans in a column ABOVE the food item that is consumed the most (in terms of quantity (kg)), and one bean on top of the food item least consumed. Make sure she understands that 0 beans indicates that zero amount of this food is eaten. 1 bean on the other hand represents some consumption of the food, but the minimum amount that is eaten during the year. THIS MAY TAKE TIME. BE PATIENT WITH THE RESPONDENT AND MAKE SURE THEY UNDERSTAND THE SCALE.

8. HAND THE RESPONDENT THE BEANS. If the respondent resists doing this at first, you may need to count out 10 beans and place them in the correct column. Then hand her one bean and ask her to put that above the column of least consumed food. Ask her to put the beans in a straight line.

9. Point out another food shown on the chart and ask how many beans should be placed above that item. You can explain this by saying, "if food "x" has 10 beans and food "y" has only one bean, then how many beans should there be for food z?". If the informant then understands what she/he is supposed to do, let her/him continue (without help) placing beans above all the foods on the chart. You may need to point out several such items and

ask how many beans should go there, before she/he begins to fill in the rest of the columns.

10. Once all the columns are complete, cross check the information by repeating what you see. For example, you can say, "I see from the picture that right now your family eats the most of food "a", and that foods "b" and "c" are eaten in the same amounts. Is this correct? Are there any changes to the picture that you want to make?"

11. Note down the food items and the number of beans corresponding to each on the chart on the food chart form. The notetaker should also write down comments on WHY the respondent has put so many beans on each food.

11. Once the quantities are all identified, inquire about the FREQUENCY with which the food is eaten in the household. Ask the respondent to put a colored bean next to each food which represents the frequency with which the family eats this food. Use the following colored beans to identify the frequency. Proceed in the order listed:

GREEN	Daily consumption
BLUE	More than once a week, but not daily
RED	Less than once a week, but not rarely
BLACK	Rarely (festivals, sickness etc.) Note: they may not include these foods in the list of those that they eat "regularly" anyway.

The notetaker should record the frequency with which each food is eaten as well as any comments which the respondents make about WHY they have said so.

Take a break, record the picture, and then ask "is there any way you would like to <u>change the picture</u> (by moving the beans around)?".

12. Use the chart to ask the following questions about related topics regarding <u>current</u> food consumption. Record these answers on the sheets provided.

12.1) Are there any foods that they run short of on a daily or weekly basis? If so, do they use any foods as substitutes? Who within the family is most affected by the shortages?

12.2) Follow up on any comments they have made that are interesting to the topic of household food security and intra-household food security (ie. the distribution of food within the household).

13) Note any changes made to the chart during the discussions.

14) When the discussion has finished (and they have asked any question they might have), encourage them to take back any foods placed on the paper so no food is wasted.

15) Thank the informant(s) and on-lookers/other participants for their time and for making this picture for you.

15) The same afternoon or evening, complete the food chart form and your notes describing the exercise with the family. Give these to Kim or Dr. Yasoda the next time you see them.

3. Woman's Time Activity Chart in Rounds 2 and 3 in Shirapur and Aurepalle

Objective: To have the mother from each case-study household make an activity chart during both rounds 2 and 3. If there is no mother in the house, choose one woman from the household that is of reproductive age. Preference should be given to women in the age group 18-45.

Data obtained from the activity charts will be used to create a few simple "household indicators" for women's work, time allocation, and energy expenditure, based on their own perceptions. It is important, therefore, that the process of making an activity chart among women be relatively consistent. Therefore, investigators must follow the steps listed below. It is also important that the activity chart reflect women's current time and activity patterns, since you will be repeating the exercise in round 3 (a different season). Please stress that you wish to have information about current patterns only.

For "current" activities we mean:

Round 2: October-February ("winter")
Round 3: March-June ("summer")

Be sure to use **LOCAL** terms to explain the time period.

Instructions:

1. Tell the mother and others present that you want to "make a picture" of the kinds of work that she does during the present time/season. Tell her that she will make a second picture later during another season. Tell everyone that they can all help to make this picture, but that the woman key respondent will be the primary person to answer the questions.

2. Ask the informant to list all the activities that she normally does during this season. Probe to make sure that you have all of the activities typically done, even if they are not done every day. The note taker should write all of these down on the form provided. WRITE THE ACTIVITIES IN THE ORDER THAT THEY SAY THEM. THIS IS VERY IMPORTANT. RESIST THE TEMPTATION TO AGGREGATE the activities.

3. Spread a large piece of paper on the ground in front the informant(s); have your "tools" ready (activity pictures, 2 types of beans, markers, notebook).

4. Take out the pictures of activities that they have mentioned and have them identify correctly the activity illustrated. DO NOT USE THESE ACTIVITIES TO PROMPT THE RESPONDENTS ON WHAT ACTIVITIES TO INCLUDE ON THE CHART.

5. Tell the informant that you want to put a picture on the paper that represents each activity. Begin with the first activity mentioned and proceed in the order that they mentioned. Put the pictures in a line on the paper; you may need to tape the them down. If they have mentioned an activity that you do not have a picture for, have the woman draw a simple symbol to represent this activity.

6. Once the picture showing the activities is complete, ask the informant to identify the activity that currently occupies most of the woman's time. Then have her identify the activity which requires the least amount of her time.

7. Explain that you want the informant to place 10 beans in a column ABOVE the activity that takes most of her time and one bean on top of the activity which takes the least amount of her time. Make sure she understands that 0 beans indicates that zero amount of time is used for this activity and that 1 bean represents some time spent in this activity, but the smallest amount of time devoted to any activity.

   HAND HER THE BEANS. If the informant resists doing this at first, you may need to count out 10 beans and place them in the correct column. Then hand her one bean and ask her to put that above the column of the least time intensive activity. Ask her to put the beans in a straight line.

8. Point out another activity shown on the chart and ask how many beans should be placed above that item. You can explain this by saying, "if activity "x" has 10 beans and activity "y" has only one bean, then how many beans should there be for activity z?". If the informant then understands what she/he is supposed to do, let her/him continue (without help) placing beans above all the activities on the chart. You may need to point out several such items and ask how many beans should go there, before she/he begins to fill in the rest of the columns.

