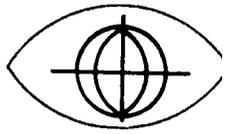


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**TRAINING AND RESOURCE UNIT  
FOR  
VITAMIN A  
AND NUTRITION EDUCATION  
IN GUATEMALA  
"UNIDAD PRO VITAMIN A"**

**Detailed Implementation Plan**

**Submitted to:  
U.S.A.I.D. Office of Nutrition**

**Cooperative Agreement No.:  
DAN-5116-A-00-0067-00**

**Grant Period:  
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**MARCH, 1992**

the  
International  
Eye Foundation

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## **I. EXECUTIVE SUMMARY**

The International Eye Foundation (IEF), in collaboration with the National Committee for the Deaf and Blind of Guatemala (NCBD) has for the past five years implemented a number of projects to enhance the nutritional status of children through promotion of vitamin A interventions.

The present project to establish a training unit for vitamin A and nutrition education "Unidad Pro Vitamin A" (UPVA) represents an extension and expansion of Cooperative Agreement No. DAN-5116-A-00-0067-00, between IEF and the USAID Office of Nutrition. The funding and implementation period of the current extension to the Cooperative Agreement is 09/1/91 - 08/30/94.

The UPVA project was conceived to support primarily the existing IEF vitamin A programs in Guatemala and Honduras. In each of these programs there has been a lack of consistent and well developed nutrition education strategies. The establishment of a training unit will help facilitate improvements to the nutrition education interventions through the evaluation of existing activities, development of comprehensive Information, Education and Communication components (IEC), improving training, adaptation of existing materials, and development of new materials in Spanish and indigenous languages.

The UPVA project will also begin to address the needs of other PVOs and NGOs within Guatemala and within the region. Since the demonstrated impact of vitamin A on morbidity and mortality, there has been an increasing awareness about micronutrient nutrition (as well as an increased number of projects with a vitamin A component) among PVOs, NGOs and governments concerning the importance of vitamin A to child survival and health. The UPVA will assist the IEF/NCBD to broaden its role to provide technical assistance and disseminate information to other NGOs, ministries and related agencies working in Guatemala and Honduras.

A secondary component to the UPVA project is to continue support for the existing PROVITA project established under the same contract. A small portion of the budget will be used to complement PROVITA project activities in plant analysis and the continuation of analysis of the Intra-household data set produced in the NutriAtol I project.

## **II. PROJECT DESCRIPTION**

### **A. Goal and Objectives**

#### **GOAL:**

To strengthen the capacity of IEF and NCBD to develop locally appropriate vitamin A and nutrition education materials, and training programs through the creation of a training unit for vitamin A and nutrition education, "Unidad Pro Vitamin A" (UPVA).

#### **OBJECTIVES:**

1. Conduct collaborative projects with other professional institutions (VITAP/VITAL/INCAP).
2. Design and produce vitamin A and nutrition training materials for IEF/NCBD projects and where appropriate other PVO/NGO groups, ministries and related institutions.
3. Provide information and materials on vitamin A deficiency and nutrition education to PVO/NGO groups requesting information.
4. Conduct workshops, seminars and lectures for IEF/NCBD projects, ministries, and universities on vitamin A deficiency and nutrition issues.
5. Convene meetings for the IEF/NCBD and coordinate inter-institutional meetings between PVO/NGO groups on vitamin A deficiency.
6. Establish and maintain a library for vitamin A and nutrition education documents and materials.
7. Produce and disseminate a semi-annual newsletter on current vitamin A activities and resources.

### **B. Location**

The NCBD has agreed to provide a detached building on the grounds of the Eye and Ear Hospital "Dr. Rodolfo Robles V." in Guatemala City to house the UPVA unit. This building consists of several rooms, suitable for administrative offices, the vitamin A library, and a conference and training room. Part of the building will be shared with the ophthalmology residents from the Institute for Visual Sciences program of the hospital and will also house the ophthalmic medical library.

The NCBD has further agreed to complete renovations to the office space; provide some furniture and shelving for the library; some office equipment; and basic utilities. The NCBD will also co-share the cost of logistical support for the project.

### C. Rational and Project Design

A common element to existing IEF Vitamin A For Child Survival projects in Guatemala and Honduras are training and nutrition education interventions. Although each project is to be commended for their efforts in training staff and community members, designing curricula, and developing basic health education materials, there remains considerable room for improvement. Among the notable problems are 1) the lack of consistent, well developed, and measurable nutrition education strategies; 2) the lack of relevant and appropriate materials on vitamin A deficiency and nutrition in Spanish and indigenous languages; and 3) the lack of access to a resource person with professional training capabilities.

Through the UPVA project, the IEF and NCBD will also begin to meet the growing need of other PVOs, indigenous NGOs and provincial ministries both within Guatemala and other Latin American countries for vitamin A related training and materials development assistance. The recently demonstrated impact of vitamin A nutrition on child morbidity and mortality has sparked the interest of PVOs, NGOs and MOH's and has led to the initiation of numerous vitamin A and nutrition projects. The UPVA project will provide technical assistance, training and nutrition education materials to programs saving them considerable time, effort and funds and assuring a better quality final product. In addition, the UPVA unit will also serve as a focal point for a wider discussion on micro-nutrient nutrition and strengthen networking and information exchange between organizations by facilitating collaborative meetings and workshops.

To accomplish these objectives, IEF in conjunction with the NCBD will create a training and resource unit at the Eye and Ear Hospital "Dr. Rodolfo Robles V." The unit will house a vitamin A and nutrition education library and will be operated by full-time staff. The establishment of the UPVA unit will help facilitate improvements to existing IEF vitamin A projects in Guatemala and Honduras and will broaden IEF's role in the dissemination of information on vitamin A to other PVO/NGO's and agencies within the region.

### **III. IMPLEMENTING AGENCIES**

#### **A. International Eye Foundation**

The International Eye Foundation is a private voluntary organization dedicated to the prevention and cure of blindness in developing countries. IEF field operations provide training, equipment and medicines, clinical services, operational research and the development of community-based programs through support for indigenous eye care organizations in 10 countries of Latin America, the Caribbean, Africa and Eastern Europe. The annual budget for 1991 was \$2 million, of which 91% was spent on direct program services. A headquarters staff in Bethesda, Maryland provides support to IEF personnel in the field.

#### **B. National Committee for the Blind and Deaf (Comite Nacional Prociegos y Sordomudos)**

NCBD was founded in 1950 as a Guatemalan non-governmental organization. It is currently a leader in the delivery of services to the blind and deaf. It has been given the mandate by the Government of Guatemala to provide all services for the prevention and cure of blindness in over one third of the country. The NCBD operates the Eye and Ear Hospital, "Dr. Rodolfo Robles V." a major specialty center in Guatemala City that trains residents in ophthalmology from Guatemala and other Latin American countries. The NCBD also has 3 branch hospitals in the interior of the country and a total of 5 peripheral clinics throughout the Republic. In addition, through its program of blindness prevention and eye health, it reaches out to communities by direct campaigns and by the training of teachers and health promoters in primary eye care. As IEF's partner NGO, the NCBD has gained considerable experience in vitamin A programming with support from USAID Office of Nutrition (for the NutriAtol I, Intra-household and Provita projects); and USAID FHA/PVC for the current child survival-vitamin A (CS-VI) projects in Guatemala and Honduras.

#### **C. CeSSIAM**

The Center for Studies of Sensory Impairment, Aging and Metabolism (CeSSIAM) is the research branch for the NCBD, located in the Eye and Ear Hospital "Dr. Rodolfo Robles V." It has a Task-Force dedicated to the study of vitamin A biology and its public health consequences for child health and nutritional blindness.

#### **IV. PROJECT DESIGN**

<b>A. Conduct collaborative projects with VITAP, VITAL, and INCAP.</b>
--

The purpose of collaborative projects are to strengthen IEF/NCBD vitamin A deficiency control projects in conjunction with other PVOs and NGOs and to draw on expert technical assistance not available to the IEF/NCBD projects.

