

COLLABORATIVE RESEARCH SUPPORT PROGRAM ON INTAKE AND FUNCTION

Fifth Quarterly Report  
(September 1 to November 30, 1982)

Functional Implications of Malnutrition CRSP)

Project No. 931-1309

## Fifth Quarterly Report

During this second year of the Nutrition CRSP, substantial progress has been reported in the implementation of Phase I activities. In all projects preliminary work in the field has taken place--the selection of communities, the collection of preliminary ethnographic and demographic data, and the testing of instruments. Concurrently, continuing work on the research design for the Phase II data collection has involved the Management Entity and the Co-Principal Investigators. Planning for data management and analytical activities has also been carried out in Berkeley and in the U.S. and overseas institutions.

In November, a major conference of the Nutrition CRSP took place in Virginia, arranged by the Management Entity and involving all Principal Investigators from overseas and from the U.S. institutions. The major objective of this meeting was the completion of the written report for submission to the External Evaluation Panel for their January meeting. A second objective, the conduct of annual business of the Scientific Coordination Board, the Finance Group, and the Institutional Council, was also accomplished at that meeting. Design decisions taken at that time were incorporated into the report which was completed in mid-December.

With the completion and execution in mid-November of the inter-campus agreement between the University of California, Management Entity, and UCLA, all of the first-tier agreements of the CRSP were finally completed. All but one of the sub-contracts between U.S. and overseas institutions are now complete and work has been carried out in the field by all projects.

Even though the UCLA-Nairobi agreement has still not been completed, due to political disturbances in Kenya and the closing of the University of Nairobi, work in the Kenya project has not been seriously delayed.

In August and early September, staff recruitment and training began in the Embu district which was selected for the study. The census and survey of households was undertaken. Data on anthropometry, morbidity, and reproduction were collected on pre-coded forms, corrected and entered on discs by the Kenyan field team. At the same time, these data were sent to UCLA, were key-punched and analyzed during November.

The Egypt Project has been able to proceed smoothly into the field after the signing of agreements between Purdue and the Institute of Nutrition in Cairo on August 31, 1982. U.S. Co-Principal Investigators visited the field, meeting with Principal Investigator Dr. Osman Galal, and the staff of the Nutrition Institute in Cairo and rapidly thereafter carrying out community selection, census, and other surveys of the selected community. With the selection of Kalama as the field site, Phase I field work began and preliminary data were collected on anthropometry of preschool and school-age children, food intake variability, community descriptions, and preliminary morbidity surveys. A field director was appointed and began work at the Nutrition Institute in Cairo, in early October.

The Mexico Project, which had been able to establish field work during the Spring of 1982, accomplished the collection and preliminary analysis of data in a pilot study conducted in San Francisco, Solis, a small community in the Solis Valley. Demographic, dietary intake, anthropometric, socio-economic, reproduction data were collected, a study of the activity patterns of 24 women carried out, and a preliminary battery of cognitive tests pretested with 21 children. Data were transferred from the field to the Institute of Nutrition in Mexico City, tapes copied and forwarded to the University of Connecticut and the Management Entity in Berkeley.

Difficulties were experienced in the procurement of equipment for the Mexico Project due to the Mexican government's restrictions of externally produced equipment and the AID requirement that equipment be U.S. manufactured and from a U.S. source. A request to waive AID restrictions on cost-shares so that equipment for Mexico could be bought in the U.S. was not resolved. These and other related matters were discussed at the Institutional Council meetings in Virginia on November 11.

Management Entity organized the November meeting of the Scientific Coordination Board in Airlie, Virginia from November 4 to November 12, and continued in Washington, D.C. from November 12 to 16. At these meetings, investigators from all the institutions represented in the Nutrition CRSP reported on their field work and the results of their preliminary analyses. With the knowledge and experience of the co-investigators in the three projects, group discussions were focussed on the modification of the interim design proposed in June, 1982. Intense discussions, held over the many days of the meetings, sought to bring together the multi-dimensional points of view encompassed in the CRSP. Out of this meeting came some portions of the report for the External Evaluation Panel's consideration, although the cohesive plan was not yet complete. Individual members of the group were then given assignments to complete their work by the first week in December and to forward their contributions to Berkeley for assembling as a document. Since complete consensus was not reached on the research plan at that time, and since there were important parts of the work still incomplete, there was absent the group discussion so desirable for collaborative work. This problem was recognized at the time as potentially serious, but because of the obligations of research and teaching and overseas field commitments, it was necessary to adjourn the meeting without complete resolution of all important issues. The minutes of the meeting are included as an appendix to this quarterly report.

During that time, a meeting of the Institutional Council and the Finance Group occupied a full day of discussions. Members of the Institutional Council were very helpful in suggesting alternatives for solving organizational problems within and between the institutions represented in the CRSP. It was agreed that members of the Institutional Council should be kept informed of the program's activities on a continuing basis.

Data management activities in Berkeley consisted of the development of procedures to be carried out by all of the collaborating projects. The Berkeley Data Manager provided leadership in organizing a meeting of the U.S. and overseas representatives of the data management teams which took place in early December. Because of the availability of a data management system (SAS) in each of the projects, the data manager is able to plan for parallel data management activities across projects. By coordinating activities in this manner, the processes of quality control and analysis will be greatly enhanced, simplified, and made cost-effective.

Members of the Management Entity were able to keep in touch with the projects with a modest amount of additional travel expense. Drs. Calloway and Beaton, while attending other meetings in Mexico City, were able to visit the Mexico project for discussions with the Principal Investigator and members of his staff. The Deputy Director attended a meeting of the three collaborating U.S. institutions of the Egypt project in Chicago in October where final design was discussed. The Deputy Director and Berkeley Data Manager met in Los Angeles with UCLA staff for the purpose of discussing the Kenya project and data management plans.

Continuing activities by the Management Entity, by the Project Principal Investigator, Doris Calloway, and the Deputy Director, Judith Balderston, and Consultant George Beaton, have dealt with issues of the detailed research design and implementation. It has been the responsibility of the Management Entity to guide the course of research design with the involvement of the projects. In order to do this, George Beaton has continued to assist Drs. Calloway and Balderston in the preparation of reports and agendas for the project representatives' consideration. This has, on the whole, been a difficult but very important process. Because of the involvement of so many investigators from such a variety of academic disciplines, the process has required considerable networking activity by the Management Entity office in the attempt to keep collaboration among the projects and with the management workable.

A report on "Policy Implications and the Nutrition CRSP" was written by Dr. Judith Geist in consultation with Professor Carl Rosberg, Co-Program Administrator. This report deals with the issues of public policy which are closely related to research areas of the CRSP. The report is being submitted to AID for circulation.

The Management Entity office has replaced the former Business Manager, Lin Schlyer who resigned in November, with Katherine Condon. Ms. Condon brings to this position a great deal of experience within the University of California where she has worked on contracts and grants, and in several positions involving financial planning in organized research units in academic departments.

Other work of the Management Entity that continues and takes

considerable guidance are equipment approvals and travel arrangements. It has been necessary to review with Thomas Cook the contract for travel for the CRSP because of dissatisfaction with their services at all offices. A meeting with the Oakland Office Manager and the Bay Area Manager of Thomas Cook proved useful in airing these concerns. Because of the advantage to the CRSP in being able to exempt travel costs from indirect cost assessment for all costs in excess of \$25,000 (already spent under subcontract with Thomas Cook) we henceforth shall save 31% of all travel costs if we continue with Thomas Cook. It was therefore decided that we would attempt to improve their service if at all possible.

It is expected that the University of California will very shortly sign a contract with an independent audit firm, Deloitte, Haskins & Sells, for audit of the accounts of the overseas institutions participating in the CRSP. This firm is the auditor for the Regents of UC and has recently conducted an audit for a CRSP project administered at UC Davis. The audit will cover all activities through February 28, 1983 and the audit report is expected by May 1, 1983.

Protocols for the protection of human subjects are currently being updated by U.S. PI's for Phase II clearances. Phase I approvals from participating institutions are being incorporated into a report to the Berkeley campus committee for the Protection of Human Subjects.

As appendices to this summary statement are minutes of the Washington and Virginia meetings and quarterly reports of the separate projects. Also included are reports of preliminary surveys from each of the projects.

Minutes of Nutrition CRSP  
Meeting of the Scientific Coordination Board  
November 5 to 12, 1982  
Airlie House, Airlie, Virginia

Present: L. Allen\* G. Harrison\* Alphonso Mata\* R. Gorsky  
Nimrod Bwibo\* N. Jerome C. Neumann\*  
Osman Galal\* A. Kirksey G. Pelto\*

J. Balderston G. Beaton D. Calloway

Observer: S. Kahn

(\*Voting Members of the SCB)

Meetings of the Scientific Coordination Board and of the Institutional Council and Finance Group took place at Airlie House in Airlie, Virginia during the period November 5 to 12 and were continued informally in Washington, D.C. on November 13 to 16, when working parties continued to meet to write reports. The main objective of the meeting was to complete the written report for submission to the External Evaluation Panel in early 1983 and to carry out other continuing organizational activities of the Nutrition CRSP. The meeting agenda is attached.

On the first day, November 5, discussion of meeting organization took place. The role of the external evaluation as reviewers and advisors of the CRSP's was discussed. The Nutrition CRSP's External Evaluation Panel will examine the proposed plan and make any necessary recommendations for changes. AID will make decisions based on the Panel's advice. The composition of the panel is now complete with approval by AID of Richard Adams, T.N. Srinivasan, and Alice Whittemore.

Project reports of Phase I activities of the three projects were circulated, shared, and discussed. Oral presentations by the three projects' Principal Investigators took most of the first day's meeting. Full written reports are available.

On the second day, November 6, sharing of project reports continued in greater detail. Dr. Osman Galal and Egypt Project PI Gail Harrison, presented a detailed report of their project's work to date. Pre-Phase I activities in which nutritional status information has been obtained was presented as well as full discussion of the community selection which concluded in the selection of the village Kalama. A lengthy written report was circulated and presents details of Phase I activities. Logistical support from the Nutrition Institute is excellent, families appear to be receptive, and authorities in the community are positive.

The Mexico project report was given by Lindsay Allen, Gretel Pelto, and Alphonso Mata who is the field director and who represented Dr. Chavez

at this meeting. The report included result of extensive surveys of the communities comprising the valley of Solis. A large pilot study was carried out to test the methods to be used in Phase II. The Mexico project has tried out the "short term recall" method of food intake on 23 families for six days per family. Activity patterns of the female heads of households and cognition tests have been given. Detailed results of these surveys are contained in the written report of the Mexico project. Some data from the preliminary surveys has been put on the IBM computer in Mexico City and some is at the University of Connecticut.

A report on the status of the Kenya Project was given by Charlotte Neumann and Nimrod Bwibo. Extensive field work has already taken place; a basic census has been done with education, language, morbidity, anthropometry surveys already carried out on mothers and pre-school children. Hemoglobin data and information on malaria have been collected. Anthropometry has included physical inspection for gross signs of malnutrition. A pre-pilot on time allocation and activities has been carried out. Some observations on resting metabolic rate have been done. A food intake recall has been carried out. Since no real villages are found in this section of Kenya, an area about 10 km long and 6 km wide has been chosen in an area on the slopes of Mt. Kenya about 100 miles from Nairobi.

All field staff has had to be trained by staff members who have been in Kenya for several months. The biggest problem is the measurement of foods since mothers do not have good ideas of quantity. Although types of foods are similar, recipes differ between households and individual intake will be very difficult because of use of the common pot. All fevers are called malaria but malaria is actually uncommon. Alcoholic intake may interfere with caloric count since the local brew is difficult to measure and is officially outlawed. A limited pilot food intake study was made using seven day recall in an area outside the study. Anthropometric measurements for mothers and children showed the existence of severe to mild malnutrition.

On Sunday, November 7, with all members present, a formal business meeting was convened. One representative of each U.S. project and one from each overseas project plus one social scientist constitute the voting membership of the SCB. Representatives of the Management Entity are ex-officio members of the SCB and therefore do not vote. After discussions on whether the chairmanship would be rotating or permanent, which were not resolved, George Beaton was elected chairman of this meeting unanimously. Judith Balderston will serve as corresponding secretary.

The matter of the change of Principal Investigators for the Kenya project was presented by Charlotte Neumann. Since UC Berkeley and UCLA are combined as a team, it was planned for the two campuses to have co-Principal Investigators, Doris Calloway was originally to have been the Berkeley Principal Investigator, and then was to have been replaced by Rosemarie Oswald who fell ill. Janet King then became Acting Co-PI for most of the first year. After very active involvement with the TAG on Reproduction during the Spring, 1982, Janet King felt it necessary to resign as Acting Co-PI in July, 1982. Charlotte Neumann emphasized that the Kenya Project is a two-campus team and must have a Berkeley Co-PI. Many people have been considered but no suitable person has been available until

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Robin Gorsky's appointment to a tenure track position in the School of Public Health. Robin Gorsky had been very active in earlier phases of the CRSP and has done important, closely related work for her dissertation. Although she lacks overseas experience, her other experience and interest would be very valuable. Charlotte Neumann considers that she would be an enormously helpful partner.

It was moved by Charlotte Neumann and seconded by Gail Harrison that Robin Gorsky be made Co-PI for the Berkeley component of the Kenya project. The motion carried with five votes in favor, one opposed, and one abstention. It was also moved to thanked Janet King for her fine and generous contributions to the CRSP and to welcome her continued interest in our work.

Discussion of the research design continued for the remainder of the meetings at Airline House. The agenda was altered and writing tasks assigned for the completion of work within the week. Based on the June interim design, the schedule of measurements proposed earlier was reexamined in order to propose which measures could be dropped and which ones added. Proposals for measures to be deleted included: food inventory, test weighing of milk, analysis of breast milk samples, and the examination of tonsil size. Also, measures of saliva and tears on adults was discussed since there does not appear to be agreement among those interested in immunology on the required frequency for these measures. The frequency and scope of economic questionnaire was also discussed and it was proposed that this be reduced in scale.

It was recommended that blood drawing every six months be added to the core design. Some members urged that T-cells are necessary for the core design since they provide good explanatory information for immunology; other members questioned whether we are not more interested in morbidity and mortality. In Egypt it may not be possible to take blood on all subjects and therefore it may be necessary to put these measures in non-core. In Mexico it is possible to take blood on some subjects but not on everyone. In Kenya it will be possible with reduced volume.

Other topics discussed for including in core were: additional measures of fat folds, and leg circumference as an indicator of nutritional status. Full discussion of the use of ergometer protocols using a bicycle at sub-max for adults (although this may be a problem since bicycles are not ridden in Mexico and it was proposed instead that a tread mill or step test be employed). Discussion concerning why projects want to measure work capacity, and what research questions will be answered followed with members of all projects committed to trying some form of capacity measurements. Cognitive tests were discussed and it was proposed to add some scales of the Brazelton, the WAIS, and Ravens Matrices. Pregnancy tests on women who have missed a menstrual period, skeletal age assessment (for non-core), tooth eruption, bone mineral density as a sensitive and accurate measure of bone mineral content were also recommended.

The afternoon session was concluded with a short discussion of a suggested analytical model presented by Judith Balderston. The objective of this model was to focus attention on how components of the study interrelate

as parts of a system and how the choice of subjects and variables needs to be made with the system in mind. A lively discussion followed on how subjects interrelate thereby making the analytical model three-dimensional.

At the Sunday evening session, the question of which children should be included in the sample was explored. Gretel Pelto spoke to the inclusion of 8-10 year olds as the result of her work in the pilot study in Mexico. In Solis it appeared that anthropometry at this age shows interesting sensitivities to differences in diet. For this age it is easy to do cognitive testing and information on school performance and other activities is easy to gather. From the Mexico preliminary survey, 8-10 year olds appear to be a greater risk in households with less food.

Discussion of sampling strategies took place. Much more information on demographic profiles of the three communities will be needed before we can decide on sampling plans.

Lindsay Allen proposed that since accurate breast milk measures are difficult, the infant will need to be dropped. Food intake aside from milk will be available and we would not need to give up information on the mother. But since lactation energy expenditure is not possible and the energy balance for lactating mothers would not be feasible, twelve hour weighings cannot be done, then is pregnancy any longer a major variable for this study? A lively discussion followed.

The issue of whether adult male intake will be available for those males who migrate to jobs raised the question of how to include them in the study. This was not resolved.

On Monday, November 8, there was a review of the purposes of the CRSP and a proposal by each project on the integrated design. Gail Harrison, speaking on behalf of the Egypt project reminded the group that this project will provide more complete food intake data than any similar project; this project will give a microdynamic appreciation of how the household operates including its coping strategies; and the possibility of generalization of results because of the replication of the core design in three settings. Gail Harrison also presented a diagram of the relationships between parts of the study as viewed by the representatives of the Egypt project. Osman Galal speaking on policy questions pointed out that there will not necessarily be uniformity in the way the project is looked at in each country. From the Egyptian point of view for example, the effect of the project may be as a model of interventions; the Egyptian government would have special interests in how agricultural productivity would be affected by improved intake.

The Kenya project proposed that "the purpose of the CRSP is to examine the dynamic interactive effects of mild-to-moderate deficits in energy intake on human function, biological and behavioral, as it pertains to households."

The Mexico project presented a diagrammatic scheme by which food intake is related to individual function terms of growth, immunology, cognition, reproduction, and work capacity. These individual functions are then shown to relate to household function in terms of disease, social interactions, learning and education, and productivity, all aspects of "quality of life."

Considerable discussion followed after the presentation of these alternative frameworks. It was the apparent consensus that the household is of central interest to the CRSP. In making decisions for the final design it will be necessary to agree on who must be studied, what must be measured, and what else can be studied on whom.

Following the Mexico project's framework, discussion followed on what should be studied for the household and how. We shall summarize briefly the discussion that followed.

For Disease/Health/Morbidity: A household index of morbidity will be computed from the individual member's morbidity. All household members will be surveyed for trauma, frequency, duration, severity, and degree of debilitation. Costs of health care to the household and the amount of time lost from productive activities due to illness or physically handicapping disorders will also need to be known.

For food intake of the household, we will need to know the sum of intakes of all members or of some other measure of food brought into the household. An index of nutritional status of the household will be found by summing over individuals and computing scales by age and sex.

Morbidity measures of households will be found from individual member's history; additional measures of sanitation, vectors, immunology, health care, and immunization will also be collected for the household.

Learning and education measures will consist of measures of mother-infant language, school attendance and performance, literacy, numbracy, problem solving for all individuals in the household; these individual scores will be combined into household indexes. It will also be desirable to have information on typical schooling costs for each place.

Social performance measures for the household will include task allocation, decision-making, stress response, and the use of resources. Other measures that would consist of the sum of individual member's activities would be the involvement in social activities, household improvement activities, and religious involvement.

Measures of economic production would include time allocation, the use of resources for production and consumption, labor allocation, salary generated, food production, storage, marketing.

Discussion of how to measure food intake included methods to be used (a combination of recall, observation, and weighing for all household members). Phase I activities of all three projects were very important in providing data and field experience for the proposed methods.

The written report on Food Intake appearing as an Annex II to the report to the EEP contains the results of these discussions. It was decided that an overall plan for collection of food intake data will have to be modified for use in each place as food distribution within the household and the timing of meals differs markedly among the three field sites. Methods of validation and training were discussed and it was agreed that validation would include the rotation of interviewers, continuing analysis of variance for testing interviewer and day variability.

The reduction of food intake data to composition data was also discussed. Sam Kahn proposed to find out who would do food analysis including dietary fiber and trace elements. It is possible that this can be done by the USDA or by FDA. Food analytical work is simple in Mexico but very difficult in Kenya. Compositional data will be stored by all projects with the computation of nutrients and coded food and nutrient data to be sent to Berkeley. Samples will need to be checked across laboratories.

On November 9 criteria for household selection were discussed at length. Questions of how households would be sampled, what classes of subjects would be of greater interest, and what attrition would be expected were explored in detail. Various methods of sampling were proposed including random sampling of the communities and sampling stratified by age groupings or by some measure of nutritional status. Annex I-C of the report to the EEP contains the outcome of these discussions. Questions of the typical birth interval in each field site were also discussed. Although it has been assumed that there are 2-year birth intervals, if birth intervals are longer, sample selection will need to take this into account if we are particularly interested in pregnancy and/or births. Annex I-A of the EEP report contains detailed discussions of the implications of various birth intervals.

The question of whether new families will be included in the sample was raised by Dr. Galal. The question of whether to choose first births was also raised since in some cultures there may be difficulty in retaining the family if something goes wrong.

A rule was adopted by consensus that one criterion for the selection of the family would be that there is at least one child under two years; for this family, we could then follow from birth to two or from two to four. (This decision would be amended if the birth interval were to be found to be longer than two years.) A second criterion would be to include households with a child of seven to ten or eight to twelve. The reason for this choice would be the relation of school starting to the other activities of household members. Since there is likely to be a problem of the accuracy of ages reported we will need to record a minimum and maximum possible age for each subject.

There was lengthy discussion on the total size of sample. It was generally agreed that the 200 households originally proposed might be a feasible target and that we should build into the start-up sample size an expected attrition rate of one-third. The weighting of the two types of households, those with 0-2 year olds and those with 7 to 10 year olds was discussed. Since we also want to find a variety of nutritional intake, status, and socio-economic groupings within each type of household it will be necessary to make sample choices to insure these ranges. Decisions about household selection will need to be deferred until all projects return with more Phase I data in December. It was decided that these decisions could be made at the time of the EEP meeting in Berkeley when the representative of the three projects are together.

It was the consensus of the group that CRSP funds shall be used for each family for a maximum of two years plus one month from the time the study is started for that family. This rule will be subject to the provision that three months will be allowed for the introduction of all households following the introduction of the first household. Once the sampling frame has been chosen, any additional families needed will be drawn from the original pool.

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It was also agreed that in order to allow for attrition the total number of families shall be 300, to be equally divided into 150 families for each stratum. (For detailed strategies discussed see Annex I-C of the EEP report.)

The session concluded with discussion of the scheduling of measurements. The outcome of these discussions is shown in detail in the report prepared for the EEP.

Assignments for writing tasks were given and members dispersed to carry out their tasks; work on November 10 and 11 was carried out in small groups as reports were written and circulated. On November 12 the Finance Group and Institutional Council met. The minutes of these meetings are submitted separately.

On November 12, members of the SCB met to discuss continuing items of business relating to publications agreements and access to data.

With respect to the publications agreement drafted by the Mexico Project and circulated to others, some members believe that there is too much PI control and that some members would prefer greater freedom for co-investigators to publish without cumbersome approval arrangements. It was suggested that there be an SCB publications committee to prepare a CRSP-wide agreement after every project has developed its own publications policy. It was a consensus that no one will publish before the January meeting and that at that time there will be further discussion of inter-project publications agreements. It was further recommended that it be SCB policy that individuals not involved in the CRSP should not have access to data nor have the right to publish during the life of the project. All co-investigators within the CRSP will have access to any data. Sub-contracts will not be offered to any individuals outside of the CRSP for any purpose without written permission of the SCB. Management Entity will have permission, however, to hire people for the performance of statistical and analytical services. Students who work on a project with a CRSP investigator will be an extension of the investigator and will have permission to use the data.

With regard to data analysis, Judith Balderston presented the data management plan with Berkeley's role as archivist, carrying out data management, quality control, and simple analytical functions during Phase II activities. The role of a statisticians'/data managers' committee was explored. Plans were made for a December meeting of data managers with overseas data managers to be involved. The SCB will play a continuing role in inter-project data analysis. The possibilities of a joint workshop involving members of all projects at the conclusion of Phase II was also discussed.

On November 13 to 16, small groups continued to meet to complete the writing of reports which are embodied in the comprehensive report prepared for the External Evaluation Panel.

Respectfully Submitted



Judith B. Balderston

Proposed Agenda

Meeting of Nutrition CRSP: SCB, Finance Group and Institutional Council  
November 5 to 12, 1982, Airlie, Virginia

- Friday, November 5 Arrivals of participants throughout the day; informal discussions in project groups; reading of reports.
- 4-6:30 p.m. Reception
- 7:30 - 9:30 Discussion of agenda and expectations for meeting.
- Saturday, November 6
- 8:30 - 12:00 Overview of projects: Reports of experience in field and constraints, recruitment and training of surveyors.
- 1:30 - 5:30 Results of preliminary surveys: Is malnutrition present? Are communities primarily subsistence agricultural? Do we have the desired subjects? Can we expect their cooperation?
- 7:30 - 9:30 General discussion of design of overall study.
- Sunday, November 7
- 8:30 - 12:00 Variable groupings: Food intake measures: Can we measure daily? How will we measure? How will we store data?
- 1:30 - 5:30 Nutritional status, disease, and reproduction measures: Are protocols sufficient? What problems have been encountered in the field?
- 7:30 - 9:00 Cognition: Testing by standardized tests; observations of mother-child interactions, school performance measures.
- Monday, November 8
- 8:30 - 12:00 Activity and Social Performance: What will we look for? How will we measure?
- 1:30 - 5:30 Continuation of morning and discussion of socio-economic survey.
- 7:30 - 9:30 Wrap up of individual areas.

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Tuesday, November 9

All day                      Consensus on design: Agreement on measures and scheduling plans for specific country project studies.

Wednesday, November 10

8:30 - 12:00                Completion of protocols: work in sub-groups.

1:30 - 5:30                Planning for translation and printing of protocols, training of surveyors, methods of data flow from field.

Evening                      Time permitting, a social evening with members of the IC who will have arrived.

Thursday, November 11

8:30 - 12:00                Finance Group:  
Election of Chairman  
Financial problems encountered by the project  
Review of budgets for next year  
Financial implications of design decisions  
Other subjects proposed by participating institutions

8:30 - 12:00                Meeting of overseas PI's and Management Entity

1:30 - 5:30                Institutional Council  
Election of Chairman  
Review of budgets  
Discussion of policies related to the IC  
Review implementation of projects  
Other subjects proposed by participating institutions

1:30 - 5:30                Scientific Coordination Board  
Conclusion of work on protocols, planning for data collection.