9. Once all the columns are complete, cross check the information by repeating what you see. For example, you can say, "I see from the picture that right that "x" activity takes most of your time and "y" activity takes a lesser amount of time, but more than "z" activity. Is this correct? Are there any changes to the picture that you want to make?"

10. Note down the activity items and the number of beans corresponding to each on the chart on the activity chart form. The notetaker should also write down comments on WHY the respondent has put so many beans on each activity.

11. After the activity chart has been made, bring out a second set of different beans and ask the woman to do the same thing, using beans to represent the amount of "effort" or "energy" each activity takes. For example, ask her to place 10 beans on the

activity that makes her the most tired to complete, and one bean next to the activity that makes her the least tired. Repeat instructions for filling placing beans on the rest of the activity categories as above.

Take a break, record the picture, and then ask "is there any way you would like to change the picture (by moving both sets of beans around)?".

12. Use the chart to ask the following questions about related topics regarding current time and activity patterns. Be sure to get information on all of the questions below.

    a. Of all the activities listed, is there anything that you feel you don't have enough time for (ie. would you rather see a taller set of beans for any activity) ? Is there anything where you wish you had a smaller set of beans?

    b. Which of the activities do you have help with and which do you do alone?

13. When the discussion has finished, ask if the respondent has any questions. Thank the informant for her time and for helping to make this picture.

14. The same afternoon or evening, complete the activity chart form and your notes describing the exercise with the informant. Give these to Kim or Dr. Yasoda.

4. Seasonality Charts

Objective:

To understand patterns in rainfall, harvesting of 2 main staples, food security (the ease in which the household has in feeding its family), vegetable consumption, male labor demand, female labor demand, childhood illness, and women's illness OVER THE PAST 12 MONTHS. In round 3 the chart will record these patterns for the period between round 2 and round 3.

This exercise will be conducted with four different groups in each village. For each group there will be a specific set of patterns to be charted:

GROUPS	Patterns to Chart
Women's Group (Harijan)	Vit-A-rich vegetable consumption (not harvest), how easy it is to provide food for the household, how easily women can get work, frequency of children's sicknesses, frequency of women's sicknesses
Women's Group (non-Harijan group)	Vit-A-rich vegetable consumption (not harvest), how easy it is to provide food for the household, how easily women can get work, frequency of children's sicknesses, frequency of women's sicknesses
Men's Group (Harijan)	rainfall, paddy harvest (in AP), corn (in MS), sorghum harvest (all), vit A rich veg consumption (not harvest), how easy it is to provide food for household, how easyily men can get work.
Men's Group (Non-Harijan)	rainfall, paddy harvest (in AP), corn (in MS), sorghum harvest (all), vit A rich veg consumption (not harvest), how easy it is to provide food for household, how easyily men can get work.

Instructions:

(1) Form a group of 6-10 participants of the correct categories (women, men, caste groups). The group should consist of both respondents and non-respondents. If others wish who were not invited wish to join the activity, please allow them to do so.

(2) Tell the group that you want to "make a picture" of how village life has varied throughout the past 12 months.

Explain to them what topics you are interested in. Tell them that you will be making a second picture later in the year to compare with this one.

(3) If you are doing a seasonality chart of morbidity or vegetable consumption, start by having them tell you what are the most common sicknesses (or vegetables consumed). USE LOCAL TERMINOLOGY TO DESCRIBE SICKNESS AND FOODS DURING THE ACTIVITY AND IN YOUR REPORTS. WE WILL TRANSLATE THE TERMS LATER. Choose the most prevalent sicknesses to chart. For vegetables, choose the Vit A rich foods which are eaten commonly in the village. Vitamin A rich foods are: colocasia leaves, spinach (paneer), fenugreek (methi), tomato, carrots, gogu, chanchalaku. If they are not consuming any vitamin A rich foods, but consume other vegetables very regularly (such as brinjal), then chart those.

(4) Spread the appropriate seasonality template on the ground in front of the informants. Have the respondents review the pictures of the local calendar and make sure that they can correctly identify each "month". If the respondents are having trouble identifying the months on the festivals calendar, switch to the agricultural calendar and use that instead. If they still cannot use this one, make a new one using events that they think of.

Have your "tools" ready (different beans and different colored markers for each pattern to be charted). Explain that you want the group to place 10 beans of one color in a column above the month in which the characteristics are highest (e.g. place ten beans of a particular color in the month when rainfall was the highest), and one bean on top of the month when it is the lowest. For example, place ten beans of a particular color in the month when rainfall was the highest.

Explain to them that 0 beans indicates 0 rainfall (sickness, labor demand, sorghum harvest etc.). Make sure they understand that 1 bean represents the minimum amount of rain during the year (ie some positive, small amount, but not 0).

(5) HAND THE BEANS TO THE GROUP. If the group resists doing this at first, you may need to count out 10 beans and place them in the correct column (for rainfall for example). Then hand over one

bean and ask the group to put that above the month in which there was least rainfall.

(6) For the sake of clarity, have the group make different pictures for each pattern. You may leave the beans from one exercise on a template and proceed to another. Encourage the group to refer to the other bean colulmns while they are forming the next. This will increase the quality of the data by cross-checking the timing of various events.

(7) Record the number of beans put on each month and the comments the group makes about why each month deserves a certain number of beans.

5. Instructions for the creation of quantitative indicators from emic information collected through PRA exercises.

We can construct variables for each household from the PRA information in order to compare with variables from the survey.

Examples of Variables

1. Village map

FOR EACH HOUSEHOLD IN SURVEY:

VAR 1: Was the household considered at "very high risk" on the village map - MALE GROUP?
(1=yes, 0=no)

VAR 2: Was the household considered at "very high risk" on the village map - FEMALE GROUP?
(1=yes, 0=no)

VAR 3: Why was the household considered at risk - MALE GROUP?

(1=sick, 2=recent death, 3=divorced, 4=disabled, 5=no job etc. 6=too many people, 7= debt, 8=no land, 99=other (specify))

VAR 4: Why was household considered at risk - FEMALE GROUP?

(1=sick, 2=recent death, 3=divorced, 4=disabled, 5=no job etc. 6=too many people, 7= debt, 8=no land, 99=other (specify))

2. Food Chart

VAR 5: ID number of respondent

VAR 6: Number of items identified BY FOOD PREPARER on food chart

VAR 7: Number of aggregated food categories (researchers will aggregate above foods into groups after examining the responses of the food preparer on the food chart). This variable will have the same value for each household.