##### **1. HKI-VITAP**

There has been initial discussion with HKI-VITAP for a collaborative project to develop Spanish and indigenous language materials. This effort is proposed as part of the VITAP FY92 & FY93 implementation plan that will involve coordination between Project Hope, Project Concern International (PCI), and Adventist Development and Relief Agency (ADRA). This activity will involve the development or adaptation of educational materials; transfer of skills to project staff in needs assessment, education and training materials development; and a training of trainers on the use of the materials.

##### **2. VITAL/INCAP/Other NGO's**

Other collaborative activities will be explored with regional and international PVO/NGOs including INCAP and VITAL during the project. The Hoffmann-LaRoche "Task Force Sight and Life" has also committed resources in support of the project.

<b>B. Design and produce vitamin A and nutrition training materials for IEF/NCBD projects and other PVO/NGO groups and institutions.</b>
--

##### **1. Develop Training Plan for Child Survival/Vitamin A Projects in Guatemala and Honduras.**

The IEF is currently operating child survival and vitamin A projects (CS-VI) in Guatemala and Honduras under a Cooperative Agreement with USAID FHA/PVC. A common element to both of these projects are nutrition education interventions to promote consumption and production of vitamin A food sources.

The UPVA will assist staff from both projects to develop a comprehensive training plan in the form of a loose leaf notebook that includes sections on 1) statement of approach, 2) needs assessments, 3) IEC strategies developed, 4) training curricula and training reports, 4) educational objectives, their corresponding indicators, and a monitoring and evaluation plan, etc.

## 2. Develop Information, Education and Communication (IEC) model.

The UPVA project will assist project staff from the CS/VA project in Alta Verapaz, Guatemala in the development of a model IEC strategy. The activity (a component of B.1. above) will involve training in needs assessment approaches; formative research techniques; concept testing; development of educational objectives and their corresponding indicators; message and materials development; and monitoring and evaluation. The UPVA will collaborate with HKI-VITAP and project staff from IEF-Honduras in this effort. Project staff from IEF-Honduras will be involved in the initial training so that a similar model can be adapted to the IEF-Honduras project in Tegucigalpa.

## 3. Collect, Evaluate, and Modify Existing Training and Promotion Materials.

In the process of developing the Vitamin A library the UPVA will contact all PVO/NGO/regional and international agencies in Guatemala and elsewhere to identify all documents and materials related to vitamin A nutrition, training, and health education to be included in the UPVA library.

In conjunction with VITAP, VITAL, INCAP, and other agencies, materials will be assessed for their potential use in the IEF CS/VA projects and for use by other PVOs. Several materials will be identified for adaptation to a Latin American rural and peri-urban environment. Core material, e.g., a vitamin A reference card, will be developed for use by community health workers and by other levels of health workers. These materials will be translated into Spanish and indigenous languages for production.

## 4. Develop and Produce Technical Materials.

In conjunction with CeSSIAM specific technical materials and documents will be developed. These will include:

For the PROVITA project, production of manuals:

- "Manual for the Collection and Analysis of Plants." This manual will outline the experiences of the PROVITA project in plant analysis;
- "Vitamin A-rich Plant Sources and Their Food Values." This document will document the chemical analysis (carotenoid values) completed on 24 Guatemalan foods rich in vitamin A.

For the INTRA-HOUSEHOLD food distribution project, the completion of a series of documents:

- Dietary component: 1) longitudinal analysis of food patterns and 2) the stratified comparison of food patterns in relation to illness. This analysis will result in three executive summaries and two full reports.
- Anthropological component: 1) analysis of intra-household observations (timed meal events) and 2) analysis of food system, intra-household preparation and distribution practices and their implications for vitamin A programs. This analysis will result in two executive summaries and two full reports.

Other journal articles will also be explored between the UPVA project and CeSSIAM. For a complete explanation of the proposed analysis see Appendix #1A, Outline for Data Analysis; Appendix #1B, List of Documents; and Annex #1, Journal Article on Intra-household Food Allocation.

For IEF:

Adaptation and translation of IEF promotional information including the "Facts Sheet", "Newsletter", and other existing training and promotional materials.

C. Provide information and materials on vitamin A deficiency and nutrition education to PVO/NGO groups requesting information.

The UPVA will provide a limited amount of technical advice, information and materials to IEF projects, other PVO/NGO groups, and government ministries requesting such information. In the process of developing a roster of local PVO/NGO groups active in Guatemala the UPVA will conduct a needs assessment to solicit their input, determine their interest in and their needs for technical assistance, information, and materials on vitamin A deficiency and nutrition. A similar activity was already completed by IEF-Honduras.

D. Conduct workshops, seminars and lectures for IEF/NCBD projects, Ministries, and Universities on vitamin A deficiency and nutrition issues.

#### 1. Develop and Conduct In-Service Training for IEF Projects.

In conjunction with the IEF CS/VA projects the UPVA will assist staff in conducting in-service training for field staff. This training will include training of trainers skills; formative research techniques; information on child survival interventions (specifically vitamin A nutrition), and gardening. Selected staff from the IEF-Honduras staff will be included in this training to strengthen in-service training for that IEF project.

## 2. Develop and Conduct Orientations for Government' Ministries.

In conjunction with the IEF CS/VA projects, the UPVA will assist staff in conducting orientations for local officials representing the Ministry of Health, Ministry of Agriculture, and Ministry of Education. These orientations will be tailored to their specific audiences but are likely to include, at a minimum, a basic orientation on the importance of vitamin A and any other state-of-the-art information. A secondary purpose of the orientations are to generate interest in and to create future dialogue around issues of vitamin A nutrition.

## 3. Develop and Conduct Orientations for PVOs and NGOs.

A similar series of orientations will be provided to PVO/NGO groups demonstrating the need and the interest for information on vitamin A deficiency. These meetings will be determined on a case by case basis. Should there be several interested agencies, the organization of a larger workshop will be explored. Of particular interest are the numerous smaller indigenous agencies that have little access to technical information on vitamin A deficiency.

## 4. Develop and Conduct Lectures at Universities.

In conjunction with CeSSIAM, a series of guest lectures will be explored with local universities. Of particular interest are training centers for medical doctors (ophthalmologists and pediatricians); social sciences (sociology, anthropology); agriculture sciences; educational sciences; and nutritional sciences.

In conjunction with the PROVITA project, anthropology students from the University del Valle in Guatemala City will continue to conduct field survey work related to vitamin A nutrition. A similar activity will be explored with IEF-Honduras in conjunction with training institutions including the Zamarano Agriculture Training College. A prospecting trip to Belize to assess similar options will also be explored with the Belizian Council for the Visually Impaired.

E. Convene meetings for the IEF/NCBD and coordinate inter-institutional meetings between PVO/NGO groups on vitamin A deficiency.

1. Host Regular Meetings of the Vitamin A Technical Group.

The UPVA will facilitate the organization of meetings of the Vitamin A Technical Group (VATG). The VATG is represented by PVOs (IEF, Project Hope, etc.) and NGOs (INCAP, NCBD, etc.) involved in vitamin A projects. The purpose of the meetings are to discuss current issues, policies, and information on vitamin A deficiency and nutrition.

2. Organize and Host Regular Meetings of PVO/NGO Collaborative Group.

The UPVA in conjunction with CS/VA project staff will participate in the formation of a PVO/NGO Collaborative Group. The collaborative group will be composed of project directors representing North American PVOs involved in child survival (IEF, Project Hope, CARE, PCI, SCF, etc.). The purpose of the meetings are to discuss current issues in child survival programs and to organize joint activities.

F. Establish and maintain a library for vitamin A and nutrition education documents and materials.

The purpose of the UPVA library is to create a repository for materials (journal articles, documents, reports, evaluations, training curricula, promotional materials, visual aids, etc.) related to vitamin A and nutrition.

The UPVA will compile a list of organizations to contact concerning vitamin A training and education materials now in use and to solicit input on training needs and future materials development. The library will be housed on the grounds of the NCBD Eye and Ear Hospital "Dr. Rodolfo Robles V." The VITAP project will assist the UPVA project in establishing a computerized reference system. The library will be open to PVO/NGOs and other agencies, students and researchers, and other registered members.