7:30 - 9:30                Continuation of afternoon discussions.

Friday, November 12

Morning                      Meeting concludes.

Note: If necessary, a smaller group consisting of those who are able to stay, may need to convene again for the purpose of writing up the conclusions of the meeting. The place and time of this continuation will be worked out as we see how the scheduled meeting progress.

Meals at Airlie House are at 8:00 a.m., breakfast, 12:30 p.m., lunch and 6:30 p.m. dinner.

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Minutes of Nutrition CRSP  
Meeting of the Finance Group and Institutional Council  
November 11, 1982  
Airlie, Virginia

Present: Institutional Council Members: Philip Costic (UCLA), Alexandra Van Gelder (Connecticut), William G. Matlock (Arizona), D. Woods Thomas (Purdue), and Robert Edwards (Management Entity)

Finance Group: (in addition to the above members of the Institutional Council): Lindsay Allen, Robin Gorsky, Gail Harrison, Norge Jerome, Avanelle Kirksey, Charlotte Neumann, Gretel Pelto, Judith Balderston

Observers: Samuel Kahn, William F. Johnson

The meeting was called to order by Robert Edwards who was made chairman by acclamation. The agenda of the meeting is attached.

Discussion of the budgetary process was led by Judith Balderston. The method was described by which annual budgets are proposed by each project and accepted if they are within annual totals and projected five-year limits by project. Woods Thomas raised the question of whether it would be possible to ask for an extension after five years. Sam Kahn reminded the group that there is a cap on CRSP money and that therefore any work in the sixth year would need to be a no-cost extension.

Since AID has asked the universities to change from quarterly to monthly transfers of money, all agreements will have to be amended. This will be done with the assistance of Bob Edwards.

A major item of discussion was the method by which equipment is purchased for the CRSP. It was felt that there were misunderstandings among projects on how such approval was to be obtained. As agreed, the following method is recommended: The principal investigator, after examination of the source of the equipment writes a letter describing the desired purchase. The letter is approved by that campus' grants and contracts office and sent to the Management Entity. Upon approval by ME, the request is forwarded to AID. If waivers are necessary, for foreign source items, these must indicate why a non-U.S. made item must be purchased.

The control of title and the responsibility for insurance of equipment was also discussed. When items of equipment have been sent to overseas institutions, some projects want to gift over such equipment while others want to retain title. In particular, the question of responsibility for vehicles and of personal injury liability was discussed. Insurance coverage for each project is imperative. Bob Edwards will check with the University of California legal office on insurance coverage for all the projects. Since the question of responsibility and liability of PI's and

institutions is not clear on this point, this is a very important question. If personal liability insurance is not an allowable cost for projects, then the question of how to protect the PI's is difficult. AID personnel are protected but contractors must provide their own insurance. Woods Thomas suggested that it might be possible to explore with AID the coverage by blanket policy for all projects.

The question of simplifying the purchase of equipment was discussed. Gail Harrison talked of difficulties in buying used equipment according to AID rules but Sam Kahn and Fred Johnson pointed out that AID did permit purchase of used vehicles. This will be useful in procuring vehicles for the field.

The rules on the purchase of equipment were described in detail. All scientific equipment above \$1,000, general-purpose equipment above \$500, foreign-source equipment, or equipment with more than 51% foreign-made parts must have the prior approval of AID. Items that have unit costs less than \$500 are considered supplies and not equipment. For rental of equipment, it is not necessary to consider source or origin. (AID has added the "source" problem while all other Federal regulations have origin but not source restrictions.) Woods Thomas proposed that because of time and effort problems, AID should permit the purchase of foreign-made equipment when there is a reasonable and accessible substitute.

Problems of timing of budget requests were explored. At present, in order to estimate needs for the next fiscal year it is necessary to know how much has been spent of the present fiscal year's allotment. It is often difficult for the universities' accounting offices to provide up-to-date reports and therefore the projects are not informed of the amount of money still available. Not only is timing a problem, but the method of preparing budgets is clumsy and the projects are reporting having to spend too much time on budgeting.

It was recommended that the fiscal year for the CRSP be made to coincide with the Federal fiscal year. Sam Kahn suggested that this would simplify AID's planning and Bob Edwards recommended that this be done. It was the consensus of the group that this is acceptable and that budgets now be prepared for April 1, 1983 to September 30, 1983 and October 1, 1983 to September 30, 1984.

The question of "phase-out" of project was discussed and PI's were assured by representatives of AID that if phase out negotiations were to occur, all personnel would be taken care of. This is part of the contractual obligation of AID in the "boiler plate".

The question of PI freedom to make personal arrangements, such as for per diem expenses, was brought up by Lindsay Allen. It was felt by members of the group that a policy across projects is needed. Purdue follows AID policy while UCLA follows its own faculty policy. AID policy is that after three months in the field, the staff person goes off per diem and on regular salary, and there are some post differentials paid. Sam Kahn pointed out that the government has higher standards and states have

lower standards. We should use whichever is lower. It was requested that the AID contract office provide us with a statement on what are the conditions for overseas work.

Continuing this discussion, the question of what expenses and allowances could be covered was explored further. Under the original planning grant there was general agreement that requests would not be made for extra allowances in order to keep control on spending. If matching funds are to be provided by the universities then they could be considered as cost-shared contributions. The principal investigators will need to agree.

It was concluded that while AID and the government have very specific rules for allowances and benefits, each institution has the option of being more restrictive than the AID rules. The original agreement to disallow per diem should be continued. The Egypt project has required that some money be set aside for dependent support and overseas per diem because of Purdue's rules. It will be necessary for the PI's to agree on the overall CRSP policy.

Discussion of difficulties with the Thomas Cook contract were raised. Instances of poor service and overcharging were described. It was suggested that we could have a partial change, since not all projects are dissatisfied with the Thomas Cook service. It was decided that Kansas will handle their own travel arrangements henceforth and that there will be no indirect cost implications. It was recommended that Management meet with Thomas Cook to present problems, that other agencies be investigated, and that we terminate the Cook contract if there is no improvement in service. Management will also consider the possibility of eliminating the travel contract and will investigate the most cost effective methods for replacing travel arrangements.

Difficulties internal to the Egypt project were discussed. Delays and difficulties were discussed which have budgetary and inter-institutional implications. The necessity of effective communications between institutions in the Egypt project was recognized; this is especially important in a collaborative effort. An ombudsman was suggested for the Egypt project institutions.

Cost-share problems on pass through funds was discussed. Some money is being held by U.S. institutions to make purchases on behalf of the overseas institutions out of host country budgets. Although Bob Edwards has written twice to AID to request that these items be exempted from cost-share considerations, he has not received a favorable reply. Members of the group recommended that he rewrite the letter to make it more specific to the situation in Mexico where the problems are most acute. It was the original intent that funds expended abroad would be exempt from matching funds. The interpretation of "obligations" of funds was discussed. It is important to specify for each project what we obligate to each institution overseas and what is retained in the U.S. to be spent on their behalf.

The Finance Group was adjourned about noon. The Institutional Council was convened in the early afternoon.

Members of the Institutional Council expressed the need to have more frequent meetings to help solve problems as projects move into the field.

There was agreement on the need to recast the budgetary calendar in order to have a smoother method for projecting and approving budgets. It was agreed that grants and contracts offices need to be more helpful, that PI's should check reports from their accounting offices but that they be provided with simple directions and forms.

Quarterly reporting from the field was discussed. Each of the project field directors need to be responsible for working with the overseas PI on financial reports. With monthly advance payments to be provided by AID, requests for advance payments may be sent with quarterly reports of expenditures.

It was suggested that each institution appears to have specific problems and that channels need to be different for each institution. Each member of the Institutional Council was aware of problems in his/her own place and volunteered to work to smooth out the difficulties. The position of the grants and contracts office appeared to be one source of difficulty at several institutions.

The issue of how the Institutional Council differs from the Finance Group was raised. Institutional Council members expressed an interest in assisting the CRSP to find additional funds and extensions of the project. Other CRSP's are more open-ended and it was suggested that we might think of adding other sites and extending the time. Council members recommended that for the next meeting they are briefed by PI's about the projects.

The necessity of providing Human Subjects' Clearance was discussed. The meeting adjourned at 5 p.m.

Respectfully Submitted



Judith B. Balderston

JBB/fb

Agenda

November 11, 1982

A.M. Finance Committee

- Election of Chairman
- 1. Budgetary Process
- 2. Allotment for Balance of Year 2
- 3. Budgets for Year 3
- 4. Cost-share Problems: Pass through Funds
- 5. Changing Budget Year to Project Year or Government Fiscal Year
- 6. Matters Referred by Egypt Project
- 7. Travel Contract with Thomas Cook
- 8. Benefits for U.S. overseas staff:
  - (a) R & R
  - (b) Uniform benefits across projects
  - (c) Dependent Travel
- 9. Items to be referred to Institutional Council
- 10. Implications of Research Design for Financial Plans.

P.M. Institutional Council

- Election of Chairman
- 1. Matters Raised by Egypt Project
- 2. Reduction in Cost-Sharing
- 3. Institutional Problems
- 4. Other items referred by Finance Committee

Activities in Solis

The period from September to November, 1982 was a particularly active one for the INN-UCONN research team in Solis. The major accomplishment during this time was the collection and preliminary analysis of data in a pilot study conducted in San Francisco, Solis, a small community at the south end of the Solis Valley. The permanent employees in Solis remained essentially the same as those described in previous reports, with the addition of several field assistants in the pilot. Dr. Allen was resident in the field throughout this quarter, with the exception of two brief periods.

By September research instruments and strategies had been developed for data collection in the pilot, which was carried out in September and October. San Francisco was selected since it would not be included in the project's long-term study but was representative of communities which will be included and suitable for purposes of a pilot. The major objectives of the pilot were testing of research instruments, training of personnel and assessment of community reaction to study methodology. Increasing general nutritional and socio-economic information on the Valley was a secondary objective.

The pilot study included the following components:

1. A census of San Francisco, including demographic data, was made. 104 households including 557 individuals were surveyed. The census was completed by the end of September.
2. Dietary intake data from 3 individuals in each of 30 households, 6 days per individual, were collected using a short term recall method, with accuracy of food intake estimates augmented by weighing individual portions. These data were collected on different days of the week in households until 6 days (Monday-Saturday) were represented for each individual. Intake data for Sundays was collected later using a 24-hour recall method.
3. Anthropometric measures (body weight, height, arm circumference and triceps skinfold) were taken on approximately 70% of most age groups of the San Francisco population.

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4. Socio-economic data from members of 39 households were collected employing a series of "enuestas." The range of variables which were explored included ownership of various possessions and animals ("material style of life"), economic strategies and wage labor migration patterns, "educational" and "modern" attitudes.
5. A reproduction study was conducted with 45 San Francisco women utilizing a questionnaire exploring such variables as reproductive history, specific events during the last pregnancy and breastfeeding patterns.
6. An activity pattern study was carried out with 24 women. Respondents detailed their daily and weekly activity patterns during an interview lasting approximately 45 minutes. This data was used to calculate percentage of time per week devoted to each activity and to estimate daily energy expenditure requirements.
7. A preliminary battery of cognitive tests was pretested with 21 San Francisco children.

Further details on the methodology employed and analysis of these data are available in the draft report on the Preliminary Survey and Pilot Study prepared for the Scientific Coordination Board, Institutional Council and Finance Group meeting in Airlie, Virginia and in a revision of this report prepared for the External Evaluation Panel meetings in Berkeley (January 1983).

During the month of September, Drs. Goldfeder and Moncada of INN prepared a data tape including census data from the 4 community preliminary survey described in the previous quarterly report, Mexican food tables (average nutrient composition of typical Mexican foods), and standard growth tables utilized by INN. The tape was sent to Storrs via air express (Texas International Airlines) and, after several days in Dallas' customs and a brief sojourn in Baltimore, reached Storrs in approximately a week. A copy of this data was subsequently sent to P. Fosler, data manager at the management entity. This was the first transfer of computerized data in the Mexico project. In October, another tape was prepared which included, in addition to updated (and cleaned) census data, anthropometric and dietary intake data from the 4 community survey. This tape was hand carried by Dr. Allen to Storrs.

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Activities in Storrs

Storrs based activities expanded substantially during this quarter under direction of Dr. G. Pelto, who was in residence at Storrs throughout this period. Two new full-time staff member were added to the CRSP-Mexico team at Storrs, beginning in September. Bruce Bernstein (M.S. Nutritional Sciences, ABD Medical Anthropology) was hired as an Educational Assistant for a range of administrative and research support duties. Dr. Roy Tembi (M.A.T. Biology, Ph.D. School of Education) was employed as a Research Associate to serve as the project's data manager and analyst.

Mr. Bernstein was plunged forthwith into the project's chilly administrative waters, presented with a number of tasks including pending housekeeping, refinement of the UCONN project's administrative routines, coordination with UCONN administration, Management Entity and A.I.D. Dr. Tembi began developin the data system for the UCONN project. This included researching and setting in motion the process for acquisition of a small cluster of EDP equipment and development of procedures for management and analysis of data. Data analysis began in earnest with the arrival of the first tape from INN. In late October, entry and preliminary analysis of dietary intake data from the pilot study was performed in Storrs.

The final week of October and the first week of November was an intense period for the CRSP team at Storrs, which devoted full energy to review and analysis of preliminary 4 community survey and pilot study data and preparation of research and financial reports for the November meeting in Airlie. Dr. Allen returned to Storrs with raw data on dietary intake, some hand tabulated. Dr. Alfonso Mata, field director of the project in Solis, joined the UCONN staff in Storrs on October 28, bringing with him computer analyzed and hand tabulated data from the preliminary and pilot studies, to participate in data analysis and report preparation. During this 2 1/2 week period a 175 page draft report on preliminary survey and

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pilot study, financial report on project expenditures to date and projections for the remainder of the present budget period and Year 3 of the project were prepared. Financial materials were prepared with the assistance of the UCONN Office of Grants and Contracts, which also prepared period reports and advanced payment requests during this time.

From November 5-12 Drs. Mata, Pelto and Allen participated in the CRSP SCB meetings in Airlie. Dr. Allen stayed in Washington through the following weekend to assist preparation of a draft project report and proposed research design for the upcoming main phase of the project. These materials were developed for review by the External Evaluation Panel in January.

Finances

Economic instability and accompanying fluctuations in monetary exchange rates continued in Mexico during this period. In early September, the outgoing president, Portillo, announced nationalization of all Mexican banks and restrictions on the flow of pesos out of the country. This was soon followed by a limitation on the amount of externally produced good (including scientific equipment) which would be allowed into Mexico--in effect, an embargo on importation. The peso experienced another devaluation and reached a level near 100 per dollar in mid-September.

In addition to staffing difficulties for the project at INN, outlined in the previous quarterly report, this latest turn of events signalled two new difficulties for the CRSP-Mexico project. The first involved transfer of funds to INN. A series of changes in banking policies led to uncertainties about how funds should be sent (whether in dollars or in pesos, to which bank accounts). This led to further uncertainties and delays. Early in September, dollar accounts were frozen, indicating that funds would have to be changed to pesos in the U.S. and transferred

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in this form. Later in the month dollar accounts were unfrozen and the most advantageous process seemed momentarily to be transfer of dollars. The situation seemed to fluctuate on a weekly basis, however. Fortunately the project was able to continue with funds that had been sent previously and the resources of INN. The hope was that the incoming administration would bring with it a period of greater economic stability and clarity in financial matters.

A second, more complicated problem, involved the delivery of equipment contracted and necessary for research operations to INN. Given the new restrictions imposed by the government, a double bind situation had occurred. The requirements of the CRSF AID funding are that equipment purchased by the project be U.S. manufactured with more than 50% U.S. produced components. The Mexican government, however, was restricting the flow of externally produced equipment into the country. This situation has already led to serious delays in purchase and delivery of equipment. A proposal to seek waiver of the buy U.S. requirement for this project turned out to be moot, since a preliminary investigation indicated that the necessary equipment was not, in fact, produced anywhere in Mexico.

The current strategy to address the problem is to revise the Mexico subtier budget such that equipment originally to be purchased by INN will be purchased by UCONN and donated to INN for use in the project. This requires contract revisions, State of Connecticut authorizations, government of Mexico authorizations and substantial increases in shipping costs. In addition, cost of equipment originally intended to be purchased by INN will add substantially to the UCONN total expenditure and thus may increase the cost share requirement significantly, although the original intention of the grant was that pass-through costs of equipment would be exempt from cost share requirements. A request was made to AID to waive the cost share requirement for this equipment, but no clear decision had been circulated by the end of this quarter.

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FIFTH QUARTERLY REPORT

September 1 - November 30, 1983

NUTRITION CRSP (931-1309)  
Kenya Project

Dr. Charlotte Neumann  
Principal Investigator  
UCLA, UC/Berkeley

## 1. Travel

### Foreign:

Dr. Charlotte Neumann - Remained in Kenya from July 13 through September 15, 1982.

### Domestic: (for Kenya project meetings)

Dr. Claudia Carr - Roundtrip Seattle, WA. to Berkeley, CA.

Dr. Robin Gorsky - Roundtrip Oakland, CA. to Los Angeles, CA.

Dr. Charlotte Neumann - Roundtrip Los Angeles, CA. to Berkeley, CA., two times.

## 2. Recruitment

Field Coordinator/Physician - interview of two candidates.

Field Nutritionist - interview of two candidates.

## 3. Management Entity Activities

Dr. C. Neumann and Dr. R. Gorsky attended the Research Final Design Planning Meeting at Airlie House, VA., November 14-19, 1982.

Mrs. Anne Coulson attended the Data Management Meeting at Berkeley, CA.

## 4. Replacement of Acting UC/Berkeley Principal Investigator

Dr. Robin Gorsky, Assistant Professor of Public Health at the University of California/Berkeley School of Public Health was appointed UC/Berkeley P.I. with the approval of the SCB meeting at Airlie House, November 1982.

Dr. Gorsky brings an expertise in systems analysis and activity and time allocation studies and nutritional intake at Berkeley. Dr. Gorsky has a PhD in Nutrition from UC/Berkeley.

## 5. Field Activities

### Kenya -

During late August and early September, 50 Embu district field enumerators were hired from a pool of about 400 individuals. These are mainly women, and some men with the equivalent of high school education (o-level). They all passed a written test and personal interview and were considered by a selection committee comprised of Kenyan research staff.

A two week period of training ensued comprised of census taking, collection of demographic information, and morbidity and mortality. Also, they were trained to carry out anthropometry, and several were taught to do hemoglobin and make thick smears.

A group of ten enumerators were trained to do food intake by recall and a pilot was started on precise food weighment. The "food intake" group also made visits to the markets, and collected food recipes.

### Mapping -

Because of the technical difficulties and poor weather and visibility, the

aerial mapping of the three study sublocations: Kararumo, Kathanguri, and Kathanjure, were not completed by the end of November so that total household registration could not be completed.

### Preliminary Survey -

Using the Survey form that was completed by August 31st, 143 households were studied by early November. The data was collected onto pre-coded forms and the corrected data was entered onto floppy discs and then analyzed using an SPSS program and by hand calculations. The findings were assembled by the Kenya Team. Simultaneously, copies (NCR) of the field data forms were sent to UCLA. These were keypunched and analyzed using SAS under the direction of Mrs. Anne Coulson. The analyses agreed with the Kenyan analyses plus, more refined analyses could be carried out. The anthropometric data was analyzed using the NCHS-CDC program which classifies individuals by % of median (NCHS) as well as percentile, and by Z scores as standard deviations. This was not available in Kenya. Also not available are appropriate food composition tables for Kenyan foods. Food analyses will have to be carried out as an interim measure. Food intake information will be analyzed for energy and protein using FAO African tables (not specific for Kenya). Arrangements need to be made for food analyses.

The results of the partial Preliminary Survey are summarized in a Project information summary (see attached).

There are now two detailed Kenya Partial Preliminary Survey Reports available:

1. from Kenyan Research group,
2. from UCLA - a composite of the Kenyan report plus additional analyses of the data at UCLA.

These are invaluable for further project planning.

### 6. Equipment

The Kenyan project now has obtained 3 vehicles for use in the field. Duty-free privileges of equipment was granted in November, 1982 by the Ministry of Finance.

### 7. Projected Activities

#### At UCLA/UCB -

1. Project plans for pilot testing of methodologies in functional areas, and further testing of food intake, morbidity, and economic studies.
2. Recruitment of field nutritionist and physician. Coordinator position will probably be offered to Dr. Eric Carter who has acted in that capacity for the past 9 months and has done an excellent job. This is not finalized as yet.

#### Management Entity/UCB -

Finalization of Research Design and methodologies.

The Field Staff deserve special commendation for having initiated the field worker training and field work and analyses.

The Kenyan group includes: Drs. James Kagia, A.A. Jansen, J. Meme, S. Kinoti, N. Thairu, and N. Bwibo, the field enumerators and supervisors, the Central

Bureau Statistics Staff; the University of California staff, Drs. Eric Carter D. Cattle, and Mrs. Frances Carter.

The project regrets to announce the untimely death of Mr. Ed Lacko, Senior Laboratory Technician of the Kenyan Medical Research Institute. He worked with the Field Staff in training for hematology in Embu. He would have played an important role in the project, particularly in the laboratory.

Quarterly Report  
Egypt Project, Nutrition CRSP  
1 September 1982 - 30 November 1982

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This has been an extremely busy and productive time period for the Egypt project. Phase I field work was accomplished and a great deal of planning activity relative to Phase II occurred.

I. TRAVEL

- September: (a) Drs. Jerome and Kirksey to Egypt 9/10/82-10/6/82. (Trip reports have been circulated).  
(b) Dr. Sieber to Egypt 9/13/82-9/23/82 (trip report attached).
- October: (c) Dr. Wolgemuth (Field Coordinator) to Egypt October 4, to remain.  
(d) Dr. Ritenbaugh to Egypt 10/13/82-11/13/82 (trip report attached).  
(e) Dr. Jerome to Chicago October 22 to chair meeting of Social Performance TAG.  
(f) Domestic project meeting in Chicago 10/25/82: Drs. Harrison, Kirksey, Hassanein, Watson, Wachs, Weber, Stini, Ismail, Smith, Balderston, Ms. Ricci (minutes attached).
- November: (g) Drs. Galal, Harrison, Jerome and Kirksey to Airlie, Virginia for SCB meeting November 6-12. The above plus Drs. Watson, Weber, Wachs, Ismail, and Mr. Remmers for project meeting in Washington, D.C., November 13 (minutes attached).

II. INTER-INSTITUTIONAL NEGOTIATIONS

- A. Kansas obtained Purdue University's approval to amend year two budget in order to hire a data manager for the project.
- B. Arizona and Purdue negotiated, after an initial request made in August, a budgetary amendment to the Arizona subcontract to accommodate the move of Dr. Watson from Purdue to Arizona. A revised request was made on October 4, and as of the end of this quarter there had been no formal response from Purdue.\*
- C. Working relationships were established among relevant institutions in Egypt.
- D. Budget planning was begun for Period Three by all concerned institutions.
- E. A disagreement between the PI's and the Purdue administration regarding the funding of domestic project meetings in budget periods one and two was resolved by the Finance Group at their meeting in November, with Purdue agreeing to reimburse Arizona and Kansas for funds spent for this purpose.

III. STAFF

- A. Mr. W. William Remmers joined the Egypt Project as Data Manager on 10/1/82, subsequently resigned this position effective 11/19/82. A notice of position vacancy has been filed and the position has been advertised.

\*Added note: The amendment was completed 12/15/82

### III. STAFF (cont.)

- B. Dr. Galal has continued as Director of the Nutrition Institute and as Egyptian PI after being named in August. Regular planning meetings are being held under his direction for all senior Egyptian scientists to complete Phase I and plan for Phase II.
- C. At Arizona, university approval was obtained to advertise for a post-doctoral fellow in the area of disease/immunology and interviews were held for a part-time student technician in the same area.
- D. Dr. June Wolgemuth, the project field coordinator, traveled to Egypt in early October and has remained in the field.

### IV. FIELD WORK

- A. A field site was selected in September. Phase I field work commenced immediately, and by the time of the SCB meeting in mid-November preliminary data were available on anthropometry of school-age and preschool children, food intake variability, community description and preliminary morbidity survey. Reports were made in detail to the senior scientists and the SCB by Drs. Galal, Jerome, Harrison, and Kirksey.
- B. The field coordinator has established an office for the project within the Nutrition Institute. A telephone line has been installed, (#849412) and a bilingual secretary (Ms. Sonia Wahib) has been hired. The field coordinator has facilitated the importation of equipment through customs and the planning of budgets and fieldwork with the Egyptian investigators. A set of communications guidelines for the field coordinator were developed jointly by the four Principal Investigators and D. Woods Thomas of Purdue and communicated to the field coordinator by Dr. Thomas.

### V. METHODOLOGIC DEVELOPMENT

- A. Kansas continued to develop and refine instruments for measuring social performance. Dr. Jerome chaired the TAG meeting on social performance 10/22/82.
- B. Purdue investigators have continued methodologic development. Dr. Kirksey's laboratory has tested procedures for reliability and reproducibility for the measurement of trace minerals, vitamin C and folate in human milk. Dr. Wachs has developed specialty measures with particular reference to school performance and has established close communication with Dr. Bishry (Egyptian Senior Scientist for the cognitive area) in preparation for Dr. Wachs forthcoming visit to Egypt in January. Dr. Ismail and his graduate student, Larry Verity, have developed the forms and directions needed for measuring basal or resting metabolic rate as well as work capacity. In addition, Dr. Ismail has completed the organizational procedures for training personnel in data collection. In particular, Drs. Abdel Wahab El Naggar and Farouk Abdel Wahab, Egyptian scientists, have agreed to collaborate in the area of work performance.