VAR 8: How many foods had 5 or more beans?

VAR 9: Did the food preparer want to change the chart? (1=yes, 0=no)

VAR 10: If yes, most beans went to which category? _____

VAR 11: Is anyone ever hungry? (1=yes, 0=no)
VAR 12: Who is hungry? (ID code from survey)

3. Women's Activity Chart

VAR 13: ID number of respondent

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VAR 14: Number of items identified BY THE WOMAN on her activity chart

VAR 15: Number of aggregated time categories (researchers will aggregate activities into standard groups after examining the responses of the woman on the activity chart). This variable will have the same value for each household.

VAR 16: How many activities had five or more beans?

VAR 17: Did the woman want to change the chart? (1=yes, 0=no)

VAR 18: If yes, most beans went to which category? _____

4. Seasonality Chart

The coding of these variables into "low", "medium", and "high" can worked out later on.

VAR 19: What is the level of rainfall at time of PRA?
(0=low, 1=medium, 2=high)

VAR 20: What is the level of paddy harvest (or most important staple) at time of PRA?
(0=low, 1=medium, 2=high)

VAR 21: What is the level of sorghum harvest (or second most important staple) at time off PRA?
(0=low, 1=medium, 2=high)

VAR 22: What is the level of vegetable harvest at time off PRA?
(0=low, 1=medium, 2=high)

VAR 23: What is the level of overall food consumption at time of PRA?
(0=low, 1=medium, 2=high)

VAR 24: What is the level of childhood infections/illness at time of PRA?
(0=low, 1=medium, 2=high)

VAR 25: What is the level of women's infections/illness at time of PRA?
(0=low, 1=medium, 2=high)

VAR 26: What is the level of demand male labor at time of PRA?
(0=low, 1=medium, 2=high)

VAR 27: What is the level of demand female labor at time of PRA?
(0=low, 1=medium, 2=high)

APPENDIX 6

APPENDIX 6--GUIDELINES FOR ETHNOGRAPHIC CASE STUDIES

ALTERNATIVE INDICATORS OF FOOD AND NUTRITION SECURITY
Village and Household Case-Study Guide
Shirapur and Aurepalle

Jayashree Ramakrishna
October 1992

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1. **Objectives of the Study**

   Review of the project objectives and their relevance to the ethnographic study

   Examples

2. **Case-study Selection Guidelines**

   Criteria for selecting case study households

3. **Case-study Methodology Review**

4. **Note-taking and Data Management Guidelines**

5. **Example of expanded notes of a semi-structured interview**

6. **Sample schedule for First Ethnographic Visit**

I. GENERAL TOPICS FOR EXPLORATION

Recall the project objective:

To determine alternative indicators for food and nutrition insecurity.

To find this out we need to know what factors affect:

Food Availability: at the household level, what food is produced or procured, multiple factors that affect this

* **seasonality**- a major factor affecting food production influenced by such factors as rainfall, pests; availability of food-vegetables etc, price of food, employment opportunity to earn money to buy food, health status- eg., diarrhoea and malaria may be more common in the rainy season, skin diseases in the hot, dry season.

* income, sources of income- agriculture, salary, flow

* number of working adults, types of job, women's work home-based,

* family size and structure, stage in the family life cycle,

* educational status-men, women, children,

* land landownership- amount, quality, distribution, access to water,

* access to public food distribution,

* employment- seasonal, duration, type, under and unemployment

For detailed discussions on how each variable operates in different situations:

Table 3.2 on page 3.5 in "Identification and evaluation of Alternative Indicators of food and nutrition Security: Some Conceptual Issues and Analysis of Extant Data"

Appendix 1, A synthesis of the Broader Literature on Potential Indicators of for Food and Nutrition Security

Food Distribution within the household

who gets what? how much? when? Criteria for determining the above:

* food preferences, personal liking, values- quality foods, high and low status foods,

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*status within the family- earning member, gender, age, *physiological status- eg., pregnant, lactating, growing, aging;

*health status- diet during illness and convalescence

Nutritional Insecurity:

Factors other than food which makes a person nutritionally insecure, eg., health, physiological status

* special precautions taken to avert illness

* health care seeking- type of care, promptness, follow up

These are some factors gathered from literature that can guide the collection of ethnographic data. A review of these will give you a sense of the aspects of the socio-economic structure and culture that may affect food and nutritional security. The ethnographer's task is to recognize and gather information on the above types of factors, as in the beginning we do not know what element are important or how they relate to each other we need to gather general information on life in Shirapur. Then, specific factor may be viewed in context of this general picture. This will give us a better understanding of why people behave in a certain way, what motivates them, how they make decisions- who do they ask for advice, how do they evaluate it, do all members of the family participate. So, in a sense you are being guided to some extent by etic categories gathered from the literature, but retain the openness to discerning other factors by observing what people do, asking their views and opinions. This is the emic perspective

Let us take two illustrations from data collected by Neeta:

1. In Khandi village a woman said her store of paddy in the khanjara would last for 5 months. However, if it rained heavily the rice may become damp and smelly, if it is not too bad they cook it with spices that mask the smell. Otherwise they have to discard it.

Probe:

If this happens often? Does it happen if the khanjara is inadequate or if it rains in a certain season. Obtain estimate of how frequently this occurs in different community. (If this is a frequent occurrence, alternative food storage methods need to be devised, if not small scale food producers may face food shortages even when food production is adequate when there is rain during xxx period.)

2. When I visited the family around 10 am the man was sleeping. I enquired if he was unwell. The wife replied, he doesn't have mood to go to work. The youngest child xxxx had diarrhoea for xxxdays. It was crawling on the ground and it was not wearing any panties. At this time xxx year old xxxx, tried gain xxxx attention by pulling her sari, and started to say her older sister xxxx was hitting her with a stick. xxx slapped the child and told me these children are always asking me for food. Where shall I get it from? In the diet surveys the woman was able to identify the exact amount of food the family ate- 1/2 kg. On being questioned how she was able to estimate so accurately she said that she only cooked what she bought each day after her husband returned home with his wages.