G. Produce and disseminate a semi-annual newsletter on current vitamin A activities and resources.

The UPVA will design and desk-top publish a semi-annual newsletter in Spanish targeting interested parties in the region. The format of the newsletter will include information on PVO/NGO projects, current technical issues, updates on new information and materials, etc.

H. Other activities

The other supporting activities of the UPVA are:

- Quarterly reporting to IEF/AID.
- Hosting of annual IEF-Latin America projects meeting.
- Participation in workshops, seminars, and conferences.

I. PROVITA Extension

1. Plant Analysis

Arrangements have been made to complete the chemical analysis of 18 additional indigenous vitamin A-rich plants at the laboratory of Dr. Steven Schwartz, Department of Food Science, North Carolina State University. A visiting Indonesian laboratory technician will conduct the analysis as part of a training agreement between NCSU and the Indonesian government. The analysis will take place from June - August, 1992. A final report on this activity will be included in the regular PROVITA reports and an executive summary will be produced through the UPVA. See section IV.B.4. above.

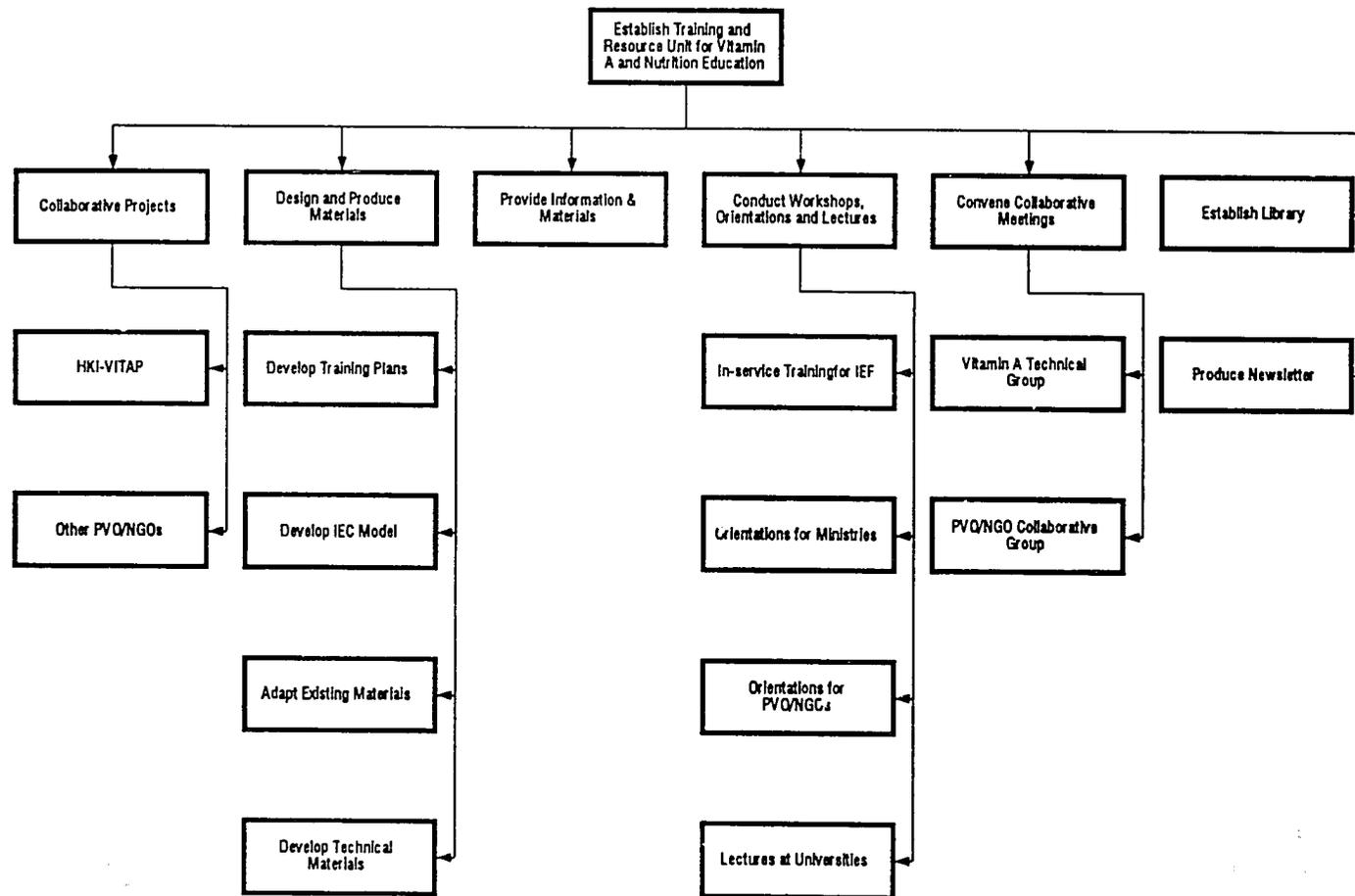
2. Intra-household Analysis

The analysis of the Intra-household data set will include further analysis of the dietary component and the anthropological component generated in the USAID Office of Nutrition funded NutriAtol I project. Final reports on these activities will be produced with assistance from the UPVA project during 1992 and 1993. See section IV.B.4. above.

J. Activities Diagram

The activities diagram is found on the following page.

# "UNIDAD PRO VITAMIN A"



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## V. MANAGEMENT

### A. Human Resources

There are two key professional positions and one support position. The key professional positions are:

#### 1. Project Director

The Project Director, (Licda Eugenia Saenz de Tejada), is a Guatemalan with a background in cultural anthropology and will work on a full-time basis. The Project Director will be responsible for overall direction and implementation of the project. The director will also be responsible for administrative actions including coordination between the project, the NCBD, and IEF headquarters in Bethesda; financial management; communication with government officials, PVO/NGOs and other institutions; personnel decisions; and official progress reports. See Appendix #2A for the job description.

#### 2. Assistant Director

The Assistant Director, (to be named), will be a Guatemalan with a background in communication and health education and will work on a full-time basis. The Assistant Director will have responsibility for coordination and implementation of program objectives. These responsibilities include conducting training and orientation; management of the library; materials development; and production of the newsletter and any other responsibilities delegated by the Project Director. See Appendix #2B for the job description.

#### 3. Administrative Assistant

The Administrative Assistant, (to be named), will be a Guatemalan with a background in office operation and will work on a full-time basis. The Administrative Assistant will have responsibility for general office operations. See Appendix #2C for the job description.

Overall fiscal and administrative oversight for the program will be provided by Dr. Gustavo Hernandez-Polanco, IEF/NCBD Country Representative who serves the same function for other ongoing IEF/NCBD programs in Guatemala. Additional technical assistance will be provided from CeSSIAM staff.

Technical and administrative back-stopping for the UPVA will be provided by IEF Headquarters staff including Mr. Jack Blanks, Director of Programs, Mr. John Barrows, Child Survival and Vitamin A Coordinator, and Mr. Edward Henderson, Administrative Officer.

## B. Technical Advisory Committee

To ensure adequate in-country technical oversight an Advisory Board has been proposed. The purpose of the advisory board is to periodically review activities of the UPVA and to facilitate networking between agencies. Proposed members are Ricardo Lujan, PhD, Professor of Tropical Medicine, Universidad del Valle; Omar Dary, PhD., Chief of Biochemistry Laboratory, INCAP; Ramiro Batres, PhD., Director, Research Unit, "Francisco Marroquin" Medical School. Other members are to be named.

## C. Organogram

The UPVA project organogram is found on the following page.

## VI. MONITORING AND EVALUATION

### A. Logical Framework

The design and planned activities are summarized into a logical framework. Explained within the logical framework are the project's Goal (supergoal), Purpose, Outputs, and their corresponding Objectively Measurable Indicators (OMI), Means of Verification (MOV), and important underlying assumptions. The logical framework is found on the following pages.