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V. METHODOLOGIC DEVELOPMENT (cont.)

- C. At Arizona and Purdue, pilot studies were initiated to ascertain whether the WHO test-weighing protocol for measurement of breast milk intake of infants could be modified for Egyptian field conditions. At Arizona, Dr. Weber has continued to study methods of identifying contaminating nutritional deficiencies, particularly with regard to trace elements, in collaboration with Dr. Daisy Fleita in Egypt. Dr. Stini has continued validation and reliability work on bone density measurement.
- D. Analysis of preliminary data from Phase I was accomplished in Egypt and at Kansas (dietary, social and demographic data) and at Arizona (anthropometric data).
- E. A supplementary proposal by Mary Mohs, a doctoral candidate at Arizona, with regard to the effect of moderate zinc deficiency on cognitive development in young children, was approved by the Egyptian PI and by the SBA.
- F. All senior scientists modified core and non-core objectives and scheduled collaborative discussions with Egyptian counterparts in December 1982 or January 1983 preparatory to beginning Phase II. Protocols for laboratory and field measures are being translated/modified jointly.

VI. MISCELLANEOUS

- A. Clearances have been requested from Management Entity and AID for purchase of vehicles and large equipment (balances and work performance equipment).

VII. PLANS FOR NEXT QUARTER

- A. Travel: Drs. Galal and Harrison to Berkeley in mid-January for meeting of External Evaluation Panel. Travel in December, January and February to Egypt for Drs. Watson, Ismail, Wachs, Jerome and Harrison to complete evaluation of Phase I data and plan for initiation of Phase II.
- B. Field Work: Final evaluation of Phase I data, and initiation of Phase II pilot testing based on results of EEP meeting in mid-January.
- C. Budget: Submit completed Period III budgets to Management Entity.
- D. Methodologic development: Continue to refine all measures for Phase II. Complete pilot studies on test-weighing modification at Arizona and Purdue.

Submitted by: Gail G. Harrison *Gail G. Harrison*



# THE UNIVERSITY OF ARIZONA

HEALTH SCIENCES CENTER  
TUCSON, ARIZONA 85724

COLLEGE OF MEDICINE  
DEPARTMENT OF FAMILY AND COMMUNITY MEDICINE

December 15, 1982

To: Gail G. Harrison

From: Cheryl Ritenbaugh

Re: Travel to Cairo, October 14 - November 14, 1982

The following is a report of my activities on a trip made to Egypt during the period October 14 to November 14, 1982. The activities fall into four broad categories: 1. Consultation on the reproduction component of the Phase II design; 2. General support in data reduction and analysis for the community survey portion of Phase I; 3. Logistical support in data shipment to the U.S.; 4. Discussions with other project personnel.

## 1. Consultation on Reproduction

Dr. Amin Kamel Said is in charge of the Reproductive Performance portion of the project for the Nutrition Institute. He had begun discussions with Dr. Kirksey in September regarding additions and modifications of the proposed Phase II design for Egypt. I continued these discussions with him. His interests in this portion of the project for Egypt center on the relationships among dietary intake during pregnancy and lactation and outcome. Egypt has no local systematic studies of weight gain patterns during pregnancy in relation to outcome. Dr. Amin is interested in the role of the early portion of the pregnancy in affecting outcome. This corresponds with my own research interests, and leads to design decisions for the Egypt project relating to multiple determinations of the onset of pregnancy and data collection on pre-pregnant weight and first trimester gain.

Discussions with Drs. Amin and Wafaa indicated that the WHO protocols for quantifying breast milk consumption by infants could not be implemented.

Some discussions followed on possible alternative strategies for determining quantity of breast milk consumed. Two of the suggested strategies will be tested at Purdue and Arizona to determine their feasibility and accuracy for further field trials. The results of all of these discussions are summarized in the reproductive competence portion of the Egypt-specific design decisions.

2. The period of my visit to Egypt coincided with the collection of Phase I data in a community survey. Drs. Amin, Wafaa and Farouk directed teams of dieticians and survey workers who were in Kalama virtually every day for two weeks. They collected anthropometric and demographic data on approximately 250 households, and three day dietary intakes on at least four members

in each of 40 households. I assisted initially in reviewing the raw anthropometric data for measurements which were unlikely to be correct. Obvious errors were found in a large proportion of measurements from one team during its first day in the field, but subsequently the obvious error rate was quite low. After the initial screening of the data, I assisted in determining how the data should be reduced for transmittal to the US, and in determining what types of analysis could be done by hand and hand calculator in Egypt. The graphs and tables resulting from that effort were brought by Dr. Osman Galal to the SCB meeting in Washington.

3. At the time of my departure for Egypt, it was thought that data could be collected and prepared for transmittal to Kansas and Arizona in time for analysis at those universities prior to the SCB meeting in Washington. When I arrived in Egypt, it became clear that although the work was progressing rapidly, the original deadlines for completion and mailing would be missed by a few days. Dr. Wolgemuth was quite occupied with problems of setting up the budget and accounts, and with getting materials through customs snarls. I therefore volunteered to assist in getting the data shipped to the US. The experience was enlightening for myself, Dr. Wolgemuth, and the Egyptian scientists.

The first batches of data were sent to Arizona and Kansas by AML Air Courier Service, which has quite a good reputation in Cairo for deliveries to Europe, and which claims overnight (approximately 48 hour) service to the US. Contrary to their promises, the packages took about a week, after being traced from Arizona (we had no success in tracing from Cairo). It was found to have stalled in a series of European cities. Knowing that system had failed, I turned to TWA Air Parcel service which was recommended by American business people. I delivered the materials to be sent to Kansas to the airport, where TWA provided complete routing (all on TWA flights) including telexes to the appropriate TWA offices enroute. I was told the flight it would arrive on (time, date, place) and confidently telexed the information, unfortunately not including the air bill number. This system too failed, and the materials arrived after about one week due in part to some delays in tracing because of problems with the air bill number.

The final data set was sent with Dr. Galal, who shipped it collect from Washington, D.C. by Federal Express to the US destinations. This system worked very well, and given the number of American and Egyptian scientists travelling between the two countries, I recommend it as the preferred method for transmitting any items larger than letters.

4. Discussions with other project personnel.  
During my visit I met with Dr. Zeinab Bishry who is the Egyptian scientist working in the area of cognitive performance. The reason for my meeting with her was to give her a copy of the dissertation proposal from Mary Mohs, a graduate student from the University of Arizona, who hopes to do a study of the relation-

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Trip Report  
Cheryl Ritenbaugh  
December 15, 1982  
Page Three

ship between cognitive development and zinc nutriture in Egypt. The meeting with Dr. Bishry was pleasant and productive. She is enthusiastic about the thesis proposal, and I look forward to visiting with her on future trips.

On my previous trip to Egypt, I met Dr. Daisy Fleita, and we again spent time together when she visited Arizona in August. I met with her several times on this trip, mixing business with social encounters. I also met Dr. Esmat Ekladious again in both social and business contexts. Drs. Fleita, Ekladious, Galal, and I had a very productive morning meeting regarding how the Egyptian project might proceed in the area of immunology, including some thinking and talking about possible long-term goals for the Nutrition Institute. This was a follow-up to some efforts begun by Dr. Sieber in early September on his trip to Egypt. In response to requests made to him during that trip, he and Dr. Watson had prepared an information document for Dr. Galal which I carried back to Egypt with me. That document served as a springboard for the meeting described above, in which my only role was to facilitate the interaction. Some tentative assignments of roles were proposed at that time; a more definitive report will be available from Dr. Watson after his December trip.

In addition to working with Dr. Farouk on the community survey, I reviewed with him the progress that had been made since Dr. Sieber's trip on the morbidity reporting forms. The young physicians who will be working with him in that phase of the project were taking exams during my stay and were not available for meeting. Generally, this portion of the project was on hold until the community survey was complete.

I visited the study village, Kalama, on two occasions. On the first visit, I had a chance to observe the community anthropometric and demographic survey in progress, and was impressed with the quality of work being carried out by the teams, as well as with the enthusiasm of the villagers for our presence. I also had a rather interesting encounter with a rat in the health center which leaves me strongly supporting any improvements we can make in that facility. On the second visit, I accompanied Drs. Amin and Zeinab Shaheen, the cultural anthropologist assisting with the general survey of the social, economic, cultural, and governmental aspects of the village. It was a very interesting experience to be able to watch the data collection process.

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TRIP REPORT, NUTRITION CRSP

Cairo, Egypt  
11-26 September, 1982

Otto F. Sieber, Jr., M.D.  
Consultant

Purpose - This trip was undertaken to:

1. Review the potential for clinical immunological research in the context of the Egypt Nutrition CRSP and local resources.
2. Provide consultation to Dr. Galal and his staff in morbidity and immunology.

Accomplishments - This trip was successful in that it:

1. Provided an assessment of the technical and clinical expertise available to any immunological projects which might be considered in the Egypt CRSP.
2. Assisted in site selection to enhance reliability of immunological research potential.
3. Reviewed morbidity protocols and assessment tools with personnel to be involved in obtaining morbidity data.
4. Provided liaison with two Principle Investigators of the Nutrition CRSP as well as the Principle Investigator, Egypt, Dr. Galal at a formative period of the project, in the morbidity and immunology portions of the project.

Itinerary:

Sept.

- 11 Depart El Paso, Texas
- 12 Arrive Cairo, Egypt. Initial meeting with Drs. N. Jerome, A. Kirksey, Hekmat, and Amin Said.
- 13 Meetings with Drs. Jerome, Kirksey, Amin, Wafaá A. Moussa, Farouk M. Shaheen, Osman Galal, Zatouri, and Hanem Bomaa, about selection of the research community.
- 14 Planned visit to Kalama. Requested by Dr. Osman Galal to participate in Dr. Galal's orientation conference with scientists from outside the Nutrition Institute, potentially participating in the Nutrition CRSP. Among the scientists in attendance: Dr. Daisy Fleita (American University), Dr. Gamal N. Gabriel (NRC), Dr. Sabry R. Marcos (NRC), Dr. El Sayed M. Hegazy (NRC), Dr. Fauzi El Shobaki (NRC), Dr. Saneya A. Azion (NRC), Dr. Onei M. Metwalli (NRC), Dr. Mohamed K. Hussein (NRC) and Dr. Leila Kamel (NRC).
- 15 Visited the field facility of the Nutrition Institute in Beheira and the village, Nedeiba.
- 16 Met with Dr. Wafaá, Dr. Farouk, Dr. Amin, Dr. Jerome and Dr. Kirksey to discuss the village site. Selection of Kalama village was made.
- 17 Day of worship.
- 18 No interviews scheduled.
- 19 No interviews scheduled.
- 20 Visited Dr. Daisy Fleita at the American University. Surveyed physical plant and equipment available for immunological studies and discussed potential protocols for the CRSP. Dr. Fleita primarily utilizes research equipment at NAMRU.

Visited Nutrition Research Center. Toured physical plant and met

Sept.

- 20 (cont.) with Drs. El Shobaki, Gabrial, Sabry, El Sayed Hegazy, Seneya, and Onei Metwalli. Current studies underway and planned were presented, and potential areas of reserach interest discussed. The NRC appears to have an excellent array of equipment applicable to immunological research. Capabilities exist and are being utilized for determination of humoral non-specific antibody. Biological assays of cellular immunological function are not yet undertaken.
- 21 Met with Dr. Farouk Shaheen and members of the Pediatric unit, Child Health Laboratory, NRC who will be working on the morbidity survey (Drs. Khaleed S. Kabil, Ahmed R. Foda, Mary T. Risk Wlah and Samia A. Wahed Boscila). Morbidity assessment tools were reviewed for understanding and applicability to the Egypt CRSP and possible modification and tailoring to the local situation.
- 22 Outbriefing with Drs. Galal and Farouk on 1) Immunology and 2) Morbidity aspects of Egypt CRSP. Details necessary in establishing any immunological effort within the CRSP and the Nutrition Institute were discussed. The concept of a Host Response Laboratory was discussed and its contributions to nutritional programs built around therapeutic intervention reviewed.
- Met with Dr. Esmat, Cairo University. Reviewed current immunological efforts and local needs for immunological assessment in research programs.
- 23-26 Depart Cairo, Egypt on Sept. 23, arrive El Paso, Texas on Sept. 26.

# Minutes

## Meeting of Egypt Project, Nutrition CRSP U.S. Scientists

O'Hare International Airport, Chicago

October 25, 1982

Present: J. Balderston, A. Ismail, G. Harrison (Chair), R. Hassanein, A. Kirksey, J. Ricci, O. Sieber, W. Stini, T. Wachs, R. Watson, C. Weber

Observer: D.R. Smith

1. Dr. Harrison opened the meeting by thanking all for attending and noting with regret that Dr. Jerome was absent due to a family emergency. Ordinarily project meetings will only be held with all three US PI's present; the current circumstance was quite unexpected. It was decided to go ahead and have the meeting, but there will be some decisions not taken because of the absence of one of the PI's. All other senior scientists were present except Dr. Ritenbaugh, who is in Egypt.

2. Drs. Kirksey and Sieber provided a brief update from the field. The village of Kalama was described and the summary of the site selection process prepared by Dr. Jerome for the SCB was distributed. There are designated Egyptian senior scientists in all areas except data management, which should be decided shortly. The trip reports of Drs. Jerome, Kirksey and Sieber will provide additional information. The Field Coordinator has been in Egypt for several weeks. It is planned that "pre-phase 1" community, demographic and food intake data will be sent this week to Kansas and anthropometric data to Arizona, in time for a preliminary summary for presentation to the SCB.

### 3. Updates from US Institutions

Arizona: Dr. Watson joined the Arizona faculty in August and is developing his program there. He has conferred in detail with Dr. Seiber and with Dr. Daisy Fleita who visited Arizona in August, regarding the program emphasis in disease/immunology. Drs. Watson and Sieber have written to Dr. Galal at Dr. Galal's request to provide some ideas for development of a host-defense section or laboratory in the Nutrition Institute. Since this capability does not now exist in the NI, planning will have to take place for the initial CRSP immunologic work to be done in Dr. Esmat's lab and for transition to the NI as the capability becomes available.

Arizona has submitted requests to Purdue for budgetary amendments to accommodate Dr. Watson's move to Arizona; the first request, in August, was rejected and further negotiations took place between the Title XII officers at the two institutions. A revised request was submitted October 4 and thus far has not been acted upon by Purdue. The Arizona group is very happy to have Dr. Watson and hopes that the budgetary impasse can be resolved with dispatch.

Dr. Stini has been testing and standardizing his instrument and methodology for measurement of bone density by photon absorptiometry. He described the rationale and method, and there was some discussion of its utility in the project and possibly for the other projects in the CRSP, since the equipment is portable enough to be shared among projects. Dr. Stini will provide a written description of the method for sharing with

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the SCB; Dr. Balderston recommended that it also be sent to Dr. Beaton.

Dr. Ritenbaugh is in the field now, assisting with the implementation of the pre-Phase I survey and the handling of initial data. She will also work on data handling and management systems in Egypt.

Additional work in progress at Arizona includes work on an annotated bibliography of nutrition studies in the Arab Middle East since 1970, and the development of a dissertation proposal on zinc deficiency and cognitive development by Mary Mohs, a graduate student who is closely in touch with Dr. Wachs. This proposal is now in the hands of the PI's for consideration.

Purdue: Dr. Kirksey reported that Purdue has arranged for purchase and shipment of all equipment necessary for the initial community survey.

Dr. Wachs reported that the core (Phase II) protocol is in pretty good shape with regard to cognitive measures in children. He has been working with Dr. Finley of the Mexico project regarding the development of measures appropriate for adults, especially in the areas of fluid and crystallized intelligence. Work is continuing on free play and toy measures and on developing measures of early motivation..

Dr. Ismail has lined up Egyptian counterpart scientists in the area of work physiology, and senses great enthusiasm for development of this area of research capability in Egypt. Equipment purchases have been postponed until the core decisions are made for Phase II. A revised protocol for the work capacity measures has been written and is in the process of being translated. A training manual will be developed.

Kansas: Dr. Jerome' accomplishments in Egypt are contained in her trip report. Kansas has an approved job description for the data manager. Hiring cannot take place until funds are transferred to amend the Kansas budget for this purpose. Dr. Harrison submitted a request for this to take place, on behalf of the PI's, on September 20. Subsequently Purdue received a request from Kansas with somewhat differing figures, and they currently await an official request from Kansas' contract office for a budgetary amendment. Dr. Balderston pointed out that there is considerable urgency in getting this position filled, as there is a meeting December 1 and 2 of all the project data managers and it is critical that the Egypt project be adequately represented.

4. Budgetary planning. Dr. Balderston explained that the Management Entity must submit immediately an accounting of the funds expended by all institutions from September 1, 1981 through August 31, 1982; an estimate of expenditures through March 31, 1983; and an estimated budget for year 03 (April 1, 1983 - March 1, 1984). At the present time, accounting of first-year expenditures and estimate of expenditures through next March have been submitted by Arizona to Purdue; Kansas' figures are not yet in hand; the ME has not received anything on behalf of the project from Purdue in this regard. The PI's forwarded a rough budgetary estimate for year 03 to Dr. Smith's office and to ME, so that Berkeley could have this for immediate reporting needs. This budget is considerably over the allocated planning amount, but the PI's do not feel they can amend it until after SCB discussions and program decisions taken next month. There was considerable discussion between Dr. Smith, Dr. Balderston and others regarding just how much money will be available for year 03. The issue was unresolved, and Dr. Harrison stated that further budgetary decisions could not be taken at this time in Dr. Jerome' absence. Until the

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reporting from all institutions about expenditures to date has been accomplished, the PI's will not have the information they need to approach detailed budget planning for year 03.

5. Publications agreement. A draft publications agreement was circulated representing the agreement developed by the Mexico project with amendments by Drs. Jerome and Galal. There was a great deal of discussion. Dr. Wachs objected strongly to the agreement as worded, feeling that it was unnecessarily restrictive and authoritarian. Dr. Ismail agreed that the tone was too harsh to be acceptable. The opinion was expressed by several that the draft as it stands now gives the PI's too much editorial control over the rights of individual scientists to analyze and publish data.

Discussion focused on the fact that any agreement for the CRSP as a whole as well as for the Egypt project should cover data availability and accessibility as well as publication. It was suggested that raw data from Egypt be deposited in four places: with the Egyptian senior scientist involved, with the US senior scientists responsible for that particular area, at Kansas for project data management, and at Berkeley for CRSP data management. The following items were agreed upon as being essential for the SCB to consider in developing an overall CRSP agreement; 1) a specified period of time for within-project only access to raw data, then a time for between -projects but within-CRSP access, followed by general availability of the raw data to the scientific community (how, in what form, etc?) 2) the need for a central record of all publications, abstracts, etc. originating from CRSP data.

It was suggested that the PI's for the Egyptian project, while in Washington next month, draft an agreement for our project which would be considerably softer in tone than the Mexican agreement and which would address the data-access questions.

6. Phase II design protocol draft. Dr. Balderston reviewed the process for the next several months: The SCB will generate a revised Phase II protocol based on discussions and preliminary data on the communities next month. The report then goes to the External Advisory Panel, which will meet in mid-January and then make a recommendation to USAID with regard to funding for Phase II. The implications were discussed in some detail; the composition of the EAP was reviewed.

Lead time necessary after a "go" from the EAP in order to implement Phase II was discussed. Dr. Watson feels he will need 2-3 months to be ready for Phase II initiation, Dr. Ismail estimates he needs only a few weeks; Dr. Wachs would prefer six months but may be able to condense that to 3 months under optimal circumstances. Drs. Kirksey and Harrison felt that 3 months would be adequate for their areas, Dr. Kirksey pointed out that this time line is consistent with the plans being made in Egypt, as Dr. Galal has been assuming that Phase II can start sometime around April 1.

Specific aspects of the Phase II draft protocol were discussed. Dr. Wachs feels the cognitive section is in reasonable shape, wants to make sure Brazelton exams are retained and pointed out that parent-child interaction measures and toy play measures remain to be standardized. Dr. Ismail has had many concerns about the work capacity/physical performance aspects. It is important that a measure of work capacity be retained in the

core. This has been discussed in detail in recent weeks and months and Dr. Balderston pointed out that all projects are now in agreement on this issue.

7. Items for SCB agenda. Several items were proposed to be added to the SCB agenda:

- 1) Publication and data access agreements
- 2) Procedures for data quality control, reliability, monitoring of intrinsic variability in measures (this has been addressed for anthropometry only, so far)
- 3) Policies about intervention need to be discussed in detail

To what degree will projects be able to decide unilaterally on questions of treatment/nontreatment?

8. Items for Institutional Council or Finance Group: The following were agreed upon as items which the Egypt Project should request the IC and/or the finance group to consider at their meeting:

- 1) Planning for additional years should begin now. The potential for longer-term involvement in this project should be faced early and planning should be systematic.
- 2) The issue of budgeting and setting aside money relative to extra benefits for the Field Coordinator has been a continuing source of disagreement between the PI's on this project and the administration at Purdue. The issue particularly revolves around setting aside funds in excess of what could be reasonably used - for education of dependents, extra international trips, etc. This should be resolved by the IC.

9. Project meeting after SCB meeting. It was suggested and there was general agreement that it would be wise to have a project meeting with Dr. Galal after the SCB meeting. He will stay in Washington November 13 and 14, and it was agreed that November 13 would be reasonable and that one day would be inadequate. The purpose would be to review the design decisions for Phase 11 decided on by the SCB and to develop time lines and plans within the project for the next months. Drs. Kirksey, Jerome and Harrison plan to stay in Washington through that time, and Dr. Watson has plans to be there on the 13th. Drs. Ismail and Wachs expressed a desire to attend and others may be able to as well. Dr. Harrison will investigate a meeting room and hotel reservations.

The question was raised about who will pay for domestic project meetings. Dr. Harrison mentioned that the PI's had decided some time ago that funds would be set aside in Purdue's budget to fund domestic project meetings, since it was impossible to anticipate when and where these would take place. Travel for this meeting (Chicago, 10/25/82) was funded out of individual project budgets at each institution with Arizona bearing the cost of the meeting room, etc. because the Purdue administration indicated that it would not and could not pay for travel of other than Purdue faculty. Discussion left this issue unresolved. The PI's will confer about this on Dr. Jerome's return, decide how to fund the project meeting on November 13, and plan for avoidance of this particular problem in the future.

Submitted by:

Gail G. Harrison  
Gail G. Harrison  
Project Representative

Distribution:

U.S. Senior Scientists  
Dr. Galal  
Dr. Smith  
Dr. Balderston  
Drs. Thomas, Matlock, & Hudson  
Ms. Ricci, Ms. Hassanein

MINUTES  
Meeting of Egypt Project, Nutrition CRSP U.S. Scientists  
Lombardy Towers Hotel, Washington, D.C.  
November 13, 1982

Present: O. Galal, G. Harrison, A. Ismail, N. Jerome, A. Kirksey,  
W. Remmers, S. Kahn (AID), T. Wachs, R. Watson, C. Weber

1. The meeting was opened, and Bill Remmers was introduced. Mr. Remmers is a candidate for the Data Manager position at Kansas.
2. A discussion of the Agenda followed. This consisted of the following:
  - a. A report from Egypt
  - b. IC and Finance Group Meeting November 11
  - c. SCB decisions:
    - 1) business, budget
    - 2) data flow
    - 3) Data Managers Meeting
    - 4) External Advisory Panel (meets January 17-19, 1983)
    - 5) publications agreement
  - d. Core design decisions
  - e. Project-specific components
  - f. Communication - field coordinator, etc.
  - g. Project meetings
  - h. Coordination of field work logistics
3. Dr. Galal gave a summary of the work in Egypt, including:
  - a. Recruiting staff and orientation
  - b. Field site selection
  - c. Review methodologies
  - d. Concentration on food intake and anthropometric measurements

Dr. Galal described the Nutrition Institute, explaining that its functions were to generate knowledge, disseminate information, train staff, and act as an information source for other institutions and government.

Dr. Galal said that 40 families had completed the preliminary food intake assessment, and that anthropometric measurements had been made on 245 families. He also said that the end users of results will be informed about the project as it develops. Two committees in NI were set up to discuss results as the project develops.

4. Dr. Jerome gave a description of the village of Kalama. It has a population of about 22,000 people, consisting of about 1,600 Muslim families. The village encompasses 1,762 Fedans, has 6 mosques, and has a Health Center. Two hundred forty-five families had been surveyed to date, and of them, 18% engaged in farming, 5 to 7% were

government employees, and 35% worked in Cairo. Food flows primarily from the city to the village.

5. Dr. Harrison discussed nutritional status data to date. Children under 12 years of age showed very early stunting of height without catch-up growth. Height/age measurements showed 28% normal. Most weight/height measurements were normal. Children's measurements did not cluster in families - i.e., great variability existed within families. At 4 to 6 months there was a deviation in the normal growth curve, and another deviation occurs at 18 months.
6. Dr. Galal cited the benefits of the CRSP project to the community include the upgrading of the facilities in the community, including those of the Health Center.
7. IC and Finance Group, met November 11, 1982

This group wanted to be more involved with CRSP. The Fiscal Year for the CRSP was changed to coincide with the Federal Budget Year (October 1). Budgets will be revised to match the new Fiscal Year. A policy decision was also made that no family will be studied with CRSP funds for more than 25 months.

A discussion of data flow ensued, including that concerning transfer of data into computer format in Egypt with cleaning. Flow would follow monthly to Kansas and then to Berkeley. Data would also be retained by the Senior Egyptian scientist in the particular area concerned, and transferred to the appropriate U.S. scientist.