> **Probe**- Did the man not get work often? Find out more about the food shortage, is this seasonal? Do they know ahead of time that they will face food shortage? How? What do they do to extend the food supply? Find employment? Find out about the child's diarrhoea, how long has it lasted? what does the mother think about it? What has been done so far- home remedies, medicines, doctor? What and how often is it fed? Ascertain reasons for these behaviors.

(This is an interesting case to follow up as it shows two processes, food shortage and hunger, and how the mother copes with the child's demands for food when none is available. How does the father react. In addition to food insecurity, the baby may face nutritional insecurity especially if the diarrhoea continues.)

III. REVIEW OF CASE STUDY METHODOLOGIES

Recall: Ethnography/Anthropology is based on the concept of culture.

CULTURE: an integrated whole
a complex set of interacting relationships
dynamic

Individuals, actions, behaviors, beliefs, values and attitudes can only be understood in the **context** of the whole. Many factors - social, political and economic - affect behaviors. A multi-disciplinary approach is needed to understand all the various factors which influence human behavior or beliefs.

Holistic research is mainly descriptive. It attempts to present a complete picture - to explain and to understand from the **perspective of the people.**

EMIC: the actor's frame of reference
what their categories are
what words, phrases or terminology they use

ETIC: Assumptions of the outsiders or researchers

Issues of **subjective bias**
validity
reliability

3.1. PARTICIPANT OBSERVATION

Participant Observation : Direct participation by a researcher in the daily life and day-to-day activities of a community.

Because of frequent interaction, the researcher becomes a "familiar" person to the villagers.

The Researcher prepares a systematic description from:

Direct Observations
Verbal Statements

Participant observation is low key, like having a natural conversation. Simply listen, do not affect others' conversation flow or behaviors.

While observing, note specific details.

Don't write **"dirty"**
"clean" Describe objectively
"well dressed"
"comfortable"

Counts
Estimates
Unobtrusive measures: eg. evidence of peels in the garbage
well worn path to the PHC

Participant Observation is a strategy that facilitates data gathering in the field, live in a place, participate and become a part of people's lives.

* It reduces reactivity - or a change in behaviour because of being studied.
* Gives insight into the culture, how to ask questions.
* Maximizes validity.
* Helps interpretation of data

Skills of a Participant Observer:

* Learning the language - local terms, idioms, and expressions.
* Become explicitly aware of the details; what appears to be mundane and common place.
* Improve recall - the details of events, conversations and situations.
* Be open, sensitive and receptive. Do not become blase.

3.2 UNSTRUCTURED and SEMI-STRUCTURED INTERVIEWS

UNSTRUCTURED and SEMI-STRUCTURED INTERVIEWS

	A	B	C	D
	x			
informal		semi-structured	formal	

A. **Conversation** unstructured interviews

B. **Unstructured** an interview based on a plan
flexible
minimum control over responses
open
interviewee determines terms and pace
active listening

C. **Semi-Structured** flexible
based on interview guide - topics to be covered and list of questions, with clear written instructions
flexible and follows leads
active listening

D. **Structured** identical schedules

Interview Conduct:

Introduction anonymity
confidentiality
desire to learn from them - their views and their observations

Let the informant lead
Maintain eye contact

Probing:

Silence
Pauses
Non-verbal gestures - nods
Repetition of their last words
Rephrasing
Ask for explanation/clarification
Ask about feelings

3.3. INTERVIEWS

Informal casual conversation

- introduce a few ethnographic questions.

- take an **emic** point of view - speak as they would to others in their cultural setting.

- use open-ended, descriptive questions, giving informant latitude to expand. "Tell me about a typical day." "Tell me what happened yesterday."

- identify key domains explanatory models for interviewing about illness: causes of illness taxonomy symptoms symptom progression, sources of treatment,assessment of care

- express interest through:

  non-verbal communication
  eye contact
  prompt probes or responses - "and", "then, what happened?", "I see.", "please explain"

-take notes on setting, observations of environment, non-verbal communications and methodology.

IV. PROBING: a pause, gesture or follow-up question, focussed on previous statement and designed to elicit further information.

Types of Probes:

* silence
* repeating previous statement
* non-verbal communication - nod, hand movement etc.
* neutral open-ended question, "and then ...?" or "How did you feel?"

AVOID leading questions
culturally sensitive questions in the beginning of the interview
interviewee fatigue, terminate the interview before the informant gets bored and restless

V. NOTES:

on setting
observations of the environment
non-verbal communication
methodology
key phrases and terms

VI. KEY INFORMANT INTERVIEWS:

obtains detailed in depth information from an expert. Most anthropologists develop a special long term relationship with their key informants.

Who are key informants?

They have special information because of their position in society- eg. the head man or shanbog, or because of training- eg. the traditional healer.

Qualities and abilities of good key informants:

- o willingness to communicate and cooperate
- o communication ability/articulate
- o impartiality
- o observant
- o reflective/analytical
- o culturally sensitive
- o ability to give concrete descriptions
- o good memory and recall time
- o a teacher with whom you have rapport
- o marginal people, those who straddle two cultures, or drop outs often make good key informants, but guard against their biases or dissatisfactions

Key Informant Interviewing:

Establish good rapport
Develop a good on-going relationship
Ask open-ended questions
Follow topic/interview guide
Follow new topics/issues/leads that open up
Explore related topics
Cross check interpretations

VII. NOTE TAKING: four types of notes

Field Jottings: rough notes, points, specific terms
Field Notes: expanded and edited jottings
Field Log: plan for fieldwork- observations and interviews
Field Diary: personal account including feelings/frustrations

Field Jottings

select observations and descriptions
memory aids- phrases, terms, abbreviated jottings in sequence
record of possible explanations and interpretations
record of context in which the conversation took place
physical environment, emotional condition, appearance
Behaviour
Note actual terms, phrases, sayings, idioms, proverbs in " "
Note researchers reactions in ( )

Field Notes

Transcribe field jottings into field notes as soon as possible, latest by the night of the interview
Retain the actual terms and flavor of the interview
Write all the details
Make two copies of the field notes, one for the researcher a and the other for the PI
Review notes and identify:
- ambiguities
- gaps
- further leads for questioning
- incorporate them in interview guide

Types of Field Notes
Methodological:

How methods work, what modifications were made
Good ideas for gathering data
Problems with data gathering
Descriptive: capture what is going on
Analytical Notes
Ideas about generalizations, trends

Importance of Language and Issues of Translation
Language gives important clues to how people think, what they believe, their ideas

IV. Guidelines for Note-taking and Data Management

Note-taking is critical in qualitative research. As we discussed in the training sessions there are:

Jotting:

Rough notes that you take during or soon after interview, observation or PRA exercise, these should include key words and phrases that will help to jog your memory. Use local terms whenever you think it conveys a concept or feeling better than the English equivalent or when you are not sure of the exact translations. These bits you can write in Marathi if it is quicker. As an ethnographer in the field you are a participant observer in many activities and events, be sure to jot notes.