### B. Management Information System

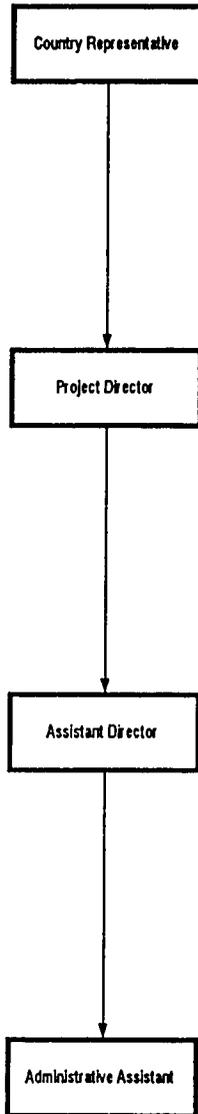
The management information system (MIS) will be developed based on the logical framework outline. The MIS will consist of a series of formats and forms to include:

- Training activities report form
- Monthly report form
- Quarterly reports form
- Library use and requisition form
- Meetings (minutes) form
- Training modules format
- Technical report format
- Needs assessment questionnaire format

In addition to the above financial records, mailing lists, and formal evaluations will be used to monitor and evaluate progress towards completion of objectives.

The Project Director will have overall responsibility for further development of the MIS with assistance from IEF headquarters. The Project Director, with assistance from the Assistant Director, will be responsible for routine monitoring of process indicators. The specific forms and formats will be developed with the EPIINFO database software program to assist staff to generate quarterly reports. The library references will be computerized using library software.

**\*UNIDAD PRO VITAMIN A\***



**LOG FRAME:**

**Project Name:** Training and Resource Unit for Vitamin A and Nutrition Education "UNIDAD PRO VITAMIN A"

**Est. Completion:** August 30, 1994

**Designed:** Jack Blanks, John Barrows, Dr. Hernandez-Polanco, Eugenia Saenz de Tejada

Narrative Summary (NS)	Measurable Indicators (OMI)	Means of Verification (MOV)	Important Assumptions
<p><b>Goal:</b> 1. To improve infant and child health and survival through prevention of vitamin A deficiency and improved infant and child feeding practices.</p>			<p>(Goal to Supergoal) 1.1. Vitamin A deficiency is a major contributing factor to infant and child health and survival.</p>
<p><b>Purpose:</b> 1. To strengthen the capacity of IEF &amp; NCBD to develop vitamin A nutrition education and training materials through the creation of a sustainable training unit for vitamin A and nutrition education "Unidad Pro Vitamin A"</p>	<p>1.1 Establishment of an effective, low cost unit capable of being sustained by the NCBD by the end of the project. 1.2 At least 2 IEF projects have improved their training and nutrition education interventions. 1.3 Other PVO/NGO groups and Ministries have improved access to technical assistance and information.</p>	<p>1.1 Financial records; Commitments from NCBD; Strategy statement; Evaluations. 1.2 IEF project evaluations. 1.3 Mid-term and final evaluations; Newsletter.</p>	<p>1. NCBD is committed to sustaining IEF sponsored projects. 2. Projects have sufficient financial resources to make improvements in programs.</p>

<p>Outputs:</p> <p>1. Conduct collaborative projects with PVOs &amp; NGOs.</p> <p>2. Design and produce education and promotional materials for IEF/NCBD projects and other PVO/NGO groups.</p> <p>3. Provide information and materials to PVO/NGO groups requesting information.</p> <p>4. Conduct orientations, workshops, and lectures for IEF/NCBD projects, PVOs, Ministries, and Universities.</p> <p>5. Convene meetings for coordination and collaboration.</p> <p>6. Establish and maintain a library for vitamin A and nutrition education materials and documents.</p> <p>7. Produce and disseminate semi-annual newsletter on current vitamin A activities and resources.</p>	<p>1.1 Number of collaborative projects completed with PVO/NGO groups.</p> <p>2.1 Two IEF project training plans completed.</p> <p>2.2 Two IEC models developed and adapted for IEF projects (Guatemala &amp; Honduras).</p> <p>2.3 100% of relevant materials are evaluated, adapted and produced.</p> <p>2.4 Number of technical documents produced for Provita, Intra-household, and IEF.</p> <p>3.1 Number of requests for information; number of materials provided.</p> <p>4.1 In-service training modules developed and number of sessions completed for IEF projects in Guatemala and Honduras.</p> <p>4.2 Number of orientation sessions completed for Ministries in Guatemala and Honduras.</p> <p>4.3 Number of orientation sessions completed for PVO/NGO groups.</p> <p>4.4 Number of lectures completed at Universities.</p> <p>5.1 Number of meetings of Vitamin A Technical Group.</p> <p>5.2 Number of meetings of the PVO/NGO Collaborative Group.</p> <p>6.1 Library system established and 100% of materials collected.</p> <p>6.2 Number of users and requests.</p> <p>7.1 Five semi-annual newsletters produced and distributed.</p> <p>7.2 Number of recipients of newsletter.</p> <p>7.3 Number of contributors to newsletter.</p>	<p>1.1 Training reports; Qtr. reports.</p> <p>2.1 Completed training plan documents.</p> <p>2.2 Completed documents.</p> <p>2.3 Survey questionnaire to PVO/NGO groups; number of materials adapted.</p> <p>2.4 Completed technical reports.</p> <p>3.1 Requisition form.</p> <p>4.1 Completed training modules; Training reports; Qtr. reports.</p> <p>4.2 Same.</p> <p>4.3 Same.</p> <p>4.4 Same.</p> <p>5.1 Minutes; Qtr. reports.</p> <p>5.2 Minutes; Qtr. reports.</p> <p>6.1 Survey questionnaire to PVO/NGO groups; evaluations.</p> <p>6.2 User and request form.</p> <p>7.1 Newsletter.</p> <p>7.2 Mailing list.</p> <p>7.3 Newsletter.</p>	<p>1.1 Other PVO/NGOs are interested in collaboration with IEF/NCBD.</p> <p>2.1 Lack of existing materials that require adaptation.</p> <p>2.2 IEC model is an improvement to projects.</p> <p>2.4 Technical documents will be useful resource to projects.</p> <p>3.1 PVO/NGOs need materials.</p> <p>4.1 Training unit can organize quickly enough.</p> <p>4.2 Information will be useful to Ministries.</p> <p>4.3 Information will be useful to PVO/NGO groups.</p> <p>4.4 Information will be useful to students.</p> <p>5.1 Key institutions are willing to collaborate and interested in policy formation.</p> <p>5.2 PVOs find coordination usefull.</p> <p>6.1 There is no other library available.</p> <p>6.2 Library is useful tool.</p> <p>7.1 Format and information is useful.</p>
<p>Other Activities:</p> <p>In Guatemala:</p> <p>1. Provide headquarters with monthly summary reports.</p> <p>2. Write quarterly and annual reports to headquarters for submission to USAID.</p> <p>In Headquarters:</p> <p>3. Procurement of major equipment and supplies.</p> <p>4. General backstopping.</p> <p>5. Assistance with quarterly and annual reports.</p>	<p>1.1 Monthly reports received regularly.</p> <p>1.2 Reports are received in timely fashion to be submitted to USAID.</p> <p>1.3 Equipment and supplies are in place and functional.</p> <p>1.4 Assistance required by field staff is provided in timely fashion.</p> <p>1.5 Reports are written and submitted in a timely fashion.</p>	<p>1.1 Headquarters records.</p> <p>1.2 Headquarters and USAID records.</p> <p>1.3 Inventory list.</p> <p>1.4 Correspondence files; monthly reports; site visits; evaluations.</p> <p>1.5 USAID receives reports in regular intervals.</p>	

Reporting to the headquarters will be completed by the Project Director following a simple 1-2 page form on a monthly basis. Included in monthly reports is the financial report for the month. With assistance from headquarters, these reports will be used to compile a more comprehensive quarterly report for submission to USAID Office of Nutrition. This report will include an activities summary with supporting documents completed for that time period and the corresponding gant chart. Following USAID guidelines the quarterly financial reports and the Office of Nutrition summary report will be submitted by headquarters on a quarterly and semi-annual basis.

Evaluations will take place at the mid-term and end of project to be conducted by IEF and outside evaluators.

### C. Schedule of Activities

Two months after submission and initial approval of the DIP, and if required, project staff in conjunction with headquarters will make minor modifications to the project outputs and schedule to more accurately reflect the needs of local PVO/NGOs and a realistic time frame. Project staff will plan activities on a quarterly basis using a software program designed for that purpose. The schedule of activities is found on the following page.