Dr. Remmers said a possibility existed of perhaps entering data into microcomputers in the field.

8. Communications

It was decided that the field coordinator would in the future:

- a. Report on a regular basis through the P.R.
- b. U.S. scientists in the field will communicate through the field coordinator.
- c. U.S. scientists will communicate with the field coordinator through the P.R. whenever possible. Dr. Woods Thomas will telex these instructions to the field coordinator.

9. Travel Schedules

Travel schedules to date were discussed. They consisted of the following:

- a. Dr. Hussein to go to Berkeley for Data Management Meeting about the middle of December.
- b. Drs. Galal and Harrison to go to EAP in January (Berkeley).
- c. Various people to go to Egypt:

- 1) Dr. Jerome from January 18 to February 28, 1983.
  - 2) Drs. Ismail and Watson to go from the middle of December, around the 14th, to January 6th.
  - 3) Dr. Harrison will go from January 26 to February 28, 1983.
  - 4) Dr. Wachs will go from January 4 to February 4, 1983.
10. Each project needs to develop a publications and data access policy. The Mexico project has developed a policy which all present agreed was too restrictive for the Egypt project. There was agreement on several principles:
- a. Access to CRSP data should be restricted to CRSP investigators for some specified period of time.
  - b. A central archive of publications in process, including abstracts, should be maintained and available to all CRSP investigators.
  - c. The senior Scientist (both US and Egyptian) in a given area (e.g., food intake, nutritional status, reproduction, etc.) should be involved fully in the development and authorship of any publications utilizing the data for which they are responsible.
  - d. Students working on the project should be treated as extensions of the senior scientist(s) with whom they are working, insofar as\*
11. Drs. Jerome and Remmers continued the description of the 245 households studied so far. 63% are regular extended households, 37% are joint households. 2,178 individuals are in the households, of which 940 are males. 45% of the females are in the reproductive years, from 11 to 45 years of age. Four per cent are pregnant at present, and 8% are in the postreproductive years. Females more than 46 years old constitute 8% of the female population. 75% of males are less than 22 years old. The mean household size is 8.4 people. Generally, the population is characterized as being a young one. The inclusion of households in Phase II that have been selected for preliminary testing was discussed.
12. Modifications of Research Design: Phase II Core and Country - specific data
- a. Food Intake  
The range of variability in food intake anticipated was discussed. It was decided that the frequency of six observations every three months was adequate. Every household member is to be measured on two sequential days per month plus one additional day per month. An inventory of "active food supply" and combination of recall and weighing of food will be done.
  - b. Immunology  
A discussion of immunology measures occurred, and the secretory immune system will be assessed via mother's milk, tears and saliva every 6 months. Blood samples will be requested on individuals over 6 months of age every 6 months for T-cells, eymphocyte mitogenesis, complement and hormones (4ml). If blood

- \*10. d. (cont.)  
approval of projects, approval of publications, etc.)

Dr. Galal will discuss these issues with the Senior Egyptian Scientists and will work with Dr. Harrison in January to develop and draft policy for circulation.

sampling increases attrition, it was acknowledged that this may effect statistical validity.

c. Nutritional Status

Core anthropology measurements were discussed, as were the core finger stick hematocrit, hemoglobin, and ferritin measurements, and hair samples for zinc status assessment.

d. Cognitive Development

Dr. Wachs will provide a 3-page country-specific protocol. Cognitive tests would add approximately 30 minutes per individual per month. "On task behavior" will be measured via in-school measurements.

e. Work Performance

RMR, 4 times/year and time allocation are part of the core. Work capacity was considered to be not a part of the core, but will be done by the Egypt project. Two measurements per individual will be taken over a 2-year period.

f. Immunology

IgA, IgG, lysozyme, E.Coli, and Rota virus will be assessed.

13. Research Design for Phase II: Core and Country - specific projects

The core data will be described in detail in the report of the SCB Meeting which is to go to the EAP by mid-December. A draft of that report will be circulated to all Senior scientists by early December for comment. In addition, the following Egypt-country specific projects were discussed:

a. Food Intake

The range of variability in food intake anticipated was discussed. It was decided that the frequency of six observations every three months was adequate. The core design now calls for observation of all household members in the same days, two days in the same week, once per month. The Egypt project will attempt to do the following: all household members, two sequential days plus one randomly selected day from the same week. The core will also include an inventory throughout the week of the "active" food supply. The mix of weighing and short-term recall will vary somewhat from project to project.

b. Immunology

The secretory immune system will be assessed via mother's milk, tears and saliva every six months. Blood samples are not part of the core, but will be requested in this project from those individuals willing to provide them. Ideal is 4ml every six months in individuals over six months of age. The possibility of blood sampling affecting attrition, and subsequent possible effects on statistical validity, were discussed. In breast milk

IgA, IgG, lysozyme, and antibodies to E.coli and Rota virus will be measured.

c. Nutritional Status

Core measurements include anthropometry as decided in earlier drafts, and a finger stick for hematocrit, hemoglobin, and ferritin or FEP measurement. In addition, the Egypt project will attempt to obtain hair samples for zinc. Individuals who are willing to give blood for immunology will have one ml additional drawn for nutritional status measures including zinc. Dr. Stini's test for bone mineral density will be made on a subsample of individuals.

d. Cognitive Development

Dr. Wachs will provide a protocol to be included. Most of the cognitive tests proposed have been included as part of the core; additional ones proposed for the Egypt project will add approximately 30 minute per individual subject per month.

e. Reproduction

Test-weighing of infants for breast milk volume has been dropped from the core due to lack of feasibility in all three sites using the WHO protocol. The Egypt project will investigate the possibility of a modified test-weighing procedure initially in the U.S. in the laboratories of Drs. Harrison and Kirksey.

f. Growth and Development

Dr. Galal mentioned that there are three periods of growth velocity-intrauterine, infancy, and puberty's growth spurt. The Egypt project will develop additional studies focusing on intrauterine and pubertal growth, including newborn assessment, maternal weight gains, anthropometric studies of infants, and bone maturation assessment.

14. Project Meetings

A Spring meeting is desirable; timing will depend on Phase II startup.

Submitted By:

  
Gail G. Harrison  
Project Representative

Distribution:

U.S. Senior Scientists  
Dr. Matlock  
Dr. Balderston

**PRELIMINARY SURVEY AND PILOT STUDY**

**NUTRITION CRSP: MEXICO**

**Principal Investigating Institutions:**

**University of Connecticut**

**Instituto Nacional de la Nutricion Salvador Zubiran**

**January 1983**

NUTRITION CRSP: MEXICO TEAM

UNIVERSITY OF CONNECTICUT

Dr. Lindsay Allen	Principal Investigator
Dr. Gretel Pelto	Principal Investigator
Dr. Perrti Pelto	Co-investigator
Dr. Roy Tembi	Data Analyst
Bruce Bernstein	Educational Assistant I

INSTITUTO NACIONAL DE LA NUTRICION

Dr. Adolfo Chavez	Director, INN	Principal Investigator
Dr. Alfonso Mata	Physician	Field Director
Dr. Homero Martinez	Field Physician	Reproduction Study
Pesaj Goldfeder	Data Manager	Data Manager
Pilar Alvis	Medical Resident	Reproduction Study
Catalina Garcia	Nutritionist	Diet Study
Mirna Cuellar	Nutritionist	Diet Study
Josefina Farrera	Secretary	Secretary
Ramon Lira	Programmer	Data Analysis
Dr. Beatrix Cabrera	Physiologist	Activity
Barbara Loyo	Interviewer	Cognitive Development Study
Luzma Neneses	Interviewer	Socio-economic Study
Tere Carus	Nutritionist	Diet Study

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## Chapter I

### INTRODUCTIONS

The materials presented in this report represent several different modes of data gathering in a number of locations within the research area by investigators from different disciplines.

In the spring of 1982, following the decision to locate the project in the Solis Valley and after several weeks of preliminary fieldwork, four communities were selected as a major focus for research in Phase I of the project. The communities were selected as potential sites for the long-term study. In these four communities -- San Nicolas, San Miguel, San Antonio and Cerritos -- data collection proceeded through a three stage process, beginning in May, 1982:

- 1) A full census of the four communities, with basic demographic data on all households.
- 2) An anthropometric and dietary survey of a random sample within each community, as follows:

## Number of Individuals

<u>Community</u>	<u>Census</u>	<u>Anthropometry</u>	<u>Diet</u>
San Miguel	588	363	78
Cerritos	908	554	107
San Nicolas	1114	676	148
San Antonio	1285	781	104

- 3) A study of social characteristics in a subsample of 109 households, selected randomly from the households in the diet-anthropometry study.

During the summer of 1982, ethnographic work was carried out in the four communities, as well as in other valley locations. The ethnographic description is based, in part, on the work during that time, and, in part, on earlier research since anthropologists from the University of Connecticut first began research on the area in 1970.

Another source of data in this report is a pilot study carried out in September and October, 1982 in the community of San Francisco, a small community at the far end of the valley that will not be included in the long-term study. The data on health status, illness patterns and reproductive history are based on clinic records from the Solis Hospital (headquarters for the project) and on patients or informants contacted through the hospital.

Throughout the project, ethnographic understanding, as well as design of research instruments and strategies has been guided by previous research and experience of the Instituto Nacional de la Nutricion in the Solis Valley and similar highland areas of Mexico.

In the following sections, data are presented for the valley as a whole, for the four potential research communities, and for the pilot community.

## Chapter II

### THE SOLIS-TEMASCALCINGO RESEARCH AREA

The Instituto Nacional de la Nutricion (Mexico)-University of Connecticut Coordinated Research Support Program (CRSP) project is being carried out in the Solis Valley of the Lerma River in the municipio of Temascalcingo. The municipio of Temascalcingo, with a population of approximately 44,000 people, is situated in the northwest corner of the state of Mexico in the Central Highlands. From Mexico City one can travel by bus or automobile on paved roads to Temascalcingo in approximately three hours, on a route west to Toluca (capital of the state of Mexico), then northward through the market center of Atlacomulco, turning on to a paved secondary road that passes a number of Mazahua Indian communities before descending into the fertile valley bottom of Temascalcingo.

The communities that comprise the municipio of Temascalcingo are primarily Mestizo (Mexican-oriented, Spanish-speaking) in the valley bottom, whereas the communities in the hills surrounding the valley are Mazahua Indian villages (on the south and west) and Otomi Indian communities on the northeast side. In pre-Revolutionary days the valley area was dominated by the rich Hacienda Solis, with its thousands

of hectares of wheatlands and numerous villages of Indian and Mestizo peoples, who were held in peonage as laborers for the hacienda owners. The hacienda Solis -- now properly referred to as ex-hacienda Solis -- still dominates the center of the valley scene, but the central hacienda building has been converted into an agricultural education center, and the new and modern Health Center Solis now stands in the shadows of the building that in earlier decades symbolized the pre-Revolutionary hegemony of the privileged elites.

The municipio of Temascalcingo, like many areas of Mexico, is full of contrasts: between the Mestizos and Indians; between town dwellers and the villagers; between the small number of local elite with middle class occupations and economic resources and the mass of low-income families. The town of Temascalcingo, located in the south end of the valley, is the political center and also the market town for the local population. Temascalcingo has a bank, a small hotel, an extremely busy bus station, and a considerable variety of commercial enterprises. The weekly market takes place on Sunday (with some carry-over to Monday) and attracts a large number of vendors from other locations, selling fresh produce, factory-made clothing, jewelry, a variety of "dime store" items, and locally manufactured pottery.

Until 1970 there were no paved roads through the valley, other than the main road that connects the town of Temascalcingo to the wider world. However, in recent years the nine kilometer road from Temascalcingo to the village of Solis, and its extension northwards to the small city of Amealco, has been paved, as has the road eastward from Temascalcingo to the municipio of Acambay. The numbers of vehicles on the roads in the valley have greatly increased, including many more buses in the network of transportation that links the local people to market centers and employment locations in Atlacmulco, Toluca, and Mexico City. There are hourly buses daily between Temascalcingo and the capital.

The valley floor has an elevation of approximately 2500 meters above sea level, with some of the surrounding hills reaching to elevations over 3000 meters. The climate is moderate during the summer months, while winters can be quite chilly -- in common with other regions of the Central Highlands. As in other parts of Mexico, the rainy season is expected in late May or early June, lasting throughout the summer months. From autumn (Sept.-Oct.) until late spring there is very little rainfall, so that any crop-growing during that period requires irrigation.

In pre-revolutionary days, at least throughout the 19th century and perhaps earlier, the valley area was irrigated by means of an extensive system of canals and waterworks

that controlled the Lerma River and permitted distribution of river water to almost all parts of the valley floor. This irrigation system fell into disrepair after the Revolution, but has now been restored and augmented through large-scale construction efforts in the 1960s. The extensive (and expensive) construction activities, including the creation of a new river bed through most of the valley, brought a period of high employment and moderate prosperity to the valley area during the 1960s. By 1970 most of the irrigation construction was completed, and wage workers had to move outside the valley region to seek employment. The period of extensive construction work apparently added considerably to the local population's interest in wage labor as an alternative or supplement to their agricultural activities.

## 2.1 THE FOOD SYSTEM IN THE VALLEY OF SOLIS

Located in the heartland of central Mexico, where the corn-beans-squash-chili complex evolved as the staples that supported the growth of Mesoamerican civilization, the people of the Valle de Solis are heavily committed today to the food of their ancestors. Corn, consumed primarily in the form of tortillas (and less frequently in other ways) is a major source of calories and a primary source of protein. For adults in the agricultural communities of the valley, tortillas have contributed approximately 45-60% of total calories, although there is some evidence that the reliance

on corn is diminishing as wheat and rice consumption increases. As noted above, maize is also, overwhelmingly, the primary crop in the valley, accounting for 86% of acreage in the irrigated lands and well over 90% of the cultivated, non-irrigated land.

Dried beans, which are available locally in many different varieties, are another primary food. The beans, cooked in water with salt, and, in some households, flavored with onion, are eaten together with the tortillas, along with a salsa typically composed of chopped green chili, tomato, onion and salt. The general serving pattern is for the cook to portion the beans into individual shallow bowls or plates of local pottery. The eater then puts the beans into the pancake-like tortillas to make a taco which is held in the hand. Alternatively, the beans are eaten with a spoon, with the tortilla folded or rolled and held like a piece of bread, eaten alternately with the beans.

Beyond the basic dietary "core" of corn-beans-chili, many other foods augment the classic staples. Among the most important are bread, pasta, rice, chicken, eggs, beef, milk, a variety of fruits (especially bananas, oranges and local seasonal fruits) and vegetables, including squash, potatoes and greens. Commercially processed foods, such as sardines, cookies, candies, salty snacks and soft drinks, are playing an increasingly larger role in local diets. Alcoholic bever-

ages, particularly commercially-bottled beer and the traditional beer, pulque (made from the sap of the maguay ("century plant")) are also important dietary components in many households. Coffee, heavily laced with sugar, is also a part of daily diet in most households.

The most typical form for preparing vegetables, pasta and rice, is to serve them in a sopa or thin stew, which, like beans, is served in individual dishes. Eggs are usually scrambled, with onions or chili, and served as a filling for tortillas. Chicken and meat are usually cut into individual-sized pieces prior to cooking in a sopa. A variety of dried red chilis are used as condiments in cooking or prepared as a salsa to accompany other foods.

The schedule of eating varies considerably, partly in relation to seasonal work schedules and partly as a function of family economic condition. In some households early breakfast, with bread and coffee, is typical, while in very poor families, coffee alone is the morning "food", until ten or eleven o'clock when tortillas and beans (the latter from the previous day) is served as the almuerzo. The main meal of the day, the comida, is served between two and four or five o'clock. A light evening supper, often the left-overs from the comida, is consumed in many families, but not all. Usually these "left-overs" are served as tacos. In some households the evening cena consists of salty or sweet snacks.

The food utilized by valley households comes from three sources: home-produced, purchased from markets, stores or vendors, and collected or gathered. In agricultural households much of the corn is home produced, although many households are not self-sufficient in maize. A common pattern is to sell some corn after the fall harvest in order to obtain cash and then purchase additional corn the following spring or summer when home-produced stores are exhausted. Squash, beans, chili, and other vegetables are also produced for home consumption, but in the Solis valley few, if any, households raise all the beans they need, and chilis, tomatoes, onions, and other main foods are also frequently purchased.

Every week, on Sunday, vendors of food (and other goods) converge on the market town (Temascalcingo) bringing food products from other parts of Mexico. In addition to a large variety of fruits, vegetables, beans, chilis and dried corn, processed foods (cheese, bread, dried fish, ices, gelatins, and sweets) are also available. More than 100 vendors set up their stands each week in the central plaza. In addition, vendors of local products, such as squash blossoms, avcaddos, apples, and peaches, in season, sell their small inventories on street corners near the market.

In addition to the large market on the "dia de la plaza", numerous stores in Temascalcingo, including general grocery

stores and specialty stores, such as butcher shops, bakeries, cheese and dairy products, are open seven days a week, providing access to a wide range of foodstuffs.

In the rural communities small stores with a highly variable range of inventories can be found in most communities. The inventory for the store in San Nicolas (below) represents the higher end of the scale for the small community stores. Most people in the rural communities make major purchases at the weekly market in Temascalcingo and supplement these with purchases from the local stores.

This informal inventory lists only those items that were directly visible on the shelves, or were seen to be sold during approximately two hours of observation in the store. While most items appear to be stored directly on the shelves, it appears that certain bulk items -- sugar, flour, rice, etc., were probably stored out of sight. Some animal feed was also stored in bags in another room. Cooking oil was sold in small quantities (cupful) on two occasions, and medicines (e.g. aspirin) were sold as individual tablets.

Finally, we should note the role of wild foods (the fruit of the nopale cactus, nuts, and wild greens) as further food resources. We believe that there has been a decline in the use of such foods but in some households they may still play a significant dietary role, at least during certain seasons of the year.

TABLE 1

## Inventory of a "Tienda" (Small Store) in San Nicolas Village

(June 15, 1982)

Oats, rolled  
 Cookies  
 Bananas  
 Rice  
 Pasta  
 Sardines  
 Canned Salsa  
 Powdered milk  
 Limes  
 Tomatoes  
 Eggs  
 Pickled chilis  
 Cooking oil  
 Kool Aid  
 Cake  
 Instant coffee  
 Fruit juice  
 Evaporated canned milk  
 Chocolate  
 Beer, Coca-Cola, other soft drinks  
 Alka Seltzer  
 Vicks Vapo-Rub "respire otra vez"  
 Acromicina (antibiotic for diarrhea)  
 Mejoral (aspirin)  
 Desenfriol D (medication for cold)  
 Cafiaspirina ("coffee-aspirin")  
 Pico ("especialmente para su estomago")  
 Nivea cream  
 Candies and gum  
 Soap (several kinds)  
 Detergent  
 Light bulbs  
 Rope  
 Notebooks and other paper supplies  
 Toilet paper  
 Slingshots  
 Batteries  
 Baby bottles  
 Cigarettes  
 Shoes  
 Decals for shirts  
 Shoe polish  
 Cloth and thread  
 Brooms  
 Fans, small ones for fanning fires  
 Candles, plain brown candles for household use  
 Candles ("veladoras") votive candles for church use

TABLE 2

Retail Prices for Selected Primary Goods in the  
Temascalcingo Area

(Prices in Mexican pesos. One peso equals approx. \$.02 US)

<u>Food</u>	<u>May, 1982</u>	<u>August 3, 1982</u>
tortillas	5.70 pesos/kg	11 pesos/kg
meat (beef)	100-120 p/kg	200 p/kg
beans	25-28 p/kg	36 p/kg
chicken	85-90 p/kg	150 p/kg
bread (sweet)	1.25 p/piece	2 p/piece
(roll)	.50 p/each	1 p/each
milk	14 p/liter	16 p/liter
oil (cooking)	60 p/liter	80 p/liter
sugar	--	13.5 p/kg
lard	--	90-100 p/kg
tomatoes	--	20 p/kg
oranges	--	7 p/kg

Source: Dona Matilda Ruiz de Lopez  
Ex-Hacienda Solis (CCDAGEM)  
August 4, 1982.

2.2 AGRICULTURE IN THE VALLEY

In the heyday of the Hacienda Solis the valley was an important wheat-producing region. After the Revolution, land was redistributed through the ejido system, a program that established community regulated lands, allocated to individuals, with inheritance rights held by children of the original ejidatarios but with provisions to protect the community rights, by prohibition of individual sale and some restrictions designed to prevent reconcentration of land in the hands of a few wealthy owners. After the re-distribution of the lands to the individual ejido communities, most of the local people preferred to sow their lands in maize, thus

insuring home production of the primary food staple, while surplus could be sold for cash as needed. Despite the efforts of governmental agriculture specialists -- who have sought to develop other income-producing crops -- the devotion to maize production has remained predominant. The following table shows the approximate numbers of hectares devoted to different crops on the irrigated lands of the valley for 1980.

TABLE 3  
Hectares in Crops (1980)

<u>Crop</u>	<u>Hectares</u>
Maize	4143
Fodder	497
Wheat	71
Oats	23
Barley	20
Grapes	9
Squash	6
Tomatoes	5
Lettuce	1
"Vegetables"	34

Non-irrigated land of the municipio is nearly three times more extensive than the irrigated area, and the pattern of cultivation in the dry land areas is even more completely devoted to maize.

As recently as the mid 1970s, the valley region had a much higher percentage of irrigated lands devoted to fodder

-- perhaps nearly a thousand hectares. Fodder production was strongly encouraged by government agricultural specialists, who intended to convert the entire valley area into a dairy economy. Several dairy cooperatives were established in the valley, but these organizations disintegrated during the period from 1976 to 1980, in part because of economic difficulties, and in part because of internal management problems. Consequently, the local market for fodder declined dramatically.

Most agricultural families in the area raise a variety of animals for local food consumption, for transportation, and for maintenance of a "savings bank", from which animals can be sold when cash is suddenly needed. The following list shows the census of animals (other than cats and dogs) as estimated by the municipio government:

TABLE 4  
Animals in Temascalcingo (1980)

Milk cattle	4,962
Meat cattle	6,417
Pigs	6,121
Sheep	14,662
Horses, burros and mules	6,236
Turkeys and chickens	39,353
Goats	1,576

The great majority of households in the municipio, as in most other rural regions of Mexico, have at least a few chickens and turkeys, even if they are too poor to have any other food animals. Also, the majority of households have at least one work animal, usually a burro. Households with somewhat more wealth in animal holdings generally have a horse or mule and a few sheep. Pigs are an important cash crop in many households. Wealthier people of the region consume some of their animals for meat, in addition to using home-produced eggs and some milk products, while poorer households consume their own animals only on special, festive occasions. The pattern of animal ownership in the four survey communities is reflected in the responses from the subsample of 109 households in the social survey. In our interview schedule we asked whether the household owned any animals in the following nine categories. We did not ask "how many?", nor does this rough "animal index" reflect possible differences in the status of the animals -- e.g. shared ownership when a family takes another family's animals for caretaking.

### 2.3 EMPLOYMENT OUTSIDE OF AGRICULTURE

In addition to farming, one of the main artisan industries of the Temascalcingo region is pottery. The Mazahua Indian communities in the southwest corner of the municipio -- San Juanico, Sta. Maria Canchesda, and Santiago -- are

TABLE 5

## Animal Ownership in the Valle Solis

(Numbers of Families Having One or More of Each Animal Type)

<u>Type of Animal</u>	<u>San Miguel</u>		<u>Cerritos</u>		<u>S Antonio</u>		<u>S Nicholas</u>	
	Yes	No	Yes	No	Yes	No	Yes	No
Cows	5	10	6	9	16	13	25	25
Mules	4	11	5	10	6	23	24	26
Sheep	6	9	2	13	6	23	21	29
Turkeys	12	3	11	4	21	8	39	11
Pigs	9	6	10	5	18	11	23	27
Horses	4	11	10	5	13	16	32	18
Burros	10	5	4	11	19	10	32	18
Goats	none		none		none		4	46
Chickens	9	6	12	3	26	3	46	4
Ducks, Geese	1	14	4	11	1	28	1	49
Doves	none		1		3		7	

all pottery communities, in which nearly every household is involved directly in the manufacture of a cheap and durable household pottery. Most of the pottery produced in these communities has not gone into the tourist market, though pottery truckers carry Temascalcingo wares throughout Mexico, and some of it is sold over the border in Texas. Since the early 1970s, however, a government-sponsored program to up-grade Temascalcingo pottery has included the construction of gas-fired kilns and the development of a distinctive and attractive tableware that is sold on the tourist market. Practically all the households that produce pottery are also involved in agriculture. The pottery industry is particularly important for the Mazahua communities because they have very little irrigated land, so their crops are far from adequate for maintaining the household subsistence economies.

Other minor cottage industries exist in the area. Basket-making and manufacture of straw hats are carried out by a few families in La Magdalena and San Pedro Del Alto (both Indian communities); whereas in the town of Temascalcingo one finds a few modern manufacturing enterprises including a small-scale metal-working establishment, a thriving "gelatin" manufacturer (the "gelatins" are sold like candies in public gathering places), and a small clothing factory. Brick manufacturing and stone quarrying is also carried out by a few individuals, mainly for local utilization.

The transportation industry is of considerable importance in the Temascalcingo region, particularly trucking pottery to distant markets. Approximately 150 taxis operate in the Temascalcingo area, and they play a major role in the transport of persons and goods, adding a dimension of flexibility and personal service not provided by the fairly considerable number of buses in the region. Since wage labor opportunities within the valley are relatively limited, it is not surprising that the people of the Solis-Temascalcingo region have been involved in temporary labor migrations to fairly distant work places for many decades. In the heyday of the bracero program many men from the region worked in the United States. Some of that labor migration to the U.S. and Canada still occurs, in both legal and illegal forms. Despite the low wages (by U.S. standards), migrant laborers have often been able to bring back considerable sums of

money to their families, and some individuals who now own trucks, small businesses, or other economic assets owe their start to their migrant labor expeditions to the United States.