Expanded notes:

Expand your notes as soon as possible. Before you do this, review all your jotting. Draw out an outline of the important issues covered in the session. Bring all the information related to that subject together. In case you forget something, or have an after thought, just indicate with a number where the piece goes in. In the notes I wrote up I followed a convention commonly followed by anthropologists: underline local terms and phrases, you can use " " for english words and phrases. Indicate probes in the margin or use a highlighter, this will help in review. Your thoughts, ideas and hunches can go in [] square brackets, you may want to use the usual brackets () in writing. Write your observations in methodology whenever it occurs to you, put brackets in color so that the typist can put it in a separate section at the end of that particular write-up.

Log Book:

As we discussed keep a log book with the left page for your schedule and the right page for what you do each day. This will help you plan your work. Even though you may not do all the things you planned, or in the sequence you planned, at any point you will know what you have to do. An ethnographer has to be self directed, by maintaining a log you can structure your time and work. It will also help you later in clearing doubts about your notes, such as, dates on which certain information was collected.

Data Management:

For each new interview write the basic demographic information- age, sex, education, occupation, marital status, and other relevant information like, landholding, number of children, type of family. If you interview the same person more than once, assign them an unique number, which the typist will also use.

Keep a separate book for each case-study family and key informant. Keep the first few pages for basic information, prepare a genealogy, write the cast of characters and relationships. Use people's names in the notes, it is less confusing. You will make a carbon copy for yourself, and hand the original to Kim.

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V. EXAMPLE OF EXPANDED NOTES OF A SEMI-STRUCTURED INTERVIEW

Interview with Raisa Begum of Khandi--August 1992

Khandi is situated on the Hyderabad and Pune National Highway which has heavy traffic. Some people were waiting under the tree for a bus and some men were at the tea stall. Some buffaloes were wandering on the road. A few shops were playing music and selling "Rakhies" for Rakhsa Bandan, a festival which commemorates the love between brothers and sisters.

The streets were wet, and the sidewalks had pools of muddy stagnant water. The drains were full and smelling awful, the paths inside the village were water logged. A small girl was helping me to locate a Hindi speaking household. While we were passing by a house with a pool of stagnant water with mosquito larvae (?) and green "tungi" (?) someone enquired about me. The girl replied, "Why are you bothered about her, see how many mosquitoes are here, how can you live here?" (I guess the lady did not hear). A little while later, I saw a man with a big sprayer and a container on his back pass by on the other side of the path. [I assume he sprays DDT in the houses].

Probe: How often he sprays? Do people use these services? What do they think about it? Interview him.

The girl took me to white colored, red tile roof house with a small platform in the front. I could hear a the sound of a small child reciting ABC. The pregnant woman who opened door looked as though she was resting on the bed which was in the same room. She welcomed me when she recalled having seen me in the village before. Raisa Begum was resting as she had just returned from her mother's house in Patencheru.

Raisa Begum (RB) who appeared to be around 20 years old is educated to 10 class. She is married to Sayed Miran Dattar is a contractor, he is quite busy as he gets one contract after another. He had a trucking business till 2 years ago; he gave it up after the truck had an accident and he could not pay the money back to "finance" (RB used many English words).

Probe: How the change in occupation affected their life-style? How did Sayed raise the money for their new business?

She has three children under six: Munwar, son (5 years), daughter, Sheema (4) who was doing her "homework" under RB's supervision, and Muzzafer (son 2) who also was with her. She is 5 months pregnant.

They own the house. The front room in which we sat measured approximately 12 x 25 ft (? large). A cot and a metal cupboard were placed on one side, on the other side there was a pile of 6 cement bags. In the middle there was a big dining table with 6 chair, beside that there was a dressing table with a big mirror. There was a TV in one corner. A few framed pictures with Arabic writing hung on the wall. She offered me a chair. When I preferred to sit on the stone-flagged floor, she laid a bed spread on the floor.

Munwar had gone to school at 9.30 am, they had returned from her mother's house at 8.30 after eating something, the children also had bread and tea when they arrived in Khandi. Previously her mother-in-law lived with her, now she has no help. She was able to rest at her mother's house, that is why she was feeling fine.

They eat roti, rice, dal and some vegetable every day, and meat three times a week. During winter and rainy season she drink tea. In summer, instead of tea, she drinks patla chanch-diluted butter milk often. In summer she does not get enough milk.

She finishes cooking breakfast and some of the housework a little after the time Munwar goes to school. She rests till 12,30, then she has to prepare lunch for husband who comes home around 1.00 pm. After lunch she washes the pots and pans, at 3.00 pm when the tap water flow she washes clothes. Soon after Munwar returns from school, she gives him food, and helps him with his studies. The it is time cook for the evening meal.

She does not like to go out and gossip, duniya bharke bhaten. She added that is why the muhallawalle think she is proud. She asked me is this correct? I just smiled. She continued-kuz padhne ke bad fiese ohi karneko achha nahi lagta- after some education one does not like to do the same thing.

Mazzafer started pulling at her sari, and gesturing to indicate he wanted to breast feed, she took him on her lap and fed him for a while. Then she told him to leave her alone, and distracted him by showing him the rat that was running under her bed.

RB says she always breast feed the youngest child till the new baby arrives. Then she dissuades them by saying "Nai, nai, yeh galiz hai, chi, chi," (no, it is dirty) or "chota papa hasenga" (the small baby will laugh). In her experience only this "would work," the child did not leave her alone even though had started taking some adult food. **Probe:** Ask her doctor how this affect her health. Ask her also how she or other older people think this may affect her health. [The spacing between each pregnancy is less than two years, she may be nutritionally insecure even though she has food security.]