## VII. SUSTAINABILITY

### A. Institution Building

The IEF and the NCBD are committed to the institutionalization of vitamin A programs in Guatemala. Towards this organizational and programmatic goal, it is anticipated that the NCBD will increasingly assume operational costs of the UPVA throughout the length of the project. The NCBD has proven itself capable of assuming both managerial and fiscal responsibility of other collaborative IEF/NCBD programs in past years.

The NCBD has agreed to contribute and renovate a building to house the unit; some of the equipment and supplies; utility costs; and part of the logistical support required to make the unit operational. The unit is staffed entirely by IEF-NCBD personnel and paid appropriate in-country salaries thus avoiding the precedent of high costs incurred by relocating expatriate staff to initiate the program. Furthermore, considerable effort is placed on strengthening the skills of in-country staff through on-going training and support during the lifetime of the project.



## B. Collaboration

An additional purpose of the UPVA is to broaden relationships with other PVO/NGO institutions in Guatemala through the development of collaborative projects with sister agencies and through the provision of information and training to other PVO/NGO groups. The UPVA will explore cost-sharing of training activities in conjunction with IEF-Honduras and other in-country agencies on a case by case basis. The UPVA currently has commitments from other international PVO/NGO groups including HKI-VITAP, Hoffmann-LaRoche "Task Force Sight and Life." Other commitments are being explored with VITAL, other USA PVOs, and INCAP.

## VIII. BUDGET

### A. Narrative

#### 1. Procurement

a. **Equipment and Supplies:** Provision has been made for necessary office equipment and supplies to ensure adequate functioning of the unit. Appropriate audio/video equipment, a computer and supplies for the development of training materials has been allotted. Also funds for vehicle support have been allocated.

#### 2. Evaluation

a. To adequately address evaluation needs, funds have been budgeted to support both external and in-house technical assistance for the mid-term review and final evaluation of this component of the project.

#### 3. Indirect Costs

IEF's most recent negotiated indirect cost rate agreement may be found in the original Cooperative Agreement. Indirect costs (24.41%) have been computed on all project costs except capital (non-expendable) equipment.

#### 4. Other Program Costs

a. **Personnel:** Provision is made for an adequate number of administrative, technical and support staff to implement, monitor and manage the project. Care has been taken to utilize existing in-country host country nationals. The use of a Peace Corps Volunteers as part of the project staff will be explored with the local Peace Corps Director.

## 5. Travel and Per Diem

a. Short term: Provision is made in the budget for local travel to the project areas by the training team to conduct workshops and seminars. Funds are included for trips to assist other organizations, NGOs etc in the region, and for the Project Director to attend an international conference. Other travel and per diem costs are budgeted for management visits from IEF headquarters.

## 6. Other Direct Costs

Provision is made for vehicle operation. Also included are center/office operation expenses (e.g., rent/renovation, telephone and postage). Adequate funds are also budgeted for estimated expenses associated with actual training sessions (per diem, lodging, meals).

## B. Budget

The detailed budget is found on the following pages.

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## INTERNATIONAL EYE FOUNDATION

	Year 1		Year 2		Year 3		Totals		Total
	AID	IEF/NCBD	AID	IEF/NCBD	AID	IEF/NCBD	AID	IEF/NCBD	
<b>I. PROCUREMENT</b>									
<b>A. EQUIPMENT and SUPPLIES</b>									
<b>TECHNICAL</b>									
1. Video Unit/Camera	1,500	0	0	0	0	0	1,500	0	1,500
2. Camera	300	0	0	0	0	0	300	0	300
3. Slide Projector	400	0	0	0	0	0	400	0	400
4. Overhead Projector	300	0	0	0	0	0	300	0	300
<b>OFFICE EQUIPMENT</b>									
1. Computer	900	1,000	0	0	0	0	900	1,000	1,900
2. Printer	0	800	0	0	0	0	0	800	800
3. Volt. Reg.	0	335	0	0	0	0	0	335	335
4. Typewriter	0	110	0	0	0	0	0	110	110
5. Office/Center Fur.	1,000	2,500	0	0	0	0	1,000	2,500	3,500
6. Photocopier	600	0	0	0	0	0	600	0	600
7. Labware	1,000	0	1,000	0	0	0	2,000	0	2,000
<b>SUPPLIES</b>									
1. General Office	1,000	0	1,000	0	1,000	0	3,000	0	3,000
2. Paper/Printing	1,500	500	2,500	0	2,000	0	6,000	500	6,500
3. Comp. Software	600	0	0	0	0	0	600	0	600
4. Training Materials	1,500	0	3,000	0	2,000	0	6,500	0	6,500
5. Lab supplies	500	0	500	0	0	0	1,000	0	1,000
<b>B. SERVICES</b>									
1. Baseline Enumer. & logist. support	0	0	0	0	0	0	0	0	0
2. Plant/Plazma Anal.	5,000	0	3,000	0	0	0	8,000	0	8,000
<b>SUBTOTAL I.</b>	<b>16,100</b>	<b>5,245</b>	<b>11,000</b>	<b>0</b>	<b>5,000</b>	<b>0</b>	<b>32,100</b>	<b>5,245</b>	<b>37,345</b>
<b>II. EVALUATIONS</b>									
<b>Consultant Fees</b>									
Fees	0	0	1,000	0	1,500	0	2,500	0	2,500
Airfare/Per Diem	0	0	0	1,500	0	1,500	0	3,000	3,000
<b>SUBTOTAL II.</b>	<b>0</b>	<b>0</b>	<b>1,000</b>	<b>1,500</b>	<b>1,500</b>	<b>1,500</b>	<b>2,500</b>	<b>3,000</b>	<b>5,500</b>
<b>III. INDIRECT COSTS (See G &amp; A line item)</b>									

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## INTERNATIONAL EYE FOUNDATION

	Year 1		Year 2		Year 3		Totals		Total
	AID	IEF/NCBD	AID	IEF/NCBD	AID	IEF/NCBD	AID	IEF/NCBD	
<b>IV. OTHER PROGRAM COSTS</b>									
<b>A. PERSONNEL</b>									
<b>IN-COUNTRY PROGRAM STAFF</b>									
<b>1. Training Unit Coordinator</b>									
Salary	5,040	0	9,600	0	9,600	0	24,240	0	24,240
<b>2. Training Specialist</b>									
Salary	2,800	0	6,960	0	7,200	0	16,960	0	16,960
<b>3. Sec./Librarian</b>									
Salary	900	0	2,520	0	2,970	0	6,390	0	6,390
<b>4. Country Director</b>									
12 days/yr	900	0	900	0	900	0	2,700	0	2,700
<b>4. Analyst-Intrahousehold</b>									
Salary	5,500	0	0	0	0	0	5,500	0	5,500
<b>PROGRAM SUPPORT STAFF</b>									
<b>5. Director of Programs</b>									
12 days/yr	600	1,800	630	1,890	630	1,890	1,860	5,580	7,440
Fringe (25%)	150	450	158	473	158	473	466	1,396	1,862
<b>6. Vitamina A Coordinator</b>									
6 days/yr	412	1,236	440	1,320	440	1,320	1,292	3,876	5,168
Fringe (25%)	103	309	110	330	110	330	323	969	1,292
<b>7. Administrative Officer</b>									
6 days/yr	460	460	485	485	485	485	1,430	1,430	2,860
Fringe (25%)	115	115	121	121	121	121	357	357	714
<b>SUBTOTAL IV. A.</b>	<b>16,980</b>	<b>4,370</b>	<b>21,924</b>	<b>4,619</b>	<b>22,614</b>	<b>4,619</b>	<b>61,518</b>	<b>13,608</b>	<b>75,126</b>
<b>B. TRAVEL AND PER DIEM</b>									
<b>1. Local and Regional</b>									
<b>a. Staff Trav./Per Diem</b>									
	2,750	0	4,600	0	5,500	0	12,850	0	12,850
<b>b. Int. Prof. Meet.</b>									
(1 RT Airfare)	2,150	0	1,450	0	700	0	4,300	0	4,300
(pd @10 days pa)	2,000	0	1,700	0	1,100	0	4,800	0	4,800
<b>c. Management Trips</b>									
Travel (2/yr)	0	1,300	0	1,400	0	1,400	0	4,100	4,100
Per Diems (20/yr)	0	1,200	0	1,300	0	1,300	0	3,800	3,800
<b>Subtotal IV. B.</b>	<b>6,900</b>	<b>2,500</b>	<b>7,750</b>	<b>2,700</b>	<b>7,300</b>	<b>2,700</b>	<b>21,950</b>	<b>7,900</b>	<b>29,850</b>