In interviews carried out in 1970 in 49 households in the town of Temascalcingo, the list of different workplaces shows that Mexico City has been the primary magnet attracting workers, but the local people have also been to many other locations.

The timing of migration to wage work has generally been related to the agricultural cycle. Men try to be home for those agricultural activities that are considered to be key parts of the male role as household head. The two main agricultural activities that are seen as requiring the participation of family heads are planting (April to June) and harvesting (from September to December). Of these, it appears that the planting season is the more crucial, as plowing is practically always carried out by males, whereas women play a much more active part in later fieldwork, including harvesting.

Following plowing, planting, and tending to the first tender shoots of maize, men often rely on women and children to take care of much of the weeding and other midsummer agricultural activities. Therefore, near the beginning of July many men leave the area to go to wage work in Mexico.

The summer months are also a time of reduced food inventories for many families, as their maize stores are often exhausted by that time and they have to purchase a larger part of the daily food supplies with cash.

Interviews in 109 households, randomly selected from the larger household survey in the four potential research communities indicate that temporary labor migration continues to play an important role in the economy and social system of the region. As we see in the following table, Mexico City is the main workplace in which the local people find employment when they leave the valley for varying lengths of time.

TABLE 6

Work Locations Outside of Solis-Temascalcingo Valley Area

(head of family or any other household members during the past year)

No outside work	38
Mexico City (household head)	42
Mexico City (sons/daughters)	38
Toluca	2
El Oro	1
Colima	1
Villa Hermosa	1
Canada	3
United States	2

The degree of migration depends on the community of residence, probably reflecting differences in available cultivable lands in the different communities. The following table

contrasts San Nicolas with the other three research communities:

TABLE 7  
Labor Migration Patterns (Family Heads) in Four Communities

	<u>0 Months</u>	<u>1-2 mo.</u>	<u>3-6 mo.</u>	<u>7-10 mo.</u>	<u>11-12 mo.</u>
San Nicolas	20	3	12	4	11
Cerritos, St. Miguel, and St. Antonio	37	4	13	1	5
Totals	<u>57</u>	<u>7</u>	<u>25</u>	<u>5</u>	<u>16</u>

These data indicate that labor migration is more intensive from San Nicolas, with a bit over half the family heads (27) migrating for at least 3 months. In the other three communities, the survey indicates the likelihood that only a few of the family heads migrate to Mexico City for longer periods of time. Only 19 of the 60 respondents were reported to be gone for three months or more.

#### 2.4 FAMILY AND KINSHIP

Kinship patterns among Mexican rural populations, particularly mestizo populations, have generally been described as bilateral, and there are no strong corporate kin groups with economic, political, or social functions beyond the household units. This does not mean that kinship as such is unim-

portant -- is simply means that ties of relationship beyond nuclear families are flexible social bonds of support, assistance, and sociability that consists of networks of individuals and families.

Households range in size from lone individuals (often elderly persons) to families with 10 to 15 persons. The larger households frequently include a married son (rarely a married daughter) plus spouse and their children. The ideal appears to be that young couples should establish their own households within a few years after marriage. Thus, many of the larger families are likely to be split, at some future time, when the son and his wife are financially able to establish a separate residence.

In the census of households for San Nicolas, one of the four survey communities, generation in-laws are presented in Table 8.

TABLE 8

## Extended Households in San Nicolas (1982)

Household Size	Daughter-in-Law Present (number)	Son-in-Law Present (number)
4	1	1
6	2	1
7	3	-
8	2	1
9	1	-
10	-	1
11	3	-
13	1	-
15	1	-

From these data it would appear that households with sons-in-law, which are unusual, are more likely to be relatively small, as the daughter plus her spouse have moved in (or remained) in order to augment the family labor force.

The marriage data from San Nicolas indicates that the usual pattern of marital choices tends to be village endogamy, marrying someone from within the community -- of 126 marriages, both partners were born in San Nicolas in 108 cases. A few of the spouses in San Nicolas are from more distant locations, such as Mexico City. These marriages usually have resulted from contacts that originated when young men of the community were in Mexico City doing wage work.

## 2.5 INHERITANCE

Family lands and other wealth are divided equally among the sons, with daughters receiving very little inheritance except in unusual cases. Often the main contribution of the girl's family is in sponsoring half of the costs of the wedding celebration. After that she is primarily dependent on her husband and his family for support.

The equal inheritance among sons -- and hence the continual partitioning of lands into smaller and smaller pieces -- has been noted by many researchers as a serious problem for the "rationalization" of effective land use among Mexican ejido communities. As land plots have been subdivided fur-

ther and further in the Solis area, more and more of the younger generation find themselves with insufficient lands, and must migrate to the cities, or find other non-agricultural means of livelihood. Individuals who find themselves unable to support their families on the small plots of land may take up full time wage labor occupations, in which case their rights to ejido lands can be jeopardized. Various patterns of "share-cropping" and loaning (or renting) of lands occur, though these arrangements are of questionable legality in the eyes of the ejido land laws.

## 2.6 EDUCATION

In the past, educational resources in the valley were very limited, with the only secondary level school located in the town of Temascalcingo. In recent years, primary schools have been built in nearly every community and Solis itself has acquired a secondary school.

The numbers of new schools built in the area during the past decade reflects the ideologies of Mexican governmental policy-makers, but it also indicate the growing realization in rural populations that one important road to economic and social development is through schooling. Even people with no specific career tracks in mind have become increasingly aware of the need for literacy and general knowledge of the world in connection with the varieties of governmental policies, programs and other situations which require complex

decisions and responses from individual families. However, because of the paucity of past resources, educational levels are quite low, as can be seen in Table 9.

TABLE 9

## Education Levels in the Four Survey Communities

## EDUCATION OF HEAD OF FAMILY (MALE)

	<u>Cerritos</u>	<u>San Antonio</u>	<u>San Nicolas</u>	<u>San Miguel</u>	<u>Total</u>	
Years	0	1	14	3	13	31 persons
	1	1	1	3	5	10
	2	1	8	1	10	20
	3	5	4	7	16	35
	4	4	1	4	3	12
	5	1	0	0	0	1
	6	2	1	1	3	7
	more	0	1	0	0	1
	$\bar{X} = 2.1$					

## EDUCATION OF FEMALE HEAD OF HOUSEHOLD

Years	0	4	11	6	16	37 persons
	1	0	0	3	9	12
	2	2	9	3	10	24
	3	5	7	2	10	24
	4	4	1	0	3	8
	5	0	0	0	0	0
	6	0	1	1	2	4
	more	0	1	0	0	1
	$\bar{X} = 1.8$					

## EDUCATION OF ELDEST SON/DAUGHTER

Years	0	3	0	3	1	7 persons
	1	0	3	1	0	5
	2	2	1	1	3	5
	3	1	5	3	8	17
	4	3	5	1	2	11
	5	2	3	1	9	15
	6	2	7	2	18	29
	more	2	3	0	5	10
	$\bar{X} = 4.0$					

The apparent difference between males and females in

years of schooling can be further examined in terms of the numbers of households in which one spouse has more education than the other. The following table addresses this question:

TABLE 10  
Relative Years of School (110 Families)

Male head has more schooling	44	
Spouses equal in schooling	38	p < .10
Female has more education	28	
	110	

The "tendency" for males to outrank their wives in years of education is not sufficiently strong (in this sample) that one could regard it as a clearly established fact. At most it remains a hypothesis with considerable credibility.

## 2.7 SOCIOECONOMIC INDICES

In communities where households pursue an economic strategy of subsistence agriculture and wage labor, each income is a poor indicator of economic status. It is also notoriously difficult to determine. In the preliminary phase of research we have used several different indications, including house type and material possessions.

In a sample of 112 households from the research villages the modal or "typical" house is one with adobe walls, cement

floor, two rooms and a separate kitchen area, with piped water at a faucet located in the yard. The following tables show this primary pattern, plus some of the variations that exist in the four primary research communities.

TABLE 11

## House Characteristics

<u>Wall Materials</u>	<u>Cerritos</u>	<u>S. Miguel</u>	<u>S. Antonio</u>	<u>S. Nicolas</u>	<u>Total</u>
adobe	13	13	6	46	78
brick/cement	1		4	14	19
brick/cement	1		4	14	19
adobe/brick/cement combination	1			3	4
adobe/stone		2	1	8	11
<u>Floor Materials</u>					
dirt floor	2	9	4	3	18
dirt/cement combination				7	7
brick/tile	0	1	0	22	23
cement	11	6	6	30	53
cement/tile combination	1			7	8
<u>Number of Rooms</u>					
one room	7	8	1	10	26
two rooms	6	5	8	36	55
three rooms	2	2	1	23	28
four rooms			1	2	3

\*\*Respondents were asked how many rooms are used for sleeping quarters. Usually all rooms (other than the kitchen area) are used as sleeping quarters, although there are exceptionally large families in which storage areas not regarded as "rooms" may also be utilized as sleeping areas.

Previous research in the Temascalcingo region, plus our recent fieldwork, indicate that the great majority of households can be rank-ordered on a multidimensional scale of material possessions, and families who acquire additional wealth will generally spend some of that wealth to acquire material goods of a high order in the "Material Style of Life" inventory. The fact that the material goods do indeed constitute a unidimensional scale is demonstrated by their consistent patterning. We have found that the households and material items can be ordered into a Guttman Scalogram, which is generally regarded as mathematical evidence of unidimensionality.

The items in our preliminary "Material Style of Life" scale tested in 110 households in the four focal communities were as follows (in order of frequencies):

TABLE 12  
Material Possessions

<u>Material Items</u>	<u>Frequency (in 110 households)</u>
radic	83
electric iron	73
gas stove	55
television	42
blender	37
sewing machine	22
bicycle	21

The range of variation in possession of these can also be visualized in terms of the number of items owned in families, ranged from high to low. For 50 families in San Nicolas, the results are presented in Table 13.

TABLE 13

## San Nicolas -- Range of MSL Item Ownership

6-7 items	12 families
5 items	8 families
4 items	9 families
3 items	9 families
2 items	8 families
1 item	4 families
0 items	0 families

The top twelve households not only have the items listed, they also tend to have, on the whole, better housing and more clothing. In the four research communities a few households have automobiles and/or other vehicles. At the low end of the scale there are four households in San Nicolas that have only a radio or an electric iron, and very little else. In the other three communities there are a few households who rate a zero on the MSL scale, as they have none of the indicated items.

## 2.8 WATER AND SANITATION

During the past six to eight years various governmental projects have succeeded in introducing running water systems in most of the communities in the valley area. Earlier these villages had been dependent on a variety of unreliable streams, small catchment basins, and the heavily polluted canals and river water in the middle of the valley. All of the four survey communities now have piped running water, principally derived from wells. Since the piped water must be pumped from storage tanks to different parts of the villages, some outlying homes are still without water pipes, especially those houses that are higher on the hillsides.

In some instances families have had their own wells dug, and there are also a few families that prefer to rely on springs that bring fresh water to locations near their houses. The state of sanitation of these various water sources is not clearly known, but it would appear highly likely that many of the wells and ground water sources are polluted by waste disposal (especially fecal material) from nearby houses.

There have occasionally been campaigns in the area to build latrines, but these efforts have been notably unsuccessful. In the sample of 109 households, only 4 report the presence of a latrine or disposal pit. In some instances abandoned buildings have become latrines of a sort, but

TABLE 14  
Sources of Water

	<u>Cerritos</u>	<u>S. Miguel</u>	<u>S. Antonio</u>	<u>S. Nicolas</u>	<u>Total</u>
Piped water (outside)	15	11	7	47	80
Piped water (inside)	0	0	1	8	9
Well (own or neighbor's)	0	2	2	10	14
Spring	0	0	0	6	6
					109

these appear to be less sanitary than the more usual open-air facilities. Defecation generally occurs outside, in nearby animal pens, cornfields, or other areas. The following table includes the surprising fact that toilets, flushed with running water, are more common than latrines. Evidently, the villagers in this part of Mexico are more likely to make the direct leap from the most "primitive" to the supposed hallmark of "civilized" living conditions.

TABLE 15  
Disposal of Human Wastes

	<u>Cerritos</u>	<u>S. Miguel</u>	<u>S. Antonio</u>	<u>S. Nicolas</u>	<u>Total</u>
Excreta libre	12	15	10	46	83
Toilet with running water	1	0	0	7	8
Latrine or "fosa septica"	0	1	0	3	4

(14 cases not reported may be presumed to be "excreta libre" with high probability)

The importance of boiling water prior to consuming it has been a feature of public health education for many years. However, only a total of nine households reported boiling of water. Given the high cost of fuel in the area, one hypothesis to be investigated is that more than nine families are aware of the concept of water boiling, but the economic costs outweigh the perceived potential benefits.

## 2.9 HEALTH, ILLNESS AND HEALTH CARE IN THE SOLIS VALLEY

As in most parts of Mexico, the health care system in the Temascalcingo-Solis region offers a mixture of services that includes private doctors, pharmacists, and other "private sector" facilities, the public health service (with several distinct governmental agencies) and traditional healers, whose training and expertise derive for the most part from popular beliefs and practices originating in both the Indian and European cultures.

### 2.9.1 Public Health Facilities

The area is served by no less than four different kinds of public health facilities. Each system is sponsored by a particular governmental agency, and there is relatively little cooperation or integration among these several facilities:

1. Centros de Salud (Secretaria de Salubridad y Asistencia--SSA)

Health Centers of the SSA system are organized by states through the local municipal governments. Each municipio has its own Health Centers, with a system of referrals to hospitals for secondary and tertiary medical services.

The SSA Health Center in the town of Temascalcingo is staffed by one medical doctor who is serving his/her one year of mandatory service immediately following graduation from medical school. In addition to the full-time services of the doctor (pasante), the Health Center generally has one nurse on duty from 8 AM until 3PM, which are considered the regular hours for consultations in the Center.

The chief advantages of the Health Center as a source of medical care is the low cost. The services of the Center include childbirth services and birth control, in addition to treatment of all minor illnesses and injuries that don't require surgery, X-rays, or other special facilities. The pasante also acts as local health inspector in restaurants and other food establishments, and participates in general vaccination campaigns.

In addition to the Health Center in Temascalcingo, there is an SSA Public Health Center in the

town of Santiago Mexquititlan in the lower end of the valley area. Santiago is in the state of Queretaro, but people can readily cross boundaries to seek the services of the Health Centers. In our sample of 109 families no mention was made of utilization of the Center in Santiago. Nonetheless, people in the communities of Donica, Santa Rosa and San Jose, all within a few kilometers of Santiago, may occasionally make use of that Health Center.

## 2. ISSEMYM Health Centers

ISSEMYM (Instituto de Seguridad Social of the State of Mexico and the Municipios). Like the SSA Health Centers, this system is a part of the State governmental structure, with provisions for secondary and tertiary services at hospitals in Atlacomulco and Toluca.

Unlike the SSA Health Centers, the services at ISSEMYM are available only to local and state governmental employees who pay a health insurance premium, in return for which consultations at the Health Center are free. The ISSEMYM Health Center in Temascalcingo was established in the mid-1970s and has a medical doctor who is supposed to be available 24 hours per day.

3. IMSS COPLAMAR (Instituto Mexicano de Seguro Social)

Unlike the SSA and ISSEMYM Centers, the IMSS health services are managed directly by the federal government. In the Temascalcingo-Solis region four such centers have been established in the past 2 years. At each one the staff consists of a medical doctor (available 24 hours a day, Monday through Friday) and 2 nurses.

The IMSS COPLAMAR Health Centers are unique in the fact that they provide free consultations, medicines and other services. They are truly "free clinics". When asked why all the people in the area don't make use of the IMSS COPLAMAR services, the social worker at the Solis Hospital replied that there is widespread belief that low cost or free medical services are of lower quality. Hence people prefer to go to the private physicians whenever the illnesses are sufficiently serious that "the best available treatment" is desired.

4. UMS--Solis Hospital

The Unidad Medico Social in Solis (which is also project headquarters) is a hybrid organization with a complex history of sponsorship by

several different state and federal agencies. At the present time the hospital is unique in that its chief budgetary support is from the National Nutrition Institute (INN). The hospital also has budgetary and administrative links to the state SSA system as well as to CODAGEM (Coordinating Commission for Agricultural and Animal Husbandry Development of the State of Mexico). CODAGEM has been involved in the maintenance of the Solis Hospital because the hospital buildings are on the grounds of the ex-hacienda Solis, which CODAGEM maintains as an agricultural extension and training facility. The hospital includes a delivery room plus four beds for adults patients, beds for children, and cubicles for eight newborn infants, including an incubator for intensive care of premature infants. The unit also has X-ray and laboratory facilities, two consultation physicians, the medical director's office, and a small library.

During the summer of 1982 the staff of the hospital included the following:

- 2 resident doctors (on call 24 hours, incl. weekends)
- 1 medical director
- 1 dentist
- 1 social worker
- 1 laboratory technician

6-8 nurses, usually 2 per shift

The services at the Solis Hospital are considerably more extensive than those of the other health centers in the area.

Unlike the other centers, in which doctors are frequently unavailable even during regular hours, the hospital staff at Solis is generally available at all hours seven days a week.

Examination of the in-patient records for 1981 and 1982 reveals that in-patients (largely childbirth cases) came from a wide range of communities, including considerable numbers from neighboring municipalities and states; more than half the 228 infant in-patients in 1981 were from communities outside the "official" catchment area of 15 villages in the Solis region.

#### 2.9.2 The Private Medical Sector

The municipal center of Temascalcingo has had private doctors for many years. In 1970 there were 3 doctors, one of whom operated a pharmacy in connection with his practice.

By the summer of 1982 there were 12 private doctors in Temascalcingo, and one part-time doctor in San Nicolas. (The part-time doctor teaches English in the secondary school in Temascalcingo, and then practices medicine in the afternoon.) In general, the fees of the private doctors entail

considerably higher costs than the modest fees at the public health clinics.

There are 5 pharmacies in the town of Temascalcingo. The pharmacies sell (with or without prescription) a number of antibiotics and other medications that are supposed to be under prescription control by the health authorities. Many people rely on the pharmacies for "informal consultations," on the basis of which they buy antibiotics and other medications without incurring the costs and inconveniences of going first to consult with an M.D. Hawkers of medications (mercolicos) also appear in the area from time to time, selling patent medicines, and other preparations outside the control of health authorities.

### 2.9.3 Traditional Healers and Medications

Our preliminary studies in the Temascalcingo-Solis region have not focussed heavily on traditional healing facilities and practices. However, even relatively superficial surveys (door-to-door interviews) in the late 1960s and 1970s demonstrated that practices involving traditional healing were widespread among the Indian populations of the region, and that a small but significant minority of people in Mestizo families also made use of home remedies and folk practitioners.

From a survey conducted in 1967 by the Instituto Mexicano de Estudios Sociales (IMES), Table 16 highlights some key features of traditional health practices, showing contrasts between the Indian and Mestizo communities.

TABLE 16

First Treatment for Illness: Temascalcingo and Santiago (Indian)

	TEMASCALCINGO		SANTIAGO	
	No.	%	No.	%
Use herb	11	21.2	60	49.6
Pharmacy	12	23.1	12	9.9
Doctor	29	0	44	30.4
Curandero	0	0	4	3.3
no answer	0	0	1	0.8

TABLE 17

Medical Practices and Material Style of Life: Temascalcingo

		TRADITIONAL PRACTICE	MODERN PRACTICE
MSL	High	4	19
	Low	7	22

Two features are noteworthy here: some households in the town did report that their first choice of health care was a traditional behavior (usually home remedies); although we had hypothesized a strong relationship between higher eco-

conomic resources (MSL) and modern health behaviors, such a relationship is not particularly evident in this sample from the late 1960s.

Survey interviewing is generally a poor method for learning about traditional health practices. Many people avoid divulging much about traditional health practices, which they feel are seen by outsiders as "backward" or "not-sophisticated". Furthermore, until one has clear ideas of what particular traditional practices are likely to be found in an area, standard interview questions usually miss the mark, and fail to elicit meaningful information because the questions are out of context.

On the other hand, the general impression that the majority of people in the valley, especially the mestizo populations, have largely put their faith in modern medicine seems supported by a variety of kinds of data. In the mid-1970s K. DeWalt reported on health practices and beliefs in one of the communities adjacent to Temascalcingo, using the title "The Illnesses No Longer Understand". Her research indicated that people regarded modern medical resources as more effective -- perhaps the illnesses themselves had changed in character.

Traditional practitioners are found, nonetheless, in the mestizo communities of the Solis hospital catchment area, and there are undoubtedly many more in the Indian communi-

ties along the outer rim of settlements. Surveys using key informants and other resources in 1980-1981 produced the following list of practitioners in the catchment communities:

midwives	9
hueseros ("bone-setters")	10
yerberos (herbalists)	6

These data must be regarded as under-representing the extent of traditional practitioners particularly because the methods of data collection were relatively short-term, compared to a full-scale ethnographic study of health practices.

#### 2.10 HUESEROS ("BONE-SETTERS")

In our sample of 109 households, 21 reported visiting a huesero within the past year. (The huesero was the only traditional healer we listed in our interview schedule.) This is a surprisingly large number, and suggests strong continued reliance on a type of service that appears to be marginal to the practices of the medical doctors of the region. The hueseros do not generally treat fractures or suspected fractures. Rather, they treat sprains, sore and stiff limbs and headaches.

Although the hueseros may use compresses, poultices, and other preparations, their main skills are massage and manip-

ulation. One report from a nearby region is that their massage treatment for headaches can be extremely effective and relaxing. Apparently the services of hueseros are also likely to be sought after doctors have treated a broken or severely sprained limb. The massage and other treatment by the huesero is primarily aimed at restoring movement and muscle-tone.

The huesero in Solis received his training from a man in Mexico City who managed (and treated) two soccer teams. In Solis his practice apparently consists mainly of persons who have fallen from horses, or had other similar accidents in connection with animals and farm work. In earlier times he used the sap from a tree, a traditional remedy, but nowadays he prefers to use Ben Gay in his massages.

#### 2.11 PREGNANCY, CHILDBIRTH AND LACTATION

The data on reproductive practices in this preliminary report are from two sources:

1. Ethnographic work in the summer of 1982 and in earlier years.
2. A study of 45 women interviewed with a structured interview schedule by Solis hospital staff in the fall of 1982.

We have calculated that at least 70% of the childbirths in Solis communities are managed at home. This is based on the following rough estimates:

total annual childbirths (Solis area)	550
total attended in Solis hospital	100
(from Solis hospital records)	
estimated utilization of other	
in-patient facilities	60
	----
remainder at home	390 births

The childbirths that occur at home are by no means all attended by midwives. Persons who have community-wide reputations as midwives (comadrona; partera) are frequently called in to assist in childbirth, and are also called in for pregnancy consultations. On the other hand, women who have had several children sometimes feel that they need no assistance from specialists, as their mothers, aunts or other experienced females can provide all the assistance they need. The following case is illustrative:

Maria S., from the community of Ixtapa has had eight children. Four of her deliveries were attended by a midwife who lives nearby. One birth attended by a doctor took place while she was living in Mexico City. Two deliveries were attended by her mother, and one birth occurred so rapidly that she had no opportunity to call for assistance from any-

one. The informant stated that she preferred to have her mother attend her childbirths, "because I have more confidence in her". During her pregnancy this woman could not eat any of the food that she herself cooked. Much of the time her husband cooked food for her, which she preferred over the cooking of her mother or sisters.

Turning to earlier data, we again find contrasts in birth attendants between Temascalcingo ("modern Mestizos") and Santiago ("Indian"):

TABLE 18  
Attendant at Latest Birth (1970)

	TEMASCALCINGO		SANTIAGO	
	No.	%	No.	%
No help	2	3.8	30	24.8
Senora (woman)	7	13.6	13	10.7
Midwife	10	19.2	31	25.6
Doctor	29	55.8	16	13.2
Senor/relative	2	3.8	20	16.5
No answer	1	2.0	11	9.1

These figures must of course be regarded with some caution, particularly for Temascalcingo, because of the rather small sample. From these data one may project that by 1982 considerably more than half of the childbirths in the municipal center were attended by the doctors. On the other hand, it is not likely that the more traditional communities (such

as Santiago) have made any large shift toward utilization of doctors for childbirth.

The likelihood that women will seek modern medical assistance during pregnancy and childbirth seems to depend to a considerable extent on physical distance (plus transportation to available medical care) and the socio-economic status of the family. The fees for childbirth at the Sclis Hospital are on a sliding scale from 750 to 1500 pesos, while private doctors charge from 2000 to 5000 pesos for delivering a baby (Summer, 1982).

The traditional cuarentena (40 day post partum rest period) included cultural rules for food avoidance, food prescriptions, and a series of prohibitions on activities, which were lifted in stages. The cuarentena remains, today, as a significant cultural practice, affecting food intake, activity patterns and use of medical services. The data collected during the first phase of ethnographic work suggests that the degree of adherence to cuarentena prescriptions and proscriptions is strongly influenced by economic means. The poorest women cannot afford to follow all of the "rules" for the full time period, but return to usual activities and eating practices more quickly following delivery. Further understanding of the significance of the cuarentena emerges from the study of the 45 women.

### Chapter III

#### THE REPRODUCTIVE STUDY: FALL, 1982

The fall study, conducted in three communities in the valley, was carried out by physicians and a social worker from the Solis Hospital. Respondents were identified by door-to-door interviewing, the only criterion being that the women had a child between 2 and 5 years of age.

The interviewers presented themselves to the mother as members of the medical team at Solis. As an introduction, it was explained that the purpose of the interview was to learn something of the customs and data of the region, in order to know how to improve the services offered at the medical center.