Munwar was born in her mother's house, Sheema was born in her in-law's house, Muzzafer was born at her mother's and she is planning to return their for this pregnancy. All the deliveries were normal.

Probe: Did she deliver in the house?

There is no change in her work pattern during pregnancy, "log" - people (who?) say that if you work as usual till childbirth, labour and delivery will be easy. When she was in her in-law's house she did all the regular work- washing clothes, cleaning the house, and looking after the children. Her mother-in-law did not tell anything or stop her from working. She has to wash lots of clothes, it was difficult to sit down and do this in during last few months of her pregnancy. I worked a little, rested a little (thoda sona, thoda baithna). As an after thought she said as the children are young she does not get enough rest. Muzzafer is always after her (hamesha piche padta) for breast milk, sometimes she gets fed up (tang ati hun).

She feels less hungry from 3-4 months of pregnancy till childbirth. I enquired if this was because of nausea, she said she never had that problem. She said people say not to eat papaya. (Not clear whether she does not eat it because it is not available or because it is bad for her.)

When she went to her mother's house for the first delivery, she was not allowed to touch any type of work, only "khana and sona" (eat and sleep). But she remained "active'" she rode a Luna (moped) till the 8th month of her first pregnancy. All her pregnancies have been easy. Now she feels weak, tired and has pain in her legs now and them. Recently in her mother's place she climbed the guava tree to pluck the fruit. Her mother told her not do this again as Raisa is feeling weak this time. The first delivery seemed hard as she had never experienced that kind of pain, but now she knows it is "normal."

She stayed at her mother's house for 40 days after both her deliveries, and even when she delivered Sheema, her mother-in-law arrived when RB was 8 months and took charge till 40 days after delivery. After delivery she more hungry than usual. Even if she was very hungry her mother would not give her large quantities of food at one time. She had "pathla khana "liquid/semi-solid" frequently. Her mother also insisted that she eat on time.

For the first 3 days after childbirth she was given only warm milk and bread. From the 4th day she had a little roti with lots of ghee, tomato and okra curry and rice, but NO DAL. Occasionally she had kali mirch (black pepper) and ghee to prevent her from getting a cold. Along with her "less spicy" post-natal diet, she had garam garam ("hot hot") tender goat-meat soup every day (for 40 days). This "helps to increase breastmilk production." She had little green leafy vegetable like spinach, because "they" (who?) said, "if the mother eat too much of green, the baby will have green colored loose motions." **Probe**: Who said this? Her mother? What does she think?

The family elders name the baby from with a name chosen from the Kuran soon after its birth. After 40 days the ceremony for zuleme dalna - cradle ceremony, when the baby is put into the cradle for the first

time is performed. After this the mother can do "light" housework-cleaning and sweeping the floor.

> **Probe:** When can she resume "heavy" work? Her mother-in-law khud kam karthe the (willingly) helped her. When she went to her mother's for delivery her mother-in-law stayed at Khandi and looked after her family.

This time RB will take Sheema and Muzzafer to her mother's house. Munwar will stay in Khandi with her mother-in-law attend school. As Patencheru is close by he and Sayed can visit her frequently.

Chubby Sheema, well-kept Sheema wanted her mother's attention, Muzzafer started demanding breast feed. She tried to divert their attention by pointing out the big rat which continued to run up and down under her bed. RB could not pacify them, she gave them some money asked them to buy a snack at a shop. I asked her where the shop was and she replied she did not know.

> (**Probe:** Does she go out in village on her own?) She insisted that they wear chappals before they go out. When they returned with some salted groundnuts she inspected them and picked out the spoilt ones.

Sheema lives with her grandmother and attends an Urdu school at Patancheru since last year. "Aurat bacchen ko kya karna english padhke? Mai tuiton lagwa dungi." (Two contradictory statements) What will a female child do with English? She thinks the daughters education is important because female children need to have "good position." She complained that the atmosphere in Khandi school was not good, many children use galliya- curse words and vulgarisms, which she did not want her daughter to use such words. So, she is sending her to a "good" school. On the other hand, Munwar can go to English medium school in Khandi. She hoped that when he grew up he would be well behaved.

RB visits her mother every 15 days and checks on Sheema's study. Sheema had come with her to Khandi this time because she needed to buy a uniform for her from Sangareddy for 15 August (Independence Day).

As I was about to leave she offered some sweets that she had brought back from her mother's. She served them on glass plates on a stainless steel tray. Muzzafer demanded a glass plate, RB said he wanted it because it looked new and special to him.

She said it was rather joyful to talk to me, she did not go t visit anyone and this was a good "time pass." She invited me to return if I had anymore "writing" to do. [Although RB appeared tired and she was distracted by her children she was warm and responsive.]

[She seems to be bringing up her children well, I wonder if this because she is educated or because of her socio-economic status. Probes to find this out.]

{Neeta: Please read this and see whether I have retained not only the contents but also the spirit of your interview. I have tried to keep to the narrative format while consolidating information along topic heads. The notes you have made to yourself at the end of the interview are good.}

APPENDIX 7

Appendix 7—List of indicators[a]

DEMOGRAPHY[b]

Dummy variables

Household located in Aurepalle
Household located in Dokur
Household located in Kanzara
Household located in Shirapur
Female-headed household

Continuous variables

Dependency ratio 1: (Number of children + number of preschoolers) / total number in household
Dependency ratio 2: Number of preschoolers / total number in household
Dependency ratio 3: Number of disabled / total number in household
Dependency ratio 4: (Number of children + number of preschoolers) / (total number in household - number of preschoolers)
Dependency ratio 5: Number of preschoolers / (total number in household - number of preschoolers)
Dependency ratio 6: Number of disabled / (total number in household - number of preschoolers)
Dependency ratio 7: (Number of children + number of preschoolers) / (total number in household - number of disabled)
Dependency ratio 8: Number of preschoolers / (total number in household - number of disabled)
Dependency ratio 9: Number of disabled / total number in household - number of disabled)
Dependency ratio 10: Household size / (total number in household - number of disabled)
Average age of household members in years
Household size
Number of adults
Number of adult females
Number of adult males
Number of schoolage children
Number of female schoolage children
Number of male schoolage children
Number of preschoolers
Number of female preschoolers
Number of male preschoolers
Number of females
Number of males
Number of disabled
Number of disabled females
Number of disabled males
Number of elderly
Number of elderly females
Number of elderly males

(continued)

[a] Data on these indicators were collected on three rounds: r1, r2, r3. For continuous variables, the overlapped analysis was performed for each variable, using two selected cutoffs referred to in the text as "high" or "low" as in "high dependency ratio 1/low dependency ratio 1" or in the case of food consumption, "frequent consumption of rice/infrequent consumption of rice." Combinations of selected indices were also analyzed.