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## INTERNATIONAL EYE FOUNDATION

	Year 1		Year 2		Year 3		Totals		Total
	AID	IEF/NCBD	AID	IEF/NCBD	AID	IEF/NCBD	AID	IEF/NCBD	
<b>C. Other Direct Costs</b>									
<b>1. Vehicle Operat.</b>									
Fuel & Oil	2,500	0	2,500	0	2,000	0	7,000	0	7,000
Maint./Spares	0	0	1,800	0	1,900	0	3,700	0	3,700
Ins/Lic/Reg	0	1,000	0	1,100	0	1,200	0	3,300	3,300
<b>2. Office Operations</b>									
Rent/Repairs	1,000	6,000	0	6,600	0	7,200	1,000	19,800	20,800
Telephone	1,500	800	2,000	900	1,000	1,000	4,500	2,700	7,200
Postage/Courier	750	0	1,750	0	1,750	0	4,250	0	4,250
Shipping	1,000	0	0	0	0	0	1,000	0	1,000
<b>3. Training Sessions</b>									
Per Diems(trainees)	2,304	0	3,000	0	3,500	0	8,804	0	8,804
Supplies	1,000	0	2,000	0	2,000	0	5,000	0	5,300
Facilities	520	0	540	0	558	0	1,618	0	1,618
<b>4. Household Food Dist.</b>									
Study	6,800	0	0	0	0	0	6,800	0	6,800
Subtotal IV. C.	17,374	7,800	13,590	8,600	12,708	9,400	43,672	25,800	69,472
SUBTOTAL IV. A.B.C.	41,254	14,670	43,264	15,919	42,622	16,719	127,140	47,308	174,448
SUBTOTAL	57,354	19,915	55,264	17,419	49,122	18,219	161,740	55,553	217,293
G & A 24.41%	12,780	3,703	13,490	4,252	11,990	4,447	38,260	12,402	50,662
TOTAL	70,134	23,618	68,754	21,671	61,112	22,666	200,000	67,955	267,955
*****									

## **IX. APPENDICES**

<b>Appendix 1A</b>	<b>Outline for Data Analysis</b>
<b>Appendix 1B</b>	<b>List of Documents</b>
<b>Appendix 2A</b>	<b>Job Description: Project Director</b>
<b>Appendix 2B</b>	<b>Job Description: Assistant Director</b>
<b>Appendix 2C</b>	<b>Job Description: Administrative Assistant</b>

## OUTLINE OF PLAN OF DATA ANALYSIS AND REPORTING FOR THE INTRAHOUSE- HOLD STUDY IN "SAN PEDRO YEPOCAPA"

### BACKGROUND:

Among the elements of experience and information that have been collected in Guatemala by and in service to field vitamin A projects of the International Eye Foundation in conjunction with the National Committee for the Blind and Deaf of Guatemala have been the data-sets from the study of intrahousehold distribution of food in "San Pedro Yepocapa," Chimeltenango Province, Guatemala. This study had the general objective to examine how foods rich in vitamin A were distributed among family members within households in a highland coffee growing area that was subject of a distribution project involving the vitamin A-rich cereal (NutriAtol), and specifically to look at the Acceptance and appropriately differential use of NutriAtol (i.e. only for preschool children within the family and only in the aftermath of a diarrheal illness).

Intrahousehold Distribution had a dietary component (based on a pictorial food frequency questionnaire, and widescale periodic sampling by a project team of a research physician, a research dietician, and two local promoters; its duration was one year), and an anthropological component (based on an intrahousehold observations of food larder, food preparation and meal behavior and an attitudes and practices questionnaire in a limited subsample of 60 homes.) The sampling frame for both studies was comparative and involved 1) a township; 2) a village; and 3) two coffee plantations.

Preliminary reports from both components have been produced by Ivan Mendoza & Ma Eugenia Sanchez (dietary) and Eugenia Sanz de Tejada (anthropological), respectively

### ANALYSIS PLAN FOR INTRAHOUSEHOLD DISTRIBUTION: DIETARY COMPONENT:

The only analysis completed has been the description of pattern of (reported) food used by families at the baseline sampling of the three subregions.

The second phase will be a descriptive analysis of the pattern of (reported) food used by families at the one-year followup combined with a within-family (pairwise) and within and across community (group-wise) evaluation of change/stability in the pattern of consumption over a 12-month period.

The third phase will be a comparison of food patterns in households reporting illness on week prior to the interview versus households with no family-member ill or convalescent from data collected at the baseline, at the one-year follow-up, and during interim interviews. The comparison will be ill versus well stratified by location within the three subregions.

To be executed by Dr. Ivan Mendoza of CeSSIAM from Feb - June, 1992.

## REPORTING PLAN FOR INTRAHOUSEHOLD DISTRIBUTION: DIETARY COMPONENT

The data will be reported in five documents. 1) a full detailed report on the longitudinal analysis of food pattern; 2) an executive summary of the longitudinal analysis of food pattern; 3) a full detailed report on the stratified comparison of food pattern with household illness versus without illness; 4) an executive summary of the stratified comparison of food pattern with household illness versus without illness, and 5) an executive summary of the entire three phases of analysis.

To be executed by Ivan Mendoza with supervision of reporting and English translation by Noel Solomons and Jesus Bulux of CeSSIAM.

## ANALYSIS PLAN FOR INTRAHOUSEHOLD DISTRIBUTION: ANTHROPOLOGICAL COMPONENT:

The analysis completed so far has been an analysis of data in the interview/questionnaire portion of the field collection in the 60 households.

The field collections also involved structured, intra-household observations reported with notes and timed with a stopwatch. The observation methodology was based on work by Dr. Joel Gittelsohn (currently of the Division of Human Nutrition of the School of Hygiene and Public Health, the Johns Hopkins University). Dr. Gittelsohn has recently published a scientific paper from his original experience in Nepal (Gittelsohn J: "Opening the Box: Intra-household Food Allocation in Rural Nepal" Soc. Sci. Med. 1991; 33:1141-1154.). He develops a structured manner to look at discrimination (favoritism/exclusion) for members of the household unit with indices for second servings, "channeling," "substitution, food quantity, etc." The second phase will attempt to code and enter the observation data and to generate "indices" based on the conceptual framework of Gittelsohn.

The overall purpose of this activity was to evaluate the practical extent to which cultural anthropology research could be of service to the understanding of human hypovitaminosis A and its remedy. The third phase will generate a brief document, based on the focus of analysis of Licda Tejada's presentation at the IVACG meeting in Guayaquil, Ecuador. A team of biologists (Dr Solomons, Bulux, Mendoza) and an anthropologist (Licda Tejada) will analyze each heading of the full documents from phases I and II, and examine how they relate to what is known about the determination of human vitamin A status or to what implications they might have for the success or failure of the various options for community level intervention.

To be executed by Eugenia Saenz de Tejada with analytical support from Drs. Solomons, Mendoza and Bulux in defined stages over the life of the Training Unit activity.

REPORTING PLAN FOR INTRAHOUSEHOLD DISTRIBUTION: ANTHROPOLOGICAL COMPONENT:

The data will be reported in four documents: (1) a full-report on the analyses of the intrahousehold observations in relation to the hypotheses and constructs of Gittlesohn; 2) an executive summary of the observations; (3) a brief document on the implications of the Yepocapa food system and intrahousehold preparation and distribution practices for vitamin A (vitamin A status; vitamin A content of food; success of vitamin A interventions) and 4) an executive summary of the findings of the entire anthropological component of Intrahousehold Distribution.