In general, the questions were well understood and elicited clear responses. The only exception was the data on the number of times per day that infants were breast-fed. We believe that the explanation for this was that the women followed the practice of demand-feeding, thus paying little attention to the actual number of times that feeding was done. In contrast, the data on the number of feedings given during the night was probably more precise, because the mother was more aware of this activity.

The questions about contraceptives revealed that their use was not very extensive. Not only was the proportion of women using them very low, but the women reacted negatively to questions about their use.

### 3.1 STUDY RESULTS

Tables 19-28 summarize data related to the results discussed below.

#### 3.1.1 . A) Obstetrics:

Younger women appear to have an earlier age of menarche than older women. Fifty-four percent of the women in the 20-29 year old group had their first menstruation between 14 and 15 years of age; compared to 77% of those in the older groups.

Of the mothers studied, 69% had their first child before the age of 20. The age at which the mother had her first child was not associated with the number of obstetrical complications. Nevertheless, age plays an important role in other functions. For example, a comparison of the 20-29, 30-39 and 40+ years age groups showed the following characteristics:

The younger the woman in the sample:

FUNCTION	STAT. SIG.
1. The younger she has her 1st child	p<.01
2. The fewer abortions	p<.01
3. The fewer children stillborn	p<.01
4. Have less pregnancy illness	p<.05

Fifty-three percent of the women in the sample have had a spontaneous abortion. Cardiovascular problems and other illnesses (unspecified) are more frequent in women who have had spontaneous abortions.

### 3.1.2 B) Lactation Patterns

Only two of the mothers did not breastfeed their last child. As lactation progresses, the child suckles fewer times per day. Comparing the frequency of feeding of children younger than three months and feeding frequency of children between three and six months, the difference between the two groups is statistically significant ( $\chi^2=7.65$   $p<.01$ ).

The duration of lactation was not related to mother's age. Seventy-five percent of the mothers breastfed their children for more than 6 months; and over 50% of the mothers breastfed for more than one year.

### 3.1.3 C) Dietary patterns of the mother:

Many women (40%) changed their eating patterns during pregnancy; the changes in diet were not related to illness or to age ( $\chi^2$ ,  $p>.05$ ). Nevertheless, the mothers who experienced some illness during pregnancy reported a greater frequency of appetite decrease during each trimester than did the healthy mothers. While the pattern of appetite change by trimester was similar for both the healthy group and the group that was ill, the magnitude of appetite decrease in

those who were ill was greater ( $\chi^2=3.58, 5.47, 9.60$  for each trimester respectively,  $p<.01$ ).

Forty-nine percent of the mothers avoided certain types of foods during pregnancy. Food avoidance occurred more frequently in the mothers who were ill. While there is considerable diversity in the types of foods avoided, the most commonly avoided foods were fats, pulque, and beans. Food avoidance was also frequent during the "cuarentena" (post-partum period). The most commonly avoided foods during the cuarentena were beans, chilis, vegetables and chicken. The practice of food avoidance is more frequent during the cuarentena than during pregnancy.

#### 3.1.4 D) Dietary Patterns of the Child:

The introduction of common foods into the infant's diet begins before one year of age. Although the pattern of introduction of each food is different both by type of food and by family, the majority of foods are introduced between the second and fifth month of life.

TABLE 19

## Reproductive History

AGE AT ONSET OF MENSTRUATION:

MOTHERS AGE	AGE OF FIRST MENSTRUAL PERIOD					TOTAL
	11	12	13	14	15	
1	1 (8)	1 (8)	4 (31)	4 (31)	3 (23)	13
2	0	4 (17)	8 (35)	7 (30)	4 (17)	23
3	1 (11)	0	1 (11)	4 (44)	3 (33)	9
TOTAL	2 (4)	5 (22)	13(29)	15(33)	10(22)	45

AGE WHEN MOTHER HAD HER FIRST CHILD.

MOTHERS AGE	15-19	20-24	24+	TOTALS
1	11 (87)	2 (13)	0	13
2	16 (70)	6 (26)	1 (4)	23
3	4 (44)	5 (56)	0	9
TOTAL	31 (69)	13 (29)	1 (2)	45

NUMBER OF SPONTANEOUS ABORTIONS (MISCARRIAGES).

MOTHERS AGE	NUMBER OF MISCARRIAGES				TOTALS
	0	1	2	3+	
1	10 (77)	1 (8)	2 (15)	0	13
2	16 (69)	4 (17)	2 (9)	1(5)	23
3	2 (22)	3 (33)	1 (11)	3(33)	9
TOTAL	28 (62)	8 (18)	5 (11)	4 (9)	45

Key: For mothers' ages 1 = 20-29 years, 2 = 30-39 years, 3 = 40+ years.

Values are presented first as the number of cases, followed by the percentage of cases (in parentheses).

TABLE 20

## Last Pregnancy, Stillbirths

WHAT WAS THE DURATION OF YOUR LAST PREGNANCY?

MOTHERS AGE	MONTHS			TOTAL
	9	8	7	
1	8 (61)	5 (38)	0	13
2	14 (61)	8 (35)	1 (4)	23
3	5 (55)	4 (45)	0	9
TOTAL	27 (60)	17 (38)	1 (2)	45

WERE YOU SICK DURING YOUR LAST PREGNANCY?

MOTHERS AGE	YES	NO	TOTAL
1	1 (8)	12 (92)	13
2	9 (39)	14 (61)	23
3	5 (55)	4 (44)	9
TOTAL	15 (33)	30 (67)	45

NUMBER OF STILLBIRTHS.

MOTHERS AGE	NUMBER OF STILLBIRTHS			TOTAL
	0	1	2+	
1	13 (100)	0	0	13
2	18 (75)	5 (21)	1 (4)	24
3	4 (50)	4 (50)	0	8
TOTAL	35 (78)	9 (20)	1 (2)	45

TABLE 21  
Last Delivery

WHERE DID YOU DELIVER YOUR LAST BABY?

At home	20 (41%)
Hospital	11 (22%)
Solis clinic	8 (16%)
Others	10 (20%)

---

WHO HELPED YOU DURING YOUR DELIVERY?

Doctor	27 (57%)
Midwife	9 (19%)
Mother in law	3 (6%)
Mother	0 (0%)
Others	8 (17%)

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TABLE 22  
Breastfeeding Practices: Timing

DID YOU BREASTFEED YOUR LAST CHILD?

MOTHERS AGE	YES	NO	TOTAL
1	12 (92)	1 (8)	13
2	22 (96)	1 (4)	23
3	7 (77)	2 (33)	9
TOTAL	41 (91)	4 (9)	45

HOW LONG DID YOU BREAST-FEED YOUR LAST CHILD?

MOTHERS AGE	TIME IN MONTHS						TOTAL
	0	3	6	6-12	12-18	18+	
1	1 (8)	2 (15)	1 (8)	3 (23)	4 (30)	2 (15)	2 (15)
2	1 (4)	0	0	8 (35)	10 (43)	4 (17)	23 (51)
3	1 (11)	1 (11)	0	3 (33)	2 (22)	2 (22)	2 (16)
TOTAL	3 (7)	3 (7)	1 (2)	14 (31)	16 (35)	8 (18)	45 (100)

TIME AFTER DELIVERY FOR FIRST BREAST FEED., (months).

MOTHERS AGE	1	2-4	4-6	6-12	12-24	24	TOTAL
1	2 (18)	4 (36)	0	1 (9)	2 (18)	2 (18)	11 (26)
2	2 (9)	9 (41)	2 (9)	2 (9)	6 (27)	1 (5)	22 (52)
3	2 (22)	2 (22)	0	4 (44)	1 (11)	0	9 (21)
TOTAL	6 (14)	15 (36)	2 (5)	7 (17)	9 (2)	3 (7)	42 (99)

TABLE 23.

## Breastfeeding Practices: Frequency

NUMBER OF TIMES INFANT FED DAILY DURING THE FIRST THREE MONTHS

DURATION OF LACTATION (MONTHS)	NUMBER OF TIMES				TOTAL
	1	2-4	5-6	6+	
0-3	0	2 (5)	15 (36)	25 (59)	42
4-6	0	11 (27)	11 (27)	19 (46)	41
6-12	1 (3)	19 (47)	8 (20)	12 (30)	40

NUMBER OF TIMES INFANT FED AT NIGHT DURING THE FIRST THREE MONTHS.

DURATION OF LACTATION (MONTHS)	NUMBER OF TIMES				TOTAL
	1	2	3	> 3	
0-3	2 (4)	15 (33)	14 (31)	14 (31)	45
4-9	5 (11)	14 (31)	13 (29)	13 (29)	45
9-12	17 (40)	9 (21)	8 (19)	9 (21)	43

AGE AT WEANING OF INFANT.

<u>AGE OF INFANT (MO.)</u>	<u>N</u>	<u>% OF CASES</u>
3	4	9
6	3	7
9	3	7
12	9	20
18	17	38
24	6	13
24+	3	7

TABLE 24

## Introduction of Adult Foods

AT WHAT AGE DID YOU START TO GIVE YOUR INFANT THE FOLLOWING FOODS?

FOODS	AGE AT INTRODUCTION (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Tortillas	0	12	12	4	8	3	0	1	1	0	0	4
Jugo fruta	1	5	6	5	4	2	1	2	0	0	0	1
Caldo de carne	1	11	6	5	10	3	1	1	0	0	0	2
Huevos	1	12	9	4	8	4	1	1	0	0	0	1
Pan	0	12	8	6	7	3	1	1	0	0	0	1
Verduras	1	6	10	6	8	6	1	1	0	0	0	1
Pulque	0	2	3	0	3	2	1	0	0	0	0	0
Atole	1	9	11	5	6	5	0	0	0	0	0	2

TABLE 25  
REPRODUCTION AND DIET.

DID YOU EAT ANY SPECIAL FOODS DURING YOUR PREGNANCY?

<u>AGE OF MOTHER</u>	<u>YES</u>	<u>NO</u>	<u>TOTAL</u>
1	6 (46)	7 (54)	13
2	14 (61)	9 (39)	23
3	4 (44)	5 (55)	9
TOTAL	<u>24 (53)</u>	<u>21 (47)</u>	<u>45</u>

DID YOU EAT ANY SPECIAL FOODS DURING CUARENTENA?

<u>AGE OF MOTHER</u>	<u>YES</u>	<u>NO</u>	<u>TOTAL</u>
1	8 (61)	5 (39)	13
2	17 (74)	6 (26)	23
3	8 (89)	1 (11)	9
TOTAL	<u>33 (73)</u>	<u>12 (27)</u>	<u>45</u>

DID YOU AVOID ANY FOODS DURING PREGNANCY?

Yes = 22 (49%), No = 23 (51%).

<u>WHICH FOODS DID YOU AVOID DURING PREGNANCY?(N=22)</u>		<u>DURING CUARENTENA? (N=29)</u>
Tortillas	2	0
Frijoles	5	17
Leche	3	0
Chile	4	15
Pulque	6	2
Grasas	6	2
Verduras	1	12
Chicken	5	13
Drinks	0	0
Salt	1	1

TABLE 26

## Dietary Changes During Pregnancy

CAUSE OF CHANGE OF DIET IN THE 18 WOMEN WHO CHANGED DURING PREGNANCY.

Nausea and vomiting	= 12 (66%)
Food cravings	= 2 (11%)
Sickness	= 1 (5%)
Loss of appetite	= 3 (17%)

Note: of these 18 women, 50% = age group 1, 27% = 2, 22% = 3.

KINDS OF FOODS ESPECIALLY CONSUMED DURING:

	<u>PREGNANCY(N=24)</u>	<u>CUARENTENA(N=40)</u>
Tortillas	10 (42)	2 (5)
Frijoles	4 (17)	3 (8)
Leche	3 (13)	5 (13)
Chile	2 (8)	1 (3)
Pulque	1 (4)	14 (35)
Grasas	2 (8)	1 (3)
Verduras	3 (13)	6 (16)
Carne	7 (29)	33 (83)
Atole	8 (33)	22 (55)
Caldos	1 (4)	14 (35)

DID YOUR APPETITE CHANGE IN YOUR LAST PREGNANCY?

CHANGE	TRIMESTER 1			TRIMESTER 2			TRIMESTER 3		
	↑	↓	=	↑	↓	=	↑	↓	=
% OF WOMEN	20	62	18	56	18	27	56	11	33

TABLE 27

ACTIVITY DURING PREGNANCY.DID YOU WORK LESS DURING PREGNANCY?

YES = 18 (36%), NO = 29 (61%).

DID YOU SLEEP MORE DURING PREGNANCY?

<u>AGE OF MOTHER</u>	<u>YES</u>	<u>NO</u>	<u>TOTAL</u>
1	5 (45)	6 (55)	11
2	9 (33)	18 (67)	27
3	1 (11)	8 (89)	9
TOTAL	15 (32)	32 (68)	47

STAGE OF PREGNANCY WHEN ACTIVITIES DECREASED. (% of women, at each month)

<u>ACTIVITY</u>	<u>&lt; 5</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
Sweeping	2	0	2	2	13	80
Cooking	2	0	2	0	15	81
Sewing	2	0	2	4	11	81
Ironing	2	0	4	2	15	85
Making tortillas	2	2	2	2	15	85
Carrying heavy loads	30	2	0	23	23	38

TABLE 28

USE OF CONTRACEPTIVES.DID YOU USE CONTRACEPTIVES --

AGE OF MOTHER	BETWEEN LAST AND PREVIOUS PREGNANCY?		AFTER YOUR LAST PREGNANCY?	
	YES	NO	YES	NO
1	1 (8)	11 (92)	3 (25)	9 (75)
2	1 (4)	22 (96)	4 (17)	19 (83)
3	0 (0)	9 (100)	0 (0)	9 (100)
TOTAL	2 (5)	42 (95)	7 (16)	37 (84)

## Chapter IV

### DEMOGRAPHIC STRUCTURE IN SOLIS VALLEY COMMUNITIES

The full census of households in the four communities selected as potential sites for the main data collection phase provides information on the demographic structure of these communities. The number of households surveyed in each community is shown below in Table 29.

TABLE 29

#### Census of the Four Communities

COMMUNITY	NUMBER OF FAMILIES
Cerritos	142
San Miguel	98
San Nicolas	190
San Antonio	192

Table 30 presents the age structure of the population, by gender and community. In reviewing these data several sources of error or potential error should be considered:

1. Determination of Birth Data.

Although the parents should legally register their children immediately after birth, many families (which we could not include) register their

infants several months after birth, and in some cases, years afterwards. In the registration documents, the "date of birth" is actually the date when the infant was registered, which would cause an underestimate of the infant's age.

2. Lack of Documents on the Elderly (over 50 years of age)

In many cases, persons over 50 years of age did not have identification papers showing birth dates. For these persons, we used a verbal statement of their birth date.

3. Adoption of Children

As in other communities in Mexico, the heads of families in the Valley of Solis sometimes adopt nephews/nieces and grandchildren as their "natural children". In the census, we did not distinguish adopted from "natural" children.

4. Migration

Some age groups may be under-represented because of temporary out-migration.

To describe the diversity of household structure within the communities and examine the relationship of structural variation to the presence of children of various ages, a series of family types have been delineated as follows:

1. Absent parent: consisting of a father, mother and children but with one of the married partners temporarily absent. (The absence could be short-term or extended.)
2. Departed child: consisting of a married couple under 50, with one or more children permanently or temporarily absent.
3. Extended: consisting of a married pair and their children.
4. Other: simple individual; couple over age 50 without children; couple living with relatives but without children.

Table 30 indicates that the proportion of children in each age group is similar in each community. Tables 31-32 show the relationship of family type to presence of children. Type 2 families have fewer children under 5, relative to total family size.

TABLE 30

## Demographic Composition of the Communities

Valley of Solis, June 1982

Age group (years)	Community								Total	
	San Miguel		Cerritos		San Nicolas		San Antonio			
	M	F	M	F	M	F	M	F		
0 - 5	61 (20) <sup>a</sup>	40 (14)	64 (14)	75 (16)	67 (11)	74 (14)	100 (15)	106 (17)	292 (15)	295 (16)
5 - 10	58 (19)	53 (19)	72 (16)	80 (18)	86 (15)	92 (17)	132 (20)	109 (17)	348 (16)	334 (16)
10 - 15	44 (14)	44 (16)	71 (16)	72 (16)	95 (16)	73 (14)	91 (14)	106 (17)	301 (16)	295 (16)
15 - 20	33 (11)	34 (12)	54 (12)	46 (10)	78 (13)	49 (09)	74 (11)	61 (10)	239 (12)	190 (10)
20 - 25	17 (05)	12 (05)	40 (09)	31 (07)	35 (06)	34 (06)	48 (07)	50 (08)	140 (07)	127 (07)
25 - 30	12 (04)	17 (06)	27 (06)	24 (05)	21 (04)	25 (05)	28 (04)	30 (05)	88 (04)	96 (05)
30 - 40	24 (08)	26 (09)	30 (07)	34 (07)	52 (09)	34 (06)	63 (10)	61 (10)	169 (08)	155 (08)
40 - 50	29 (09)	22 (08)	27 (06)	34 (07)	43 (07)	45 (08)	48 (08)	38 (06)	147 (07)	139 (07)
50 - 60	17 (05)	10 (04)	25 (06)	20 (04)	34 (06)	45 (08)	35 (05)	32 (05)	111 (06)	107 (06)
+60	16 (05)	19 (07)	39 (09)	42 (09)	72 (12)	60 (11)	32 (05)	30 (05)	159 (08)	151 (08)
Total	311 (100)	277 (100)	449 (100)	458 (100)	583 (100)	531 (100)	651 (100)	623 (100)	1994	1889

<sup>a</sup> ( ) = Percent.

TABLE 31  
 Number of Families with Children Under 1 Year  
 According to Family Type  
 Valley of Solis, July 1982

Family type	N	Number of families with children			
		With 1 year old		Without 1 year old	
		N	%	N	%
1	176	47	27	129	73
2	128	3	2	125	98
3	115	27	23	88	77
4	86	27	31	59	69

TABLE 32  
 Number of Families with Children Under 5 Years  
 According to Family Type  
 Valley of Solis, July 1982

Family type	N	Number of families with children under 5 yrs							
		0		1		2		+3	
		N	%	N	%	N	%	N	%
1	176	38	(22)	49	(28)	60	(34)	7	(16)
2	128	112	(90)	9	(7)	5	(4)	2	(2)
3	115	46	(40)	22	(19)	25	(22)	22	(19)
4	86	23	(27)	20	(23)	26	(30)	17	(19)

## Chapter V

### DIETARY INTAKE

Dietary studies of inhabitants of the 4 communities (Cerritos, San Antonio, San Miguel, San Nicolas) were made on a total of 437 individuals, 24% of the families in the census. In each family studied, we collected information on the "habitual" diet of the mother, her husband and one child. In the community of San Francisco Solis, careful, quantitative data on food intake for a seven-day period, was collected for 30 households for the female household head, male household head, and one child, aged 8 to 12.

#### 5.1 METHOD FOR COLLECTING HABITUAL DIET (FOUR COMMUNITY STUDY)

The following steps constituted the procedure for obtaining data on habitual diet from the female heads-of-households:

1. In the context of the last month, the female head-of-household was asked what the family usually ate for each meal of the day, and for snacks.
2. The ingredients used in each recipe were recorded, as were their amounts. The ingredients used in each recipe were recorded, as were their amounts or volumes, and method of preparation.

3. The quantity of each recipe consumed by each of the key individuals was asked, and sample portions (or water as a substitute for liquids and soup) were weighed.
4. The quantities of other ("non-recipe", e.g. tortillas) food consumed were described, and weighed when available.
5. The proportion of the family recipe consumed was calculated for the individual, and the nutrient content of the diet was calculated by computer after the quantity of each ingredient and food was calculated and coded. The nutrient data base was the Mexican Food Tables.

## 5.2 METHOD FOR COLLECTING DAILY INTAKE (SAN FRANCISCO)

1. Training personnel to supervise the interviews.
2. Selection of persons from the nearby community of Temascalcingo. Seventeen males were selected and from these 7 were finally chosen.
3. A one-week course of training for the interviewers, providing
  - general information on the methodology
  - training in conducting the questionnaire
  - training in use of balances and calculations

- standardization of personnel
- 3-day practice in a community

The method of short-term recall involved visiting each family twice per day to ask about their diet on that day. The visits were made after breakfast (9-12 a.m.) and after lunch (3-6 p.m.).

We asked the mother what was eaten for breakfast by herself, the male head of household and one of the children (between 8 and 12 years of age). The individual portions were weighed, as were the amounts of foods used in the recipe for the family. In the second interview, we obtained the same information, also asking the subjects (man, woman and child) what they had eaten outside of the house, noting the quantities which they mentioned (e.g. 2 tacos de barbacoa). We then gave them a sheet of paper to write down what they ate for dinner after the interviewer left the house. The following day, the interviewer asked about the quantity of each listed food consumed, and weighed the amount described by the mother. Water was weighed to substitute for soups and liquids if these were not available for measurement.

### 5.3 RESULTS

#### 5.3.1 "Habitual Diet" in the Valley

Although we realize that data on food intake obtained by information on "habitual" intakes is imprecise, this method is useful in a preliminary survey of communities. It enables us to evaluate the usual types of foods consumed, and to compare relative calorie intakes between age groups and among communities.

##### 1. Children aged 3-5 years:

Of the children aged 3 to 5 years, 68% ingested less than 1800 calories per day, 39 children (53%) ingested less than 100 kcal/kg body weight. The proportion of calories provided by corn was similar (25-32%) at each level of intake. In the case of fats, individuals who consumed over 1500 kcal/day ate 36% more fat than those who consumed 1000-1500 kcal/day ( $t=2.60$ ,  $p<0.01$ ).

##### 2. Children aged 8-12 years:

Of this age group, 70% consumed less than their recommended calorie intake (compared to the US - RDA). Less than 70 kcal/kg were consumed by 11 of these children. A greater proportion of total calorie intake came from corn in this age group, compared to the 3-5 year olds. Children aged 8-12 who

consumed 1500-2000 kcal/day, ingested 39% more calories as corn than did 3-5 year olds ( $t=2.98$ ,  $p<0.01$ ). Calories from fat were lower in the 8-12 year olds, although the difference compared to the 3-5 year old group was not statistically significant. In all groups, the intake of fat was low.

### 3. Women aged 20-40 years:

Fifty-one women (46%) consumed less calories than the RDAs. Thirty women (27%) consumed less than 30 kcal/kg daily. The percentage of calories from corn and fat was the same as in the 8-12 year old group.

TABLE 33

Calorie Intakes, Women: Valley of Sclis, July 1982

Range of intakes	N	%	Total kcal	+ -SD	Corn kcal	+ -SD	%	Fat kcal	+ -SD	%
<500	0	(0)	---	---	---	---		---	---	
500-1000	1	(1)	---	---	---	---		---	---	
1000-1500	19	(17)	1297	123	571	221	(44)	171	131	(13)
1500-2000	31	(27)	1777	159	721	315	(41)	184	167	(10)
2000-2500	32	(29)	2175	137	943	400	(43)	269	259	(12)
2500-3000	9	(8)	2828	146	1165	613	(41)	273	210	(10)
3000-3500	10	(9)	3326	107	1696	503	(51)	315	199	(9)
>3500	10	(9)	4094	500	1699	753	(42)	633	461	(15)

TABLE 34

Calorie Intakes, Children 3-5 Years: Valley of Solis, July 1982

Range of intakes	N	%	Total kcal	+SD	Corn kcal	+SD	%	Fat kcal	+SD	%
<500	2	(3)	365	70	276	58	(48)	22	31	(6)
500-1000	15	(20)	810	117	251	120	(31)	140	125	(17)
1000-1500	26	(35)	1227	145	360	185	(20)	148	107	(12)
1500-2000	16	(22)	1711	101	422	328	(25)	317	309	(19)
2000-3000	14	(19)	2400	334	770	413	(32)	345	352	(14)
>3500	1	(1)	3763	0	---	---	---	---	---	---

TABLE 35

Calorie Intakes, Children 8-12 Years: Valley of Solis, July 1982

Range of intakes	N	%	Total kcal	+SD	Corn kcal	+SD	%	Fat kcal	+SD	%
<500	0	---	---	--	---	--	--	--	--	--
500-1000	1	(5)	728	0	269	0	(37)	19	0	(3)
1000-1500	0	---	---	--	---	--	--	--	--	--
1500-2000	8	(40)	1662	117	849	339	(51)	101	96	(6)
2000-2500	7	(35)	2203	119	879	414	(40)	293	238	(13)
2500-3000	3	(15)	2676	193	1120	331	(42)	508	743	(19)
>3500	1	(5)	4572	0	1613	0	(35)	1326	0	(29)

### 5.3.2 Dietary Patterns in San Nicolas

From the food surveys of habitual diet in the four communities, the records of twenty-eight households from San Nicolas were randomly selected for analysis of dietary regimens. To begin the process of analyzing these data for patterns, the results of the food frequency check list were tabulated. Respondents were asked how many times per week a considerable series of foods were eaten:

TABLE 36

## Food Frequency of Selected Food Items: San Nicolas (Adults)

ITEM	DAILY	4-6/WEEK	2-3/WEEK	1/WEEK	<1/WEEK NEVER
Tortillas	28	-	-	-	-
Beans	25	1	2	-	-
Salsa	28	-	-	-	-
Oil	27	-	1	-	-
Pasta	10	4	7	4	3
Rice	1	-	8	8	11
Eggs	9	1	7	1	10
Chicken	-	-	7	10	11
Beef	-	-	5	20	3
Pork	-	-	-	1	2
Bananas	2	-	8	13	5
Oranges	4	-	3	10	11
Bread	13	3	3	1	8
Milk	4	-	-	-	24
Potatoes	1	-	9	12	5

From the food frequency check list, as well as from the report "habitual daily diet", several measures were constructed. These measures are useful first of all simply as descriptive tools -- additional ways of describing food use and of highlighting individual or familial variations within the over-all pattern. Further, they may prove useful as measures of dietary quality, particularly when they capture differences in nutrient sources (eg. animal vs. vegetable protein sources). When these measures can be related to nutrient intake they help us to establish the nature of variation in intake in relation to local dietary patterns. The measures developed from the San Nicolas data are as follows:

### 5.3.2.1 Dietary Complexity I. (D.C. I)

This measure is based on reported usual or "habitual" diet and was constructed as a simple additive numerical index, in which each food item is counted only once per day. (For example, tortillas contribute a score of 1, whether eaten once a day or three times a day; similarly, oranges add a single point to the D.C.I. score of an individual, whether eaten once, twice or three times in a single day.) The first dietary complexity score, then, is a reflection of the number of different types of foods eaten in a single day, as reported by individuals who are providing information on their perceived usual daily diet. The distribution in the dietary records for San Nicolas (excluding incomplete records) is given in Table 37.