[b] Adults are defined as those 15 years or older. School-aged children are those from 6 years to under 15 years old. Preschoolers are those under 6 years old. The elderly are defined as those 55 years or older.

Appendix 7 (continued)

DEMOGRAPHY (continued)

Continuous variables (continued)

Number of females who are separated, divorced or widowed
Number of females who are separated, divorced or widowed
Number of widows
Number of widowers
Percent of household members that are children
Percent of household members that are preschoolers
Percent of household members that are disabled
Percent of household members that are elderly
Percent of household members that are female and disabled
Percent of household members that are male and disabled
Percent of household members that are female and elderly
Percent of household members that are male and elderly

MIGRATION

Dummy variables

Household has 1 or more members who migrated for employment reasons
Household has 1 or more members who migrated for health reasons
Household has 1 or more members who migrated for education reasons
Household has 1 or more migrants sending out money
Household receives money from 1 or more migrants
At least 1 migrant lives in the household

Continuous variables

Number of migrants who leave for employment reasons
Number of migrants who leave for health reasons
Number of migrants who leave for education reasons
Number of migrants sending money
Number of migrants from whom household receives money
Number of migrants in the household

HOUSEHOLD CHARACTERISTICS

Dummy variables

Household has no electricity
Household has no home vegetable garden
Livestock allowed inside the household
Household uses poor quality water (community well or community tap) to bathe
Household has thatch roof
Household has thatch or mud walls
Household gets water only from a poor quality source (community well or community tap)
Household does not use improved cooking fuel
Household uses ordinary chulah to cook
Household dumps garbage in compound

Continuous variables

Number of rooms in the household
Sum of ten low status household characteristics
Number of rooms per capita
Number of houses owned
Roofed area in square meters

(continued)

Appendix 7 (continued)

LAND

Dummy variables

Household bought land in the past 4 months
Household bought land in the past year
Household sold land in the past 4 months
Household sold land in the past year
Household has no land
Household has access to poor quality land with poor soil or no irrigation
Household has access to mediocre qality land with mediocre quality soil or irrigation
Household owns poor quality land with poor soil or no irrigation
Household owns good land with good soil or irrigation

Continuous variables

Per capita sum of cultivated land (mean of 3 rounds)
Per capita area of agricultural plots controlled by the household (mean of 3 rounds)
Per capita number of agricultural plots listed by the household (mean of 3 rounds)
Percentage of cultivated land (mean of 3 rounds)
Percentage of fallow land (mean of 3 rounds)
Number of agricultural plots owned by the household
Number of agricultural plots listed by the household
Total area of all plots
Total cultivable area
Number of plots that are irrigable
Number of plots with deep red/black soil
Number of fields crossed, sum all plots
Per capita sum of cultivated land
Per capita area of agricultural plots controlled by the household
Per capita number of agricultural plots controlled by the household
Percentage of cultivated land
Percentage of fallow land
Total fallowed area

LIVESTOCK

Dummy variables

Household owns at least 1 large animal
Household owns at least 1 medium animal
Household owns at least 1 small animal
Household bought at least 1 large animal
Household bought at least 1 medium animal
Household bought at least 1 small animal
At least 1 large animal died
At least 1 medium animal died
At least 1 small animal died
At least 1 large animal sold
At least 1 medium animal sold
At least 1 small animal sold

Continuous variables

Number of bullocks owned
Number of buffaloes owned
Number of horses owned

(continued)

Appendix 7 (continued)

LIVESTOCK (continued)

Continuous variables (continued)

- Number of donkeys owned
- Number of goats owned
- Number of sheep owned
- Number of pigs owned
- Number of poultry owned
- Number of large animals owned
- Number of medium animals owned
- Number of small animals owned
- Number of large animals sold
- Number of medium animals sold
- Number of small animals sold
- Number of large animals which died
- Number of medium animals which died
- Number of small animals which died
- Number of large animals bought
- Number of medium animals bought
- Number of small animals bought

INCOME

Continuous variables

- Number of household members with more than 1 income activity
- Number of household members who are attached laborers[c]
- Number of household members who are agricultural laborers[c]
- Number of household members who are casual laborers[c]
- Number of household members who are farmers[c]
- Number of household members who are salaried workers[c]
- Number of household members with a caste occupation[c]
- Number of household members who do agricultural labor
- Number of household members who do casual labor
- Number of household members who have atleast 1 job
- Number of unique income activities in the household

TRANSFERS

Dummy variables

- Household has money savings
- Household gave cash/in-kind gift
- Household gave cash/in-kind dowry
- Household gave cash/in-kind loan
- Household received cash/in-kind gift
- Household received cash/in-kind dowry
- Household received cash/in-kind inheritance
- Household received cash/in-kind government transfer
- Household paid out cash transfer in the last 4 months
- Household paid out in-kind transfer in the last 4 months
- Household paid out mixed transfer in the last 4 months
- Household received cash transfer in the last 4 months
- Household received in-kind transfer in the last 4 months

(continued)

[c] Primary occupation.