To be executed by Eugenia Saenz de Tejada of the Training Unit.

## APPENDIX 1B

DOCUMENTS AND BASIC/APPLIED RESEARCH PROJECTS RELATED TO VITAMIN A PRODUCED BY THE IEF-NCDB AND/OR CESSIAM SINCE 1987 WHICH MIGHT SERVE AS THE BASES FOR PRACTICAL TRANSFER OF INFORMATION AND TRAINING AT THE LOCAL LEVEL IN SPANISH AND/OR INDIGENOUS DIALECTS.

### Publications:

Kjølhede C, Gadomski AM, Wittpenn J, Bulux J, Rosas A, Solomons NW, Brown KH, Forman MR: Conjunctival impression cytology (CIC) to detect subclinical vitamin A deficiency: Feasibility of a field trial to detect subclinical vitamin A deficiency. Am J Clin Nutr 49:490-494, 1989.

Gadomski AM, Kjølhede CL, Wittpenn J, Bulux J, Rosas A, Forman MR: Conjunctival impression cytology (CIC) to detect subclinical vitamin A deficiency: comparison of CIC with biochemical assessments. Am J Clin Nutr 49:495-500, 1989.

Solomons NW, Bulux J, Guerrero AM, Portocarrero L, Quan de Serrano J, Quinonez J, Rosas AM, Vasquez A, Zepeda E, Brown KH, Forman M, Gadomski A, Kjølhede C, Morrow F, Russell RM. Vitamin A en areas urbanas marginales de la Capital de Guatemala. Rev Chil Nutr 17 (Suppl 1) 41-45, 1989.

Bulux J, Moran O, Hernandez AA, Cifuentes, Lopez CY, Sanchez M: Guatemala Report. Proceedings of the First Regional Taller on Vitamin A Status in Latin America and the Caribbean, Guatemala City, (mimeo) Arlington, VA: Vitamin A Field Support Project, August 1990.

Solomons NW, Morrow FD, Vasquez A, Bulux J, Guerrero A-M, Russell. Test-retest reproducibility of the relative dose response for vitamin A status in guatemalan adults: Issues of diagnostic sensitivity. J Nut 120, 738-744, 1990.

Morrow FD, Guerrero A-M, Russell RM, Dallal G, Solomons NW: Test-retest reproducibility of the relative dose response for vitamin A status in Guatemalan adults: Issues of diagnostic specificity. J Nutr 120: 745-750, 1990.

Bulux J: La citologia de impresion conjuntival (CIC) en el diagnostico de deficiencia de vitamin A. Proceedings of the Second Regional Taller on Vitamin A in Latin America and the Caribbean, San Juan, Puerto Rico, (mimeo) Arlington, VA: Vitamin A Field Support Project, November 1991.

Portocarrero L, Quan de Serrano J, Lopez CY, Zepeda E, Vasquez A, Bulux J, Solomons NW: Comparison of food-frequency and twenty-four hour recall instruments for estimation of vitamin A intake. Food and Nutrition Bulletin 13:

Portocarrero L, Quan de Serrano Q, Canfield C, Tarara T, Solomons NW: Carrots and Dietary vitamin A adequacy. Food and Nutrition Bulletin 14:

## UnPublished Documents

Saenz de Tejada Descripcion Analitica de los Patrones Alimentarios en Mesoamerica desde los Tiempos Prehistoricos hasta el Presente, con Especial Atencion a la Triada. Universidad del Valle de Guatemala (thesis) 1988.

Vitamin A Intake by Pregnant Women in Marginal Areas of Guatemala City: Quantitative Aspects and Patterns of Dietary Sources. Final Report on the Project. (Mimeo) CeSSIAM for US AID Mission in Guatemala. September 1988.

Galindo C, Preliminary Study on Food Consumption in San Pedro Yepocapa, Chimaltenango, Guatemala. (Mimeo) Guatemala City, International Eye Foundation/National Committee for the Blind and Deaf. November, 1989.

Scott W, Haskell M: Patterns of Availability, Acceptance, and Use of Carotene-Containing, Domesticated Vegetables and Wild Plants in Three Rural Regions of Guatemala: Alta Verapaz, Santa Rosa; Zacapa. (Mimeo) Bethesda, International Eye Foundation, 1990.

Breuer K: Vitamin A Status and Anthropometric Measurements in Elderly Persons Living in a Peri-Urban Area of Guatemala City. "Friedrich Wilhelms" University of Bonn (thesis) 1990.

Zizza CA Influence of Household Food Strategies on Vitamin A Intakes of Rural Guatemalan Children. University of Arizona (thesis) 1990.

Sanchez ME, Mendoza I, Solomons NW: Intrahousehold distribution of food in the Guatemalan Vitamin A Intervention: Dietary Component; Interim Report, Phase I. (Mimeo) Bethesda, International Eye Foundation, 1991.

Solomons NW, Barrows J: Intrahousehold Distribution of Food in the Guatemalan Vitamin A Intervention: Executive Summary. (Mimeo) Bethesda, International Eye Foundation, 1991.

Saenz de Tejada E: Intrahousehold Distribution of Food in the Guatemalan Vitamin A Intervention: Anthropological Component; Interim Report, Phase I. (Mimeo) Bethesda, International Eye Foundation, 1991.

von der Heiden K: Problems of Food-Security among Elderly People in Developing Countries: The Case of Guatemala City. "Friedrich Wilhelms" University of Bonn (thesis) 1992. (in preparation)

Projects in Phase of Analysis:

Saenz de Tejada E: Intrahousehold Distribution of Food in the Guatemalan Vitamin A Intervention: Anthropological Component

Sanchez ME, Mendoza I, Solomons NW: Intrahousehold distribution of food in the Guatemalan Vitamin A Intervention: Dietary Component

Schwartz S, Lopez CY: Carotene-Pigment Content and Dietary Vitamin A Activity of 21 Domesticated and Wild Plants in the Food System of Guatemala.

Ramirez I, Romero ME: Practical Aspects of the Application of High Performance Liquid Chromatography in Developing Countries

**Position Description**  
**PROJECT DIRECTOR**

The Project Director will report directly to the IEF-Guatemala Country Representative. This individual will be responsible for implementation, direction and management of the "Unidad Pro Vitamin A" project, with duties to include:

1. Supervise the Assistant Director and Administrative Assistant and any other assigned staff or volunteers in their daily activities.
2. Under direction of the Country Representative, responsible for the recruiting and termination of project staff, including local short-term consultants.
3. Responsible for preparation of monthly financial and summary reports; quarterly reports; and annual reports for submission to Bethesda, with appropriate copies to the key institutions and USAID.
4. Maintain and coordinate communication between the project office, the Country Representative office, and Bethesda headquarters office.
5. Under direction of the Country Representative, responsible for disbursement of funds to include payroll and purchase of routine office supplies.
6. Responsible for execution of all technical aspects of the project to include:
  - detailed planning for each objective;
  - establishing priorities and scheduling activities;
  - design of the management information system (MIS);
  - monitoring and evaluation;
  - writing and editing documents, modules, training plans, etc.
  - conducting training sessions and workshops;
7. Responsible for networking and liaison with key institutions to include organizing collaborative/coordination meetings.
8. Develop feasible proposals for expansion of the project and additional funding.
9. Serve as an IEF representative at professional meetings and conferences.

**Position Description  
ASSISTANT DIRECTOR**

The Assistant Director will report directly to the Project Director. This individual will be responsible for the implementation of duties delegated by the Project Director, with duties to include:

1. Assist the Project Director in all aspects of routine administrative duties including supervision, office operations, preparation of reports, and correspondence.
2. Under direction of the Project Director, responsible for execution of specific technical aspects of the project to include:
  - assist in the detailed planning and scheduling for each objective;
  - compile routine monitoring data;
  - assist in the design and production of documents, modules, training plans, etc;
  - assist in planning, organization, and facilitation of training sessions;
  - assist in production of newsletter;
  - maintain database for mailing lists;
  - maintain library database;
3. Under direction of the Project Director, responsible for networking and liaison with key institutions including organizing collaborative/coordination meetings.
4. Represent IEF at meetings and conferences.