TABLE 37

#### Dietary Complexity in "Habitual" Diet

NUMBER OF ITEMS	FREQUENCY (no. of cases)
10	1
7	4
6	4
5	6
4	4
3	4
2	1

### 5.3.2.2 Dietary Complexity II (D.C. II)

This measure of complexity was derived from the food frequency check list and is also a simple additive index. The number of days for all food items is summed, yielding a measure that ranged from 45 to 90 for adults in San Nicolas. (For example, a very simple diet, heavily dependent on tortillas, beans, sugar and salsa would have a low score in the 45-60 range, reflecting 7 points for tortillas, 7 for beans, etc.) The range for San Francisco adults on D.C. II is presented in table 28.

TABLE 38

#### Dietary Complexity II (Food Frequency/Weekly)

SCORE	NUMBER OF CASES
85 - 90	4
80 - 84	3
75 - 79	2
70 - 74	4
65 - 69	3
60 - 64	2
55 - 59	3
50 - 54	1
45 - 49	1

### 5.3.3 Animal Protein Units

A major source of intra-community variation in diet is the amount of animal protein consumed. Therefore a measure of units of animal protein was constructed as a third descriptive tool. The measure is additive, based on the weekly food

frequency checklist. The range of scores for San Nicolas adults is as follows:

TABLE 39  
Animal Protein Units - San Nicolas

PROTEIN UNITS	NUMBER OF PERSONS
18 - 20	3
15 - 17	0
12 - 14	1
9 - 11	3
6 - 8	2
3 - 5	9
< 3	7

#### 5.3.3.1 Dietary Quality I (DQ I)

The Guttman scaling technique was used to develop a measure of dietary quality, which reflects the nature of food items, as well as frequency. The Guttman scaling procedure tests the "dimensionality" of a domain and, although it is empirically developed, the selected items must be interpretable in ethnographic terms; that is, they must "make sense" in terms of what people do (in this case, what they eat.) DQI, our first measure of dietary quality consists of four items, listed below in increasing order of frequency:

1. Beef, at least once a week
2. Bread, at least three times per week
3. Eggs, daily
4. Chicken, at least twice a week

These four items create five groups or scale steps. The coefficient of reproducibility of the scale is .958.

#### 5.3.3.2 Dietary Quality II (D.Q. II)

A second measure of dietary quality for the San Nicolas sample was constructed based on the Guttman scaling technique, but using different types of items. The second scale, which utilizes five items, creates six groups and has a coefficient of reproducibility of .95. The items, in decreasing order of frequency are:

1. A fruit (other than oranges/limes) at least weekly
2. A complex carbohydrate (rice, pasta, potatoes) other than corn and beans, daily
3. A fruit source of vitamin C, at least weekly
4. An animal protein food, daily
5. More than one source of animal protein food, daily

Some of the interrelationships among these measures are as follows:

1. The two Guttman scales of dietary quality are quite highly correlated. In all of the correlation coefficients that follow, the calculation is based on the Spearman rank order correlation. For the two scales of dietary quality:

$$R_s = .78 \quad (p < .01) \quad (N = 24)$$

2. The correlation of DQ I with the total number of units of animal protein in the weekly food frequency is:  
Rs = .84 (p<.001) (N = 24)
3. The correlation of DQ II with the total number of units of animal protein in the weekly food frequency is:  
Rs = .89 (p<.001) (N = 24)
4. The correlation of DQ I with Dietary Complexity I (DC I), based on habitual diet is:  
Rs = .74 (p<.01) (N = 24)
5. The correlation of DQ I with Dietary Complexity II (weekly servings) is:  
Rs = .83 (p<.001) (N = 24)
6. The correlation of DQ II with Dietary Complexity II (weekly servings) is:  
Rs = .81 (p<.001) (N = 24)

For 14 of the 24 adults in the San Nicolas sample, information was available on the Material-Style of Life index. Recognizing the difficulties of the small sample size, the following correlations are, nonetheless, very interesting:

1. There is a correlation of Rs = .50 between weekly dietary complexity (DC II) and MSL

2. There is a correlation of  $R_s = .76$  ( $p < .01$ ) between DQ II and MSL
3. There is a correlation of  $R_s = .62$  ( $p < .025$ ) between DQI and MSL
4. There is a correlation of  $R_s = .75$  ( $p < .01$ ) between number of units of animal protein weekly and MSL (Note that this correlation is identical to that of MSL and DQ II).

#### 5.4 PARENT-CHILD COMPARISONS

The same measures of dietary complexity and dietary quality were constructed for the San Nicolas young child sample. The data below concern only the 12 children whose parent (father or mother) is in the adult sample.

1. There is a correlation of  $R_s = .983$  between the parent's weekly dietary complexity score (DC II) and the child's score.
2. There is a correlation of  $R_s = .985$  between the parent's weekly number of animal protein units and the child's weekly animal protein units. (It should be noted that the Spearman rho is based on rank, not on absolute score. In fact, there are many differences between parent-child pairs in the number of units but the ranking (within the child

sample and within the adult sample) remains virtually identical!)

3. There is a correlation of  $R_s = .71$  between parents DQ II score and child's score.

### 5.5 FOOD INTAKE (SAN FRANCISCO SCLIS): PILOT STUDY

The methodology for food intake data collection in the pilot study was described earlier (pp. 65-66). The data analysis, and the results described in this section, were limited to summary indices on intake amounts and patterns. For this purpose kilocalorie and protein (gm) intakes were selected as the summary indices. The basic assumption in the collection and analysis of the pilot study data was that the habitual diet, dietary complexity and patterns in the pilot sample were commensurate with those observed in the four study communities. Finally, it should be noted that because of logistical problems, a different method (24-hour recall) was used for the collection of food intake data on Sundays. For this reason, Sunday data were excluded from the pilot study data analysis.

#### 5.5.1 Relative Variation and Patterns in Food Intake

Coefficients of variation (CVs) were separately calculated on both kilocalorie and protein intake by age group (adults and children), sex of individuals, day of the week, and

interview sequence. The results are presented in Tables 40-43. As can be seen from these tables, the CVs are generally within the expected ranges. In addition, the relative variation appears to be higher among females (adults and children) in both calorie and protein intake when compared with males.

From the further analysis of the weekday-to-weekday and interview-to-interview calorie and protein intake patterns two observations were noted. First, the overall mean food intake values are consistent with expected patterns by age and sex. Secondly, the weekday-to-weekday and interview-to-interview patterns by age and sex show no consistent day of the week or interview sequence number pattern in terms of the highest or lowest mean kilocalorie or protein intake values.

#### 5.5.2 Analysis of Variance

A series of exploratory analyses of variance (with different subject groupings, no groupings, repeated measures and single measures models) were conducted to determine significant variations, if any, among the various subject groupings examined. From the results, a few observations and conclusions can be made:

1. When all the subjects (N = 50) were included in a repeated measures ANOVA model with sex and age

group (adults, children) as distinct grouping variables, significant sex and age grouping effects ( $p < .05$ ) were obtained on both kilocalorie (KCAL) and protein (PRCT) intake by day of the week, and by interview sequence number. The significant sex and age group effects were expected.

2. When adults were separately analyzed using a repeated measures ANOVA model with FAMPOS (sex-age group) grouping, the following results were obtained:

a) there was a significant difference ( $p < .05$ ) between adults males and females on both kilocalorie and protein intake by day of the week, but no significant day of the week effect. Follow-up analyses showed that the adult sex differences were attributable to

i) kilocalorie intake on Thursdays, Fridays, and Saturdays; and

ii) protein intake on Fridays and Saturdays. It may be noted here that Monday is a marketing day in the pilot community. In part, therefore, the "toward-the-end of the week" differences noted in 'a' above may be due to the reduced amount of food

in the homes a few days after the Monday market day.

b) there was a significant difference ( $p < .05$ ) between adults males and females on both kilocalorie and protein intake by interview sequence; in addition, there was a significant interview sequence number effect ( $p < .05$ ). Follow-up analyses showed that the adult sex differences on protein intake were attributable to

i) kilocalorie intake on interview #1, interview #2 and interview #4; and

ii) protein intake on interview #4.

The interview sequence number effect may be due to variations in measurement and/or interviewee adaptability to the food intake measurement protocol.

3. When food intake by children was separately and similarly investigated as in '2' above, no significant differences were observed.

From 2.a and 2.b above, there was no clear pattern of day of the week effect in kilocalorie and protein intake by adults. The only plausible explanation may be that most of the observed differences are likely due to sex differences and/or other factors that influence adult food intake pat-

terns. For example, the interview sequence effect considered here did not take into consideration differences in intervening days of the week between the interview sequence numbers; moreover, special events (e.g. market days) or different days of the week might have influenced food intakes differently for each family in the pilot study. With respect to the latter, such special events, if any, did not appear to have a community-wide effect in the pilot study.

It seems that in the final phase of the study additional careful monitoring will be implemented to document any special days or events that may likely influence food intake. With regards to interview sequence effects, if any, variations attributable to them will be significantly reduced in the pilot study in implementing the food intake protocol.

Finally, the interviewer effects and differences due to socioeconomic status of individual families have not yet been investigated using the pilot study data. When this is done, perhaps additional clues will be obtained to further minimize any effect that may confound the true indices of food intake in the proposed study communities. In summary, the results so far obtained indicate that the study can be carried out as previously planned, and without any significant loss of accuracy or validity.

TABLE 40

KILOCALORIE INTAKE BY DAY OF THE WEEK AND BY INTERVIEW SEQUENCE:  
MALE AND FEMALE ADULTS

	Adult Males*			Adult Females**		
	Mean	SD	CV	Mean	SD	CV
<b>Day of the Week:</b>						
Monday	2581.612	856.671	.332	2148.828	704.913	.328
Tuesday	2475.010	539.511	.218	2080.728	869.744	.418
Wednesday	2241.784	1088.627	.486	1797.541	661.386	.368
Thursday	2739.580	650.463	.237	2080.221	603.209	.290
Friday	2541.216	628.547	.247	1786.734	898.193	.503
Saturday	2676.652	554.497	.207	2143.650	634.000	.296
<hr style="border-top: 1px dashed black;"/>						
<b>Interview Sequence:</b>						
1	2791.503	416.801	.149	2206.141	760.708	.345
2	2658.491	560.709	.211	2195.580	560.937	.255
3	2435.807	887.210	.364	1977.834	934.002	.472
4	2701.201	625.953	.232	1920.253	601.631	.313
5	2284.856	1034.776	.453	1857.832	759.076	.409
6	2383.997	736.975	.309	1880.063	761.963	.405
<hr style="border-top: 1px dashed black;"/>						
<b>Total 6 Visits</b>	2542.643	564.378	.222	2006.285	487.093	.243

\* N = 12

n = 22 07

\*\* N = 20

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TABLE 41

KILOCALORIE INTAKE BY DAY OF THE WEEK AND BY INTERVIEW SEQUENCE:  
MALE AND FEMALE CHILDREN

	Male Children *			Female Children **		
	Mean	SD	CV	Mean	SD	CV
<b>Day of the Week:</b>						
Monday	1260.395	533.459	.423	1563.221	360.929	.231
Tuesday	1594.348	373.058	.234	1445.232	525.410	.364
Wednesday	1705.444	388.862	.228	1215.724	525.601	.432
Thursday	1625.646	376.003	.231	1413.646	452.423	.320
Friday	1558.348	468.448	.301	1310.213	558.409	.426
Saturday	1658.531	307.787	.186	1461.850	483.849	.331
<hr style="border-top: 1px dashed black;"/>						
<b>Interview Sequence:</b>						
1	1738.475	311.474	.179	1356.795	535.835	.395
2	1519.103	390.538	.257	1387.783	482.863	.348
3	1769.031	400.063	.226	1266.835	495.011	.391
4	1506.288	372.747	.247	1554.872	456.392	.294
5	1480.198	371.378	.251	1418.618	513.774	.362
6	1389.511	596.249	.429	1424.982	478.951	.336
<hr style="border-top: 1px dashed black;"/>						
Total 6 Visits	1567.103	259.064	.165	1401.647	326.266	.233

\* N = 9

\*\* N = 9

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84A

TABLE 42

\* PROTEIN INTAKE BY DAY OF THE WEEK AND BY INTERVIEW SEQUENCE:  
MALE AND FEMALE ADULTS

	Adult Males **			Adult Females ***		
	Mean	SD	CV	Mean	SD	CV
<b>Day of the Week:</b>						
Monday	76.295	26.188	.343	66.378	28.626	.431
Tuesday	76.709	29.443	.384	66.996	27.374	.409
Wednesday	71.544	51.536	.720	59.850	28.717	.480
Thursday	93.403	42.225	.452	69.624	35.996	.517
Friday	83.920	24.539	.292	56.675	27.159	.479
Saturday	82.871	24.790	.299	63.867	18.274	.286
<hr/>						
<b>Interview Sequence:</b>						
1	97.032	42.249	.435	74.463	30.121	.405
2	91.063	44.068	.484	75.438	35.025	.464
3	74.821	29.202	.390	58.927	25.604	.435
4	83.938	27.237	.324	59.982	23.126	.386
5	65.740	29.283	.445	55.752	24.243	.435
6	72.149	23.886	.331	58.829	23.981	.408
<hr/>						
<b>Total 6 Visits</b>	80.791	24.400	.302	63.899	16.810	.263

\* in grams

\*\* N = 12

\*\*\* N = 20

TABLE 43

\*PROTEIN INTAKE BY DAY OF THE WEEK AND BY INTERVIEW SEQUENCE:  
MALE AND FEMALE CHILDREN

	Male Children **			Female Children ***		
	Mean	SD	CV	Mean	SD	CV
<b>Day of the Week:</b>						
Monday	41.254	20.589	.499	46.605	15.483	.332
Tuesday	47.532	11.977	.252	44.412	21.464	.483
Wednesday	49.982	11.082	.221	37.911	17.513	.464
Thursday	60.893	27.799	.457	43.904	15.119	.344
Friday	48.900	16.214	.332	50.007	28.879	.578
Saturday	61.023	43.623	.715	46.536	25.176	.541
<hr/>						
<b>Interview Sequence:</b>						
1	55.182	13.319	.241	42.307	19.258	.455
2	57.883	27.170	.469	43.838	17.574	.401
3	54.306	14.127	.260	40.226	17.270	.429
4	57.806	45.235	.783	53.081	26.082	.491
5	44.961	13.883	.309	43.478	20.250	.466
6	39.446	17.199	.436	46.447	24.820	.534
<hr/>						
Total 6 Visits	51.597	10.044	.195	44.896	13.418	.299

\* in grams

\*\* N = 9

\*\*\* N = 9

## Chapter VI

### ANTHROPOMETRY

Anthropometric data was collected from adults and children of a random sample of households in the four census communities in July (n = 2,374, 61% of census population). In October, similar measures were taken from individuals in 26 (approximately 25%) of the households in the pilot study community, San Francisco. The anthropometric study was carried out by research teams from Instituto Nacional de la Nutricion under the direction of Dr. Alfonso Mata. The research team which collected anthropometric data in San Francisco included two assistants who had previous experience in anthropometry during the preliminary census, supplemented by a one week training course, and a physician who was trained in anthropometry by experts from the Instituto Nacional.

Methods of data collection in the pilot study proceeded according to the following scheme:

1. Selection of personnel
2. Training of professional and auxiliary personnel
3. Quality control by supervision and standardization

#### 4. Measurements in San Francisco, Solis

The anthropometric measurements taken in both studies were body weight, height (length under two years), arm circumference and triceps skinfold thickness. Body weight was measured on a Detecto balance, without shoes and without excess clothing. Recording was to 0.05 kg. Infants who could not be weighed were carried (usually by the mother) and the weight of the infant calculated by the difference in the carrier with and without the infant. Height was measured against a fixed steel tape measure, checked for vertical with a plumb line. A square was positioned on the head. The subject stood without shoes, with heels against the wall and knees straight. Recording was to 0.1 cm. Infants (under 2 years) were measured by a wooden infantometer. Arm circumference was measured with a flexible tape on the left arm, half way between the elbow and shoulder with the arm bent and hand on the thorax. Recordings were made to 0.01 cm. Triceps skinfold thickness was measured with a Lange caliper on the back of the left arm at the midpoint. The arm was relaxed and the skinfold held 1.5 cm above the midpoint. Recordings were made to 0.5 mm, in duplicate.

Measurements were made in community schools and homes. The original intention was to set up "measuring stations" in schools or centrally located houses. Each family was visited one day before the measurements were made and asked to come

to the central location the following day. Schoolmasters were requested to cooperate in the study of school-aged children. On average twenty families per day or 100-150 individuals were measured. Working hours for the anthropometry team were 6 A.M. to 2 P.M. In the evenings, families were solicited for their cooperation on the following day. Toward the end of data collection a special effort was made to obtain measurements in the houses of individuals who had not yet turned up for measurement.

Quality control was achieved by the method of Habitch. The measurements of every 10th subject were retaken by a different member of the team to check for accuracy and reproducibility. After every 50 weighings, the balance was recalibrated using a weight. The flexible tape measure was constantly checked against a metal one and the calipers against a metal cube of known size.

#### 6.1 ANALYSIS

Data from children from 0-12 years of age were employed for preliminary analysis. For both the census communities and pilot community studies, criteria for defining levels of nutritional status were based on comparison with WHO standards. The levels derived were as follows:

Height

"Normal:" Height > 90% of height-for-age standards.

"Marginally malnourished:" Height 70-90% of height-for-age standards.

"Severely malnourished:" Height < 70% of height-for-age standards.

Weight

"Normal:" Weight between 90-100% of weight-for-age standards.

"Marginally malnourished:" Weight between 80-90% of weight-for-age standards

"Malnourished:" Weight between 70-80% of weight-for-age standards.

"Severely malnourished:" Weight < 70% of weight-for-age standards.

Weight-for-Height

"Normal:" Weight-for-height 90-100% of standards.

"Marginally malnourished:" Weight-for-height 80-90% of standards.

"Severely malnourished:" Weight-for-height 80% of standards.

## 6.2 RESULTS

### 6.2.1 Height for Age

Data for preschool-aged (0-4 years) and school-aged (8-12 years) children of the four communities ("Solis Valley") and the pilot community classified according to adequacy of height-for-age are presented in Tables 44 and 45. Table 46 presents the distribution, according to family type (see pp. 61-62), of nutritional levels among children in the four communities as indicated by adequacy of height-for-age. Risk of low height-for-age of the pilot study community children relative to the community of lowest risk in the four communities is presented in Table 47.

Height-for-age was normal for approximately 72% of the children in the four communities, while 28% were malnourished, according to above criteria. In these communities there were no differences in the distribution of height adequacy among the different types of families. The incidence of low height-for-age was substantially higher in San Francisco than in the four communities. San Francisco children were shorter at every age than those of the four communities. Approximately 73% of the children in San Francisco were below normal height-for-age. The relative risk of low height-for-age among San Francisco children compared to the community of lowest risk in the four communities ranged between 7-11 for various age groups.

### 6.2.2 Weight-for-Age

Results of classification of children by weight-for-age are presented in Tables 48-52. Children of the four communities had a slightly higher incidence of low weight-for-age than those of San Francisco, but the problem was serious in both studies.

In San Francisco 45% of the children were of normal weight-for-age, while 55% were malnourished. Relative risk of low weight for age among San Francisco children compared to community of lowest risk in the four communities ranged from 1.10-1.64.

In the four communities approximately 65% of the children measured were below normal weight-for-height. Approximately 40% of the infants in the four communities were malnourished. The percentage of low weight-for-age increased after infancy in the four communities: approximately 64% of children aged 1-5 years and 72% aged 8-12 years were malnourished by this measure. Type 1 families had the highest incidence of malnutrition overall (54% including infants). The distribution of malnutrition was similar among children 1-5 years of age and 8-12 year olds according to family type.

### 6.2.3 Weight-for-Height

Weight-for-height data are presented in Tables 53-55. During the first year of life approximately 20% of the infants of

the four communities were malnourished, but by 2-5 years this proportion was reduced by half. The incidence of malnutrition in the four communities was independent of a family type, although there existed 1.08-1.35 times more risk of malnutrition in family types 3 and 4 (not a statistically significant difference). In infants the risk of inadequate weight-for-height was 2.24 times higher than in the group aged 2-5 years ( $X^2$  6.95,  $p < 0.01$ ). In older children there was no difference in the incidence of malnutrition according to family type.

In San Francisco, where children tended to have higher weight and height-for-age than in the four communities, weight-for-height was substantially more adequate. The incidence of malnutrition according to this analysis was 11% overall, with the highest incidence among 2-3 year olds.

#### 6.2.4 Discussion

Several methodological problems encountered in collecting the anthropometric data and methods of compensation should be mentioned. First, there were some familiar problems in obtaining anthropometric measures:

1. Weight. The majority of male adults refused to remove their shoes and sweaters because they did not think it was necessary and the mornings were cold. Many children measured in front of their

friends in school were embarrassed to remove any clothes in front of their friends.

2. Height. Again it was difficult to convince most individuals to take off their shoes. When refusal was definite, we measured the height of the shoe. When data were collected house-to-house the problem of uneven floors was minimized by hanging a metal tape and checking that it was vertical by a plumb line.

3. Arm Circumference and Skinfold. Difficulties were encountered if individuals wore long sleeves in that localization of the midpoint of the arm was sometimes not clear. In young children obtaining this measure was more difficult because they believed the intention was to vaccinate them and begin to cry. Some objection to marking the midpoint of the arm was also evident.

There were also minor problems maximizing subject participation. The most difficult members to locate were the male heads-of-households and older sons, who worked in the fields. Some of these agreed to be measured at 6 A.M., but not all. A few families refused to cooperate, saying that they were too busy, they would receive no benefits and would lose work time.

Despite these methodological difficulties we feel that the data collected accurately represent the anthropometric characteristics of these communities. The reproducibility of circumference and skinfold measurements was acceptable and that of weight and height measurements excellent. Children often gave a wrong last name, but this could generally be corrected from census and household number data. Frequently, the birth dates obtained in the census (from registration) differed from the age stated by the child or mother. Children whose age could not be determined with confidence were excluded from the height and weight-for-age analysis.

Without longitudinal data it is not possible to say whether differences in height are due to nutritional or genetic factors. Undoubtedly both exist. It is assumed here that the differences are largely nutritional.

A second difficulty in interpreting these data is that the study of the four communities was done in July 1982, and that of the pilot community in October 1982. Our cross-sectional data do not permit us to be certain that there was a cyclical trend in anthropometric changes, although this could have explained the differences between the pilot and the other communities, which were most significant in the 2-5 year old age group. However, possible cyclical changes in nutritional status could not have explained the large

differences in height between the pilot and other communities. Presumably the nutritional history of the children in the pilot community was poorer than that of the rest of the valley.

TABLE 44  
 Classification by Height-for-Age, Preschoolers  
 I. Valley of Solis, July 1982

Age	N	% Adequacy of height			
		70-80	80-90	90-100	>100
0-1	72	0	7 <sup>a</sup> (10) <sup>b</sup>	46 (64)	19 (26)
1-2	92	0	35 (38)	55 (60)	2 (2)
2-3	90	0	23 (26)	61 (68)	6 (6)
3-4	88	0	32 (36)	54 (61)	2 (2)
4-5	104	1 (1)	22 (21)	75 (72)	6 (6)
Total	446	1 (0)	119 (27)	291 (65)	35 (8)

II. San Francisco Solis  
 October 1982

0-1	16	2 (13)	5 (31)	8 (50)	1 (6)
1-2	11	5 (45)	3 (27)	3 (27)	0 (0)
2-3	19	9 (47)	6 (32)	4 (21)	0 (0)
3-4	24	10 (42)	9 (38)	5 (20)	0 (0)
4-5	13	3 (23)	7 (54)	3 (23)	0 (0)
Total	83	29 (35)	30 (36)	23 (28)	1 (1)

a N.  
 b %.

TABLE 45

Classification by Height-for-Age, Schoolchildren  
I. Valley of Solis, July 1982

Age	N	% Adequacy of height-for-age			
		70-80	80-90	90-100	>100
8-9	117	6 <sup>a</sup> (5) <sup>b</sup>	15 (13)	89 (76)	7 (6)
9-10	123	0 (0)	23 (19)	93 (76)	7 (5)
10-11	101	0 (0)	20 (20)	72 (71)	9 (6)
11-12	109	2 (2)	33 (30)	67 (61)	7 (6)
Total	450	8 (2)	91 (20)	321 (71)	30 (7)

II. San Francisco Solis (Pilot)  
October 1982

8-9	12	3 (21)	6 (50)	3 (25)	0 (0)
9-10	19	4 (21)	10 (53)	5 (26)	0 (0)
10-11	14	6 (43)	7 (50)	1 (7)	0 (0)
11-12	20	3 (15)	10 (50)	7 (35)	0 (0)
Total	65	16 (25)	33 (51)	16 (25)	0 (0)

a N.

b %.