Appendix 7 (continued)

TRANSFERS (continued)

Dummy variables (continued)

Household received mixed transfer in the last 4 months
Household paid out cash transfer in the last month
Household paid out in-kind transfer in the last month
Household paid out mixed transfer in the last month
Household received cash transfer in the last month
Household received in-kind transfer in the last month
Household received mixed transfer in the last month

Continuous variables

Number of different types of cash transfers-in in the last month
Number of different types of in-kind transfers-in in the last month
Number of different types of mixed transfers-in in the last month
Number of different types of cash transfers-in in the last 4 months
Number of different types of in-kind transfers-in in the last 4 months
Number of different types of mixed transfers-in in the last 4 months
Number of different types of cash transfers-out in the last month
Number of different types of in-kind transfers-out in the last month
Number of different types of mixed transfers-out in the last month
Number of different types of cash transfers-out in the last 4 months
Number of different types of in-kind transfers-out in the last 4 months
Number of different types of mixed transfers-out in the last 4 months

LOANS

Dummy variables

Household received at least 1 loan in the last 4 months
Household received at least 1 cash loan in the last 4 months
Household received at least 1 in-kind loan in the last 4 months
Household received at least 1 formal loan in the last 4 months
Household received at least 1 informal loan in the last 4 months
Household received at least 1 loan from relatives in the last 4 months
Household received at least 1 loan from moneylender in the last 4 months (Yes
Household received at least 1 loan for food in the last 4 months
Household received at least 1 loan for consumption goods in the last 4 months
Household received at least 1 loan for dowry in the last 4 months
Household received at least 1 loan for health in the last 4 months
Household received at least 1 loan for production in the last 4 months
Household received at least 1 loan for construction in the last 4 months

Continuous variables

Number of loan sources in the last 4 months
Number of sources of cash loans in the last 4 months
Number of source of in-kind loans in the last 4 months
Number of formal loan sources in the last 4 months
Number of informal loan sources in the last 4 months
Number of loans received from relatives in the last 4 months
Number of loans received from moneylenders in the last 4 months
Number of sources of food loans in the last 4 months
Number of sources of consumption goods loans in the last 4 months
Number of sources of dowry loans in the last 4 months

(continued)

Appendix 7 (continued)

LOANS (continued)

Continuous variables (continued)

Number of sources of health loans in the last 4 months
Number of sources of production loans in the last 4 months
Number of sources of construction loans in the last 4 months

TOTAL/FOOD EXPENDITURES

Dummy variables

Household purchased rationed rice
Household purchased rice/jowar daily/weekly
Household took at least 1 grain loan

Continuous variables

Per capita total expenditures (mean of 3 rounds)
Per capita food expenditure (mean of 3 rounds)
Food share of total expenditures (mean of 3 rounds)
Total food expenditures per week
Total expenditures on purchased foods per week
Total value of foods received in-kind per week
Number of foods purchased
Number of foods consumed from own production and received in-kind
Number of foods purchased daily
Number of foods purchased weekly
Number of foods purchased fortnightly
Number of foods purchased monthly
Number of foods purchased by season
Number of foods purchased yearly
Number of foods consumed from own production
Number of foods consumed from in-kind wages
Number of foods consumed from in-kind food gifts
Number of foods consumed from sharecropping
Number of foods consumed from foodstocks
Number of foods consumed from in-kind food loans
Number of foods gathered/scavenged
Quantity of grains purchased daily/weekly
Quantity of grains taken on in-kind loans
Value of own production consumed weekly
Value of in-kind wages weekly
Value of in-kind food gifts consumed weekly
Value of sharecropping consumed weekly
Value of foodstocks consumed weekly
Value of in-kind food loans consumed weekly
Percentage of total number of foods purchased daily
Percentage of food consumed from own production
Percentage of food consumed from in-kind wages
Percentage of food consumed from food gifts
Percentage of food consumed from sharecropping
Percentage of food consumed from food stocks
Percentage of food consumed from in-kind food loans
Number of in-kind foods / Number of purchased foods

(continued)

Appendix 7 (continued)

NONFOOD EXPENDITURES

Dummy variables

- Household performed marriage
- Household spent on house repairs
- Household performed ceremony or family event
- Household gave gifts
- Household bought jewelry

Continuous variables

- Total weekly expenditures on nonfoods
- Number of nonfoods purchased daily
- Number of nonfoods purchased weekly
- Number of nonfoods purchased fortnightly
- Number of nonfoods purchased monthly
- Number of nonfoods purchased yearly
- Number of nonfoods purchased by season
- Number of nonfoods purchased

FREQUENCY OF FOOD CONSUMPTION

Continuous variables

- Frequency of consumption of rice
- Frequency of consumption of finger millet
- Frequency of consumption of sorghum
- Frequency of consumption of pearl millet
- Frequency of consumption of buns/bread
- Frequency of consumption of biscuits
- Frequency of consumption of wheat
- Frequency of consumption of pulses
- Frequency of consumption of nuts/oilseed
- Frequency of consumption of green leafy vegetables
- Frequency of consumption of roots/tubers
- Frequency of consumption of other vegetables
- Frequency of consumption of fruits
- Frequency of consumption of tea with milk
- Frequency of consumption of milk/milk products
- Frequency of consumption of fats or oils
- Frequency of consumption of sugar or jaggery
- Frequency of consumption of meat/fish
- Frequency of consumption of eggs

DIET

Continuous variables

- Number of servings per recipe
- Number of foods per recipe
- Number of ingredients per recipe
- Number of leftovers per recipe
- Number of recipes
- Number of unique food items

(continued)

Appendix 7 (continued)

MORBIDITY

Dummy variables

At least 1 preschooler sick in the last 14 days
At least 1 preschooler sick with 3 illness symptoms in the last 14 days
At least 1 preschooler sick with diarrhea in the last 14 days
At least 1 woman sick in the last 14 days
At least 1 woman sick with 3 illness symptoms in the last 14 days
At least 1 woman sick with gynecological problems in the last 14 days

Continuous variables

Number of women who were sick in the last 7 days
Number of women who were sick in the last 14 days
Number of women who were sick with 3 illness symptoms in the last 7 days
Number of women who were sick with 3 illness symptoms in the last 14 days
Number of women who were sick with gynecological problems in the last 7 days
Number of women who were sick with gynecological problems in the last 14 days
Number of preschoolers who were sick in the last 7 days
Number of preschoolers who were sick in the last 14 days
Number of preschoolers who were sick with 3 symptoms in the last 7 days
Number of preschoolers who were sick with 3 symptoms in the last 14 days
Number of preschoolers who were sick with diarrhea in the last 7 days
Number of preschoolers who were sick with diarrhea in the last 14 days

CASTE

Forward caste
Backward caste
Scheduled caste