TABLE 46  
 Height-For-Age Of Children  
 Solis Valley, July 1982

Family type	// Cases	Height-for age, % adequacy					
		Normals		Chronic malnutrition		Severe malnutrition	
		N	%	N	%	N	%
1	554	408	74	145	26	1	0
2	81	59	73	22	27	-	-
3	289	203	70	85	29	1	0
4	222	158	72	63	28	1	1

TABLE 47

Risk of Low Height-For-Age: Comparison of Pilot Community with Valley of Solis

Age (years)	Community	% Low Weight	Relative risk <sup>a</sup>	Significance <sup>b</sup>
0-1	San Francisco Valley of Solis	43 10	7	P<0.01
2-5	San Francisco Valley of Solis	78 30	8	P<0.01
8-12	San Francisco Valley of Solis	75 22	11	P<0.01

<sup>a</sup> Comparison with community at lowest risk.

<sup>b</sup>  $\chi^2$  test.  $p < 0.01$

TABLE 48

Classification by Weight-for-Age, Preschoolers  
I. Valley of Solis, July 1982

Age	N	% Adequacy of weight			
		<70	70-90	90-100	>100
0-1	78	2 <sup>a</sup> (3) <sup>b</sup>	26 (33)	15 (19)	35 (46)
1-2	92	8 (9)	59 (64)	19 (21)	6 (7)
2-3	91	4 (4)	50 (55)	28 (31)	9 (10)
3-4	90	4 (4)	60 (66)	18 (20)	8 (9)
4-5	103	2 (2)	54 (52)	34 (33)	13 (13)
Total	454	20 (4)	249 (55)	114 (25)	71 (16)

II. San Francisco Solis (Pilot)  
October 1982

0-1	17	1 (6)	4 (24)	9 (53)	3 (18)
1-2	9	2 (22)	3 (33)	4 (44)	0 (00)
2-3	19	5 (26)	5 (26)	9 (47)	0 (00)
3-4	24	2 (8)	10 (42)	12 (50)	0 (00)
4-5	14	1 (7)	6 (43)	7 (50)	0 (00)
Total	83	11 (13)	28 (34)	41 (49)	3 (4)

<sup>a</sup> N.

<sup>b</sup> %.

TABLE 49

Classification by Weight-for-Age, School-Age Children  
I. Valley of Solis, July 1982

Age	N	% Adequacy of weight			
		<70	70-90	90-100	>100
8-9	117	9 <sup>a</sup> (8) <sup>b</sup>	65 (55)	21 (17)	22 (20)
9-10	123	10 (8)	82 (66)	21 (17)	10 (8)
10-11	103	13 (12)	68 (66)	16 (15)	6 (6)
11-12	111	22 (20)	59 (25)	16 (14)	14 (13)
Total	454	54 (12)	274 (60)	74 (16)	52 (11)

II. San Francisco Solis (Pilot)  
October 1982

8-9	12	2 (17)	5 (42)	5 (42)	0 (00)
9-10	19	3 (16)	10 (53)	6 (32)	0 (00)
10-11	14	2 (14)	10 (71)	2 (14)	0 (00)
11-12	21	2 (10)	9 (43)	10 (48)	0 (00)
Total	66	9 (14)	34 (52)	23 (35)	0 (00)

a N.

b %.

TABLE 50  
Weight-For-Age Of Children by Family Type  
Solis Valley, July 1982

Type of family	# Cases	Age (years)	Weight-for-age, % adequacy					
			0-60	60-70	70-80	80-90	90-100	>100
1	44	0-1	0	1 (2)	4 (9)	13 (29)	9 (20)	17 (39)
	235	2-5	5 (2)	7 (3)	45 (19)	99 (42)	54 (23)	25 (11)
	309	8-12	5 (2)	32 (10)	112 (36)	91 (29)	46 (15)	23 (7)
2	2	0-1	0 (0)	0 (0)	0 (0)	1 (50)	1 (50)	0 (0)
	18	2-5	0 (0)	1 (6)	5 (28)	3 (17)	9 (50)	0 (0)
	62	8-12	2 (3)	5 (8)	22 (35)	13 (21)	12 (19)	8 (13)
3	24	0-1	1 (4)	0 (0)	1 (4)	2 (8)	6 (25)	14 (58)
	127	2-5	0 (0)	4 (3)	30 (24)	43 (34)	39 (30)	11 (9)
	138	8-12	3 (2)	11 (8)	44 (32)	45 (33)	19 (14)	16 (12)
4	23	0-1	1 (4)	0 (0)	1 (4)	2 (9)	5 (22)	14 (61)
	104	2-5	0 (0)	4 (4)	23 (22)	37 (36)	30 (29)	10 (10)
	95	8-12	3 (3)	7 (7)	29 (30)	33 (35)	12 (13)	11 (12)

TABLE 51  
 Weight-For-Age Of Children  
 Solis Valley, July 1982

Family type	# Cases	<u>Marginal malnutrition</u>		<u>Well-nourished</u>	
		N	%	N	%
1	377	203	54	174	46
2	47	17	36	30	64
3	195	90	46	105	54
4	154	72	47	82	53

TABLE 52

Risk of Low Weight-For-Age: Comparison of Pilot Study with Valley  
of Solis

Age (years)	Community	% Low weight	Relative risk <sup>a</sup>	Significance <sup>b</sup>
0-1	San Francisco Valley of Solis	29 36	1.35	N.S.
2-5	San Francisco Valley of Solis	52 64	1.64	P<0.01
8-12	San Francisco Valley of Solis	65 72	1.10	N.S.

<sup>a</sup> Comparison with community at lowest risk.

<sup>b</sup>  $\chi^2$  test.  $p < 0.01$

Classification by Weight-for-Height  
I. Valley of Solis, July 1982

Age	N	% Adequacy, weight-for-height			
		<70	70-90	90-100	>100
0-1	93	3 <sup>a</sup> (3) <sup>b</sup>	17 (18)	24 (26)	49 (53)
1-2	123	0 (0)	28 (23)	49 (40)	46 (37)
2-3	115	0 (0)	15 (13)	48 (42)	52 (45)
3-4	108	0 (0)	3 (3)	45 (42)	60 (56)
4-5	138	0 (0)	7 (05)	48 (35)	83 (60)
8-9	146	0 (0)	11 (8)	65 (45)	70 (48)
9-10	153	0 (0)	3 (2)	58 (38)	92 (60)
10-11	127	0 (0)	15 (12)	48 (37)	64 (50)
11-12	140	0 (0)	17 (12)	49 (35)	74 (52)

II. San Francisco Solis (Pilot)  
October 1982

0-1	17	0 (0)	1 (6)	12 (71)	4 (23)
1-2	11	2 (18)	1 (9)	6 (55)	2 (18)
2-3	20	0 (0)	5 (25)	15 (75)	0 (0)
3-4	24	0 (0)	0 (0)	22 (92)	2 (8)
4-5	13	0 (0)	3 (23)	9 (69)	1 (8)
8-9	12	0 (0)	0 (0)	10 (83)	2 (17)
9-10	19	0 (0)	2 (11)	16 (84)	1 (5)
10-11	13	0 (0)	0 (0)	12 (92)	1 (8)
11-12	17	0 (0)	2 (12)	14 (83)	1 (6)

a N.

b %.

TABLE 54

Weight-For-Height Of Children  
Solis Valley, July 1982

Type of family	# Cases	Age	Weight-for-height, % adequacy						
			0-60	60-70	70-80	80-90	90-100	>100	
1	44	0-1	0 (0)	1 (2)	3 (7)	5 (11)	13 (29)	22 (50)	
	235	2-5	0 (0)	0 (0)	4 (2)	25 (11)	95 (40)	111 (47)	
	275	8-12	0 (0)	3 (1)	2 (1)	17 (6)	109 (40)	144 (52)	
2	2	0-1	0 (0)	0 (0)	0 (0)	0 (0)	7 (50)	7 (5)	
	18	2-5	0 (0)	0 (0)	0 (0)	1 (6)	6 (33)	11 (61)	
	61	8-12	0 (0)	1 (1)	0 (0)	5 (8)	22 (36)	33 (54)	
3	24	0-1	0 (0)	1 (4)	2 (8)	3 (12)	5 (21)	13 (54)	
	127	2-5	0 (0)	0 (0)	2 (2)	10 (8)	50 (39)	65 (51)	
	138	8-12	0 (0)	1 (0)	2 (1)	10 (7)	52 (38)	74 (54)	
4	23	0-1	0 (0)	1 (4)	2 (9)	2 (9)	5 (22)	13 (57)	
	104	2-5	0 (0)	0 (0)	2 (2)	9 (9)	39 (37)	54 (52)	
	95	8-12	0 (0)	0 (0)	2 (2)	8 (8)	37 (39)	48 (51)	

TABLE 55

Risk of Low Weight-For-Height: Comparison of Pilot Community with  
Valley of Solis

Age (years)	Community	% Low weight/ height	Relative risk <sup>a</sup>	Significance <sup>b</sup>
0-1	San Francisco Valley of Solis	6 22	4.39	P<0.01
2-5	San Francisco Valley of Solis	13 11	1.29	NS
8-12	San Francisco Valley of Solis	7 8	1.04	NS

<sup>a</sup> Comparison with community at lowest risk

<sup>b</sup>  $\chi^2$  test.  $p < 0.01$

## Chapter VII

### PHYSICAL ACTIVITY OF WOMEN IN THE PILOT COMMUNITY

A survey of physical activity patterns was designed to obtain information on the usual activity of women in the Solis Valley and to assist us in designing the methodology for future research in the project. The survey was conducted in October, 1982 in the pilot community of San Francisco.

Twenty-eight families were selected initially employing the San Francisco census and socio-economic data. Families representing a range of socio-economic status were selected with additional criteria that they have at least one child between 8-12 years of age. These families were then asked for their cooperation. After preliminary screening the survey was conducted with 24 women of these households.

#### 7.1 SURVEY INSTRUMENT

An Activity Questionnaire was developed consisting of two principal components:

1. A timetable of activities divided into two parts: morning and afternoon/evening (after "comida").
2. A series of questions more carefully defining the nature, duration, seasonality, etc. of activities.

The interview, therefore, elicited the following information about activity patterns:

- Amount of time for each activity
- How many days per week it was done
- Rhythm (with or without interruptions)
- Body position (lying down, erect, sitting, squatting, kneeling, bending, various)
- Condition of terrain (level, uphill, downhill, undulating. Also dry, rocky, muddy, wet)
- Weight carried (light, moderately heavy, heavy, very heavy)
- Effort (does this task involve light, moderate, or much exercise?)
- Fatigue (does this task make you not at all, moderately, or very tired?)
- Description of the components of each activity
- Patterns of rest
- Agricultural activities
- Seasonal nature of activities

## 7.2 SURVEY PROCEDURE

Households, which were identified from the project map of the community, were visited by the interviewer who first explained the purpose of the study. The interview required approximately 35 minutes. Thirty-six percent of the interviews were tape recorded.

Two types of methodological problems were encountered: problems with subjects and problems with the questionnaire.

Problems with subjects included:

1. reluctance to be interviewed about missing information and
2. difficulty locating subjects because they were away from the house, especially in the morning, because of agricultural activities.

Problems with the questionnaire affected both interviewer and respondents. For example, it was difficult for the interviewer to remember and record all the information at the time it was given by the women. Tape recordings of interviews were helpful in this respect. The women found it difficult to distinguish between "effort" and "fatigue" (the data on fatigue are probably more reliable than those on effort). Discussions of such positions as kneeling, squatting and sitting on heels require some actual demonstration, as the definitions used by the women were not always clear.

### 7.3 RESULTS

The major activities described by the women in the study were as follows:

1. Tending a store (taking articles from a shelf, putting them on the counter, an action which

- involves primarily walking, sitting, and kneeling).
2. Breast-feeding (holding the infant in the arms, and sitting to breast-feed during the day or lying down if at night).
  3. Sewing (mending, by hand or machine, or weaving wool or cotton).
  4. Milking (milking cows while seated).
  5. Ironing (erect or sitting).
  6. Washing dishes (washing utensils used in serving or preparing food - cleaning, rinsing and drying - done while standing or sitting).
  7. Stripping kernels from corn, done with an instrument called an oletera.
  8. Cooking (lighting the stove, cooking or heating food; sometimes a wood fire is used).
  9. Making tortillas (placing the dough in a press, cooking the tortilla, and placing it in a container).
  10. Caring for children (bathing, dressing, combing hair, changing diapers and feeding).

11. Cutting grass (with instruments called hoz or gua-  
dana, with the assistance of a horse or carrying  
the grass on the back to bring it home).
12. Guarding animals (giving water, food, taking them  
to pasture, leading them home and cleaning their  
quarters).
13. Carrying milk (in a bucket).
14. Washing clothes (soaking clothes one day before  
washing them, scrubbing, rinsing, and hanging them  
to dry).
15. Cleaning house (sweeping, bed-making, cleaning  
furniture).
16. Going to the mill (carrying buckets of soaked corn  
to the mill and back).
17. Gathering wood (going to the hills, gathering or  
cutting wood by hand, making a bundle, putting it  
on an animal or carrying it on the back to carry  
it home).

A chart was prepared including the number of days each activity was performed per week and the amount of time devoted to each activity per day and per week for each respondent. Number of hours working per day, sleep and rest patterns were also charted. Percentage of time per week in

each activity was calculated from these data (based on 24 hours per day).

The data indicate that housework, as might be expected, occupies a substantial amount of time for most women. Cooking required more time than any other activity on average (9.35%). All respondents reported cooking 7 days per week. All but 3 reported washing dishes (average time allocation 3.79%) and cleaning house (average time allocation 5.91%) daily. Washing clothes required an average of 7.7 hours per week (4.52% time). The number of days per week this activity was performed varied, with one exception, from 2-6. Those who washed fewer days washed more hours on wash days. Generally, the women reported stripping corn and making tortillas 3-4 times per week. The amount of time devoted to stripping corn when this activity was undertaken varied from 15 minutes to 1 hour. Making tortillas, however, required 1-5 hours.

Seven of the women in the survey were breastfeeding, an activity requiring an average of 9.78% of their time. Child-care was reported 7 days per week (17 women) or not at all (7 women).

All but 1 respondent reported spending some time during the week caring for animals. Twenty said they cared for animals 7 days per week, but the amount of time spent in this activity varied considerably, from 15 minutes to 7 hours per day.

The activities least often performed were milking, carrying milk, cutting grass, and gathering wood. Two women tended a store, each 7 days a week (10 and 13 hours per day). Since other activities were performed simultaneously with tending a store throughout the day, however, it is difficult to interpret the energy demands represented by this activity.

Examples of activity patterns for 2 women are presented in Tables 56 and 57 below. The first (ID #015) is a woman with an infant, living in a household of eight people. Breast-feeding occupies a substantial amount of time daily (3 hours per day, 12.5% of her time). Other daily activities reported include washing dishes, cooking, childcare (in addition to breastfeeding), caring for animals and housecleaning. She sews 6 days a week, an activity which occupies over 7% of her time. In a typical week she does not tend a store, milk, carry milk, cut grass or gather wood.

The second woman (ID 046) lives in a household with 6 other people. During 5 days per week the majority of her time is spent caring for animals and cooking. Washing clothes, which requires 6 hours on washing days, takes the place of caring for animals two days per week. Cooking and cleaning are the only daily activities reported. This woman's responsibilities do not include washing dishes and caring for children. She reports performing only 9 of the 17 activities charted.

Comparison of these two examples suggests that, despite obvious similarities, there is substantial variation in the pattern of activities of women in this survey. It is likely that this variability is related to such variables as socio-economic status, specific economic strategies, household size and type. Full analysis of this matter has not yet been undertaken.

Based on reports of activity patterns, daily and weekly calorie expenditures were estimated for each woman. Estimations were based on data on energy expenditure collected elsewhere in Central America by INCAP (B. Torun). Results of this analysis are presented in Table 58.

TABLE 56  
Physical Activity Patterns (Pilot Study)

<u>Activity</u>	<u>Hours/day</u>	<u>ID #105</u>		
		<u>Hours/week</u>	<u>N/week</u>	<u>%time/week</u>
Tending store	0	0	0	0
Breast-feeding	3	21	7	12.5
Sewing	2.2	13	6	7.73
Milking	0	0	0	0
Ironing	0.5	1	2	0.59
Washing dishes	1	7	7	4.16
Stripping corn	0.5	1.5	3	0.77
Cooking	2.5	17.5	7	10.29
Making tortillas	3	9	3	3.35
Childcare	1	7	7	4.16
Cutting grass	0	0	0	0
Guarding animals	0.5	3.5	7	1.96
Carrying milk	0	0	0	0
Washing clothes	2	6	3	3.57
Cleaning house	1	7	7	4.16
Going to mill	0.25	0.75	3	0.26
Gathering wood	0	0	0	0

TABLE 57

## Physical Activity Patterns (Pilot Study)

<u>Activity</u>	<u>Hours/day</u>	ID #046		<u>N/week</u>	<u>%time/week</u>
		<u>Hours/week</u>			
Tending store	0	0		0	0
Breast-feeding	0	0		0	0
Sewing	2	2		1	1.19
Milking	0	0		0	0
Ironing	2.5	5		2	2.97
Washing dishes	0	0		0	0
Stripping corn	0.5	1.5		3	0.77
Cooking	3	21		7	12.5
Making tortillas	3	9		3	3.35
Childcare	0	0		0	0
Cutting grass	0	0		0	0
Guarding animals	7	35		5	20.83
Carrying milk	0	0		0	0
Washing clothes	6	12		2	7.14
Cleaning house	0.5	3.5		7	1.96
Going to mill	0.5	1.5		3	0.77
Gathering wood	0	0		0	0

TABLE 58

## Caloric Expeniture of Women in San Francisco Solis

<u>Household</u>	<u>Number</u>	October 1982	
		<u>Daily Expenditure</u>	<u>Weekly Expenditure</u>
004		3,139	21,972
010		1,402	9,814
014		1,049	7,340
015		1,761	12,328
022		1,889	13,223
025		1,143	8,005
030		-	-
032		1,089	7,625
035		1,221	8,550
039		1,715	12,006
044		1,709	11,964
046		1,811	12,716
053		1,153	8,071
056		1,811	12,675
059		1,418	9,925
060		1,902	13,316
066		766	5,360
068		2,816	19,715
083		1,599	11,196
089		1,650	11,553
092		-	-
095		1,912	13,384
099		1,202	8,412
101		1,905	13,336
104		1,092	7,642

## Chapter VIII

### SUMMARY

This report has summarized research operations and data collected as of November, 1982 by the Instituto Nacional de la Nutricion-University of Connecticut Collaborative Research and Support Project in the Solis Valley, Mexico. In addition to review and collection of extensive ethnographic material, a range of nutritional, socio-economic and behavioral measurements and surveys were made in a preliminary study of 4 Solis Valley communities (July, 1982) and in a pilot study in the community of San Francisco, Solis (September to October, 1982).

Data sets developed and given preliminary analysis in this report include:

1. Census, including demographic data: 4 communities (n = 622 households, 3895 individuals) and San Francisco (n = 104 households, 557 individuals).
2. Dietary intake: 4 communities (n = 437 individuals) and San Francisco (n = 30 households, 90 individuals).
3. Anthropometry: 4 communities (n = 2377 individuals) and San Francisco (n = 26 households).
4. Socio-economic variables: 4 communities (n = 109 households) and San Francisco (n = 39 households).

5. Reproduction: San Francisco (n = 45 women).
6. Physical Activity Patterns: San Francisco (n = 24 female heads of households).

In addition, under direction of Dr. Gordon Finley, who has made 2 site visits to the project, a preliminary cognitive battery has been developed. This was pretested by assistants during the pilot study with 21 San Francisco children. Data from this pretest and intercorrelations with dietary, anthropometric and social variables are being analyzed, but have not been included in this report.

Other work in progress includes development of immunological and infant cognitive development studies. Dr. Ranjit Chandra has made a site visit to discuss laboratory set up for immunological studies. Dr. Tiffany Field has made a recent site visit to lay groundwork for development of the infant cognitive study design and instruments. Her research associate is scheduled to arrive in Solis in February, 1983 to train assistants and inaugurate the cognitive study.

#### 8.1 INTERRELATIONSHIPS BETWEEN THE DATA SETS

This preliminary research was not designed to test hypotheses about the relationship of food intake to functional outcomes or social antecedents. Its purposes, rather, were to train field staff in the application of research tools and instruments, to assess the community response to our research procedures and to provide feedback on the

effectiveness and feasibility of the proposed measures. Nonetheless, it is useful to examine the inter-relationships among the data sets statistically since this provides some feedback about the validity of the various instruments and research procedures. In the statistical exercises we are not looking for (or expecting) strong support for specific hypotheses. Rather, we must scan the results for patterns of relationships. If intercorrelations are consistently illogical or unrelated to any theory, there is reason for concern. On the other hand, relationships and patterns that conform to theoretically (and ethnographically) - derived expectations provide evidence that the procedures and measures "make sense".

Given the variable nature of the data (nominal, ordinal and interval measurements) and the very small sample sizes, we decided to use the Spearman rho (rank-order) statistic to examine relationships, and to regard a correlation of .30 or greater as indicating a non-random, patterned relationship, whether or not the coefficient had a "p value" of less than .05. The former decision is a conservative one; the latter reflects our experience concerning the relationship between magnitude of correlations in small (pilot) samples and results in larger samples following pilot testing. For the purpose of assessing pattern, we therefore feel that a relationship of .30 (in small samples) is a reasonable point at which to suggest a degree of non-random patterning.

Several strong relationships between dietary intake and anthropometric measures were observed in data for individuals and between women and children of the same family. Table 59 presents correlations found in 6 of these relationships.

TABLE 59

## Correlations Between Dietary and Anthropometric Measures

<u>Variables</u>	<u>N</u>	<u>Rho</u>
Female household heads: Mean daily kcal intake with wt/(ht squared)	20	0.68
Female household heads: Mean daily kcal cost (activity survey) with mean daily kcal intake	15	0.61
Male household heads: Mean daily kcal intake with wt/(ht squared)	17	0.58
Key child: Mean daily kcal intake with wt/(ht squared)	20	0.77
Mean daily kcal intake of key child with mean daily intake of female	22	0.64
Mean daily kcal intake of 3rd child with mean daily intake of female	7	0.79

Pilot study data were employed to explore relationships between dietary and anthropometric variables and social variables. The social variables explored included "material style of life" (MSL), total number of animals possessed by the household (Tot Animals), "educational attitudes" (Ed

Attitudes), "modern attitudes" (Mcd Attitudes), number of children (Nu Child) less than and greater than 12 years of age in the household, ratio of the number of children in various age groups in the household, and male migration patterns.

The material style of life scale, described more fully above (pp. 29-30) included the following items and frequencies in the pilot study.

	<u>Frequency</u>
clothes closet (ropero)	35
electric iron	34
radio	34
gas stove	26
television	22
furniture (other than table)	22
blender	20
sewing machine	10
motor vehicle	7
camera	2

Attitude scales were constructed from responses to questions asked during the pilot study regarding aspirations for children (including the value of education, preferred occupations), attitudes toward education, attitudes toward particular professions and other questions intended to "tap" the extent to which the individual is oriented to the world

outside the local community. The responses were then combined into a series of scales: "father's modern attitude scale", "mother's modern attitude scale", "father's education attitude scale", "mother's education attitude scale", and a composite measure combining the four scales to reflect a family "modernization-education attitude scale".

Some of the stronger relationships between these social variables and dietary (mean daily kcal intake) and anthropometric ( $wt/ht^2$ ) variables are presented in Table 60.

TABLE 60

## Correlations of Social with Dietary and Anthropometric Measures

Social Variables	Child 8-12 yrs		Mother			Father	Children < 5 yrs		
	Mean Calorie Intake (daily)	Weight/Height <sup>2</sup>	Mean Calorie Intake (daily)	Weight/Height <sup>2</sup>	Weekly Activity Cost	Mean Calorie Intake (daily)	Weight/Height <sup>2</sup> Child #1	Weight/Height <sup>2</sup> Child #2	Weight/Height <sup>2</sup> Child #3
M. S. L.	.47					-.51			.54
Total # of animals	.41								
Male Education Attitudes	.41	.43	.36		.37		.52	.36	.80
Male Modern. Attitudes		.34			.44	.48	.41	.71	.74
Female Education Attitudes		.34			-.35		-.40		
Female Modern. Attitudes		.44	.45	-.34	.63		.34	.48	
Ratio: Child < 5 to > 5						.44		.59	
Ratio: child < 12 to > 12					.50			.45	-.29
Ratio: child < 12 to HH size					.50			.45	-.29
# of children < 12					.35				
# of persons ≥ 12					.50				
Mean Caloric Intake					.65				
Father's visit home						.61			
Father's migration							.45	.42	

## Chapter IX

### CONCLUSIONS

The research in Solis in this preliminary phase of the project indicates a range of nutritional status among this valley's population. Ethnographic data and impressions and anthropometric data show a substantial incidence of malnutrition, primarily marginal malnutrition with a small incidence of severe malnutrition among children of various age groups. Dietary intake data suggest a range of caloric and protein adequacy, with significant incidence of apparently low intakes. More extensive dietary intake data to be collected in the main data gathering phase of the project will permit a more confident assessment of dietary adequacy by this method. The socio-economic context of this nutritional picture is clear: a rural, highland population pursuing a mixed economic strategy of subsistence agriculture and wage labor. In this respect, the valley population is representative of many contemporary, marginally nourished rural Third World populations. Preliminary analysis suggests that patterns of relationships exist between socio-economic and nutritional status variables. More extensive data collection and analysis as projected for the main phase of the project will provide an opportunity to explore these and other relationships in much greater depth.