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**Position Description  
ADMINISTRATIVE ASSISTANT**

The Administrative Assistant will report to the Project Director and where appropriate the Assistant Director. This individual will be responsible for general office operation, with duties to include:

1. Receive guests and maintaining the office in a presentable manner.
2. Responsible for general office communication to include answering phones, sending and receiving fax communications.
3. Assisting the Project Director and Assistant Director with general word processing of correspondence, reports, and documents.
4. Maintain and update the filing system.
5. Enter and maintain computer databases mailing lists.
6. Manage receipt and sending of daily general mail and express mailings.
7. Act as receptionist at the library.
8. Assist in the production of documents and the newsletter including photocopying and binding and mail-merge.
9. Assist in the organization and logistics of training activities.
10. Maintain the office in the absence of the Project Director and the Assistant Director.

**X. ANNEX**

**Journal Article on Intra-Household Food Allocation**

## OPENING THE BOX: INTRAHOUSEHOLD FOOD ALLOCATION IN RURAL NEPAL

JOEL GIFFELSOHN

Division of Human Nutrition, Department of International Health, School of Hygiene and Public Health,  
The Johns Hopkins University, Baltimore, MD 21205, U.S.A.

**Abstract**—The study examined intrahousehold food behavior in six villages in a rural hill area of mid-Western Nepal. Qualitative and quantitative methodologies taken from both anthropology and nutritional sciences were used to collect data on food belief systems, household allocation of food resources, and the effect of these features on diet and anthropometric status in a sample of 767 individuals in 115 households. Background data were also collected on socioeconomic status and demographic variables such as education levels, occupation, and migration patterns. The core methodological approach used direct structured observations of meals to examine how food is distributed within households.

The results document a variety of mechanisms by which some individuals are favored over others through household food distribution, including serving order, serving method, refusing to serve foods, channeling foods and substituting low status foods for high status foods. No differences were observed in mechanisms of food distribution or nutrient intake between male and female children, contrary to evidence in the literature suggesting that male children will be favored. On the other hand, adult women were less likely to meet their nutrient requirements for energy, beta-carotene, riboflavin, and vitamin C than men of the same age. Women's late position in household serving order, channeling of special foods to males and children, and lower total intake of food accounts for these findings.

**Key words**—intrahousehold food distribution, age, sex differences, food beliefs and practices, diet, Nepal

### INTRODUCTION

Interest in intrahousehold food distribution stems from both practical and theoretical concerns in many disciplines. For many years, researchers have noticed that except in times of famine, malnutrition does not affect all members of a household equally. Pelto [1] observes: "It has long been recognized that malnourished children are often found in households where their siblings approach normal height and weight". Van Esterik [2] notes, "There is sufficient evidence to say that food is not equally divided within households... the distribution of food reflects the order of precedence and social value of the food consumers". Associated with differential nutritional status, researchers have observed differences in morbidity and mortality within households, both of which suggest unequal distribution of food [3-5].

These findings have important consequences for programs seeking to improve the lives of people in developing countries. Unequal household resource distribution patterns mean that program resources directed at households—whether income-generation, health care, or food supplementation—may not consistently reach targeted individuals [6]. Piwoz and Viteri [7] observe: "Most programmes aimed at bettering nutrition seek to improve health care, increase the household food supply, or modify the acquisition, and preparation of food in the home. Evidence suggests, however, that improvements in the supply of food to the household alone are not enough to ensure the adequate nutrition of all its members. Undernutrition has been found to persist among households within communities and among individuals within households where income and reserves are both stable and sufficient to avoid such conditions".

Development programs require knowledge of household resource allocation patterns to improve the effectiveness of their interventions [4].

Studies of intrahousehold food distribution are also important in methodological and theoretical terms. Few studies of mealtimes have linked behavior and intake systematically. Most previous studies of food intake within households have emphasized the need to accurately determine the amount and types of foods consumed by household members, with little regard for the behaviors that occur during meals and their significance for actual intakes [8]. Studies that attempt to incorporate a behavioral dimension often presuppose particular patterns of food serving (e.g. woman feeds toddler), but overlook other modes of food serving in operation (e.g. toddler takes food away from sibling). Additionally, intrahousehold food allocation provides insights into social relations within the household (e.g. status), and degree of adherence to other aspects of social life (e.g. ritual) [2].

Despite the interest intrahousehold food distribution has generated, little empirical research on the subject has been conducted. Pinstrup-Anderson [9] has observed that intrahousehold food distribution has become a "black box", a kind of catch-all category for explaining intrahousehold variation in nutritional status: "the black box must be opened but rather than emptying everything out—and thus overwhelming even the most ambitious researcher or evaluation officer—we must select the most important parts for study and clearly identify what is left inside". This paper reports on research conducted in the rural hills of Nepal with the purpose of opening the "black box".

### EVIDENCE FOR PREFERENTIAL FOOD DISTRIBUTION

The core feature of this study is how food is differentially distributed to various household members, a behavior I will refer to as preferential food distribution. Preferential food distribution implies favoring certain household members through increased food quantity (usually resulting in higher caloric intakes), and/or improved food quality (giving foods with greater nutrient density or greater varieties of foods, resulting in improved intakes of many nutrients). It may also refer to forms of favoritism that have no immediately appreciable effect on diet, such as serving priority.

Existing evidence on preferential food distribution is spotty. In general, greater attention has been paid to who receives preferred treatment (the types of preferential food distribution) rather than how preference is shown to one individual over another (the mechanisms of preferential food distribution) [2, 10].

In the literature, preferential food distribution has been reported to follow several patterns based on characteristics of individual household members, including their sex, age, economic contribution, birth order and body size. Sex differences in household food allocation have been observed in a number of locales as Bangladesh [11], Brazil [12], Great Britain [13], the Ivory Coast [14], and the Sudan [15], and always appear to favor males. Evidence of preferential food distribution for specific age groups shows much intercultural variation. In general, elders appear to be favored for reasons related to their status within the household [16]. As well, adults may receive preferred treatment because of their economic contribution to the household. Chaudhury notes, "In societies, where family resources are meager and immediate economic viability of a household depends on, among other things, the number of able-bodied adults, marked skewing in the distribution of food in favor of adults over children is expected to be a factor contributing to high infant mortality" [17].

In the 'economic approach' to household food allocation, food resources are doled out in accordance with the economic contribution of individual household members [18, 19]. For instance, Gross and Underwood's study of sisal workers found patterns of food distribution favoring adult males, the main wage earners. Although not currently contributing to the household economy, some children received preferred treatment based on their perceived future contribution to the household. Kumar [20] observes, "Children embody potential human capital for the household unit, and consequently household resources will be spent in raising them, which under conditions of scarce resources, will depend on their expected benefit to the household".

A number of researchers have postulated fertility variables such as birth spacing and birth order of children as factors influencing household food allocation [21]. Behrman [18] presented evidence of parental bias favoring low birth-order children in India. Horton's study in the Philippines indicated significant effects of birth order on long-term indicators of nutritional status, such as height-for-age, with older children doing better than younger children [22]. Studies of birth order preference usually have the

perceived future economic contribution of the child as a motivating factor for differential feeding practices.

Finally, Fine [23] hypothesizes a type of food allocation where household members are fed according to their body size. Food allocation based on body size is tied into cultural perceptions of ideal body types (e.g. fat or thin preference). Schepers-Hughes [24] has documented selective infant feeding and food refusals according to body type and behavioral characteristics of children in Brazilian slums. This mode of feeding would present special problems for already malnourished children, who may actually require supplementary feeding.

Nepal appears to be an ideal location to study issues in intrahousehold food allocation. Previous research in the country indicates there are disparities in the diet and nutritional status between males and females of all ages, possibly associated with the lower cultural and economic valuation of women in the country [25-30]. Economic status in rural areas is generally poor, but varies considerably from household to household [31-33], permitting an examination of the effect of economic status on household food allocation. Socio-cultural diversity within communities is evident, particularly related to caste [34]. This paper presents results on intrahousehold determinants of food allocation, rather than interhousehold factors such as caste and economic status [35]. The majority of the existing evidence points at age, sex, and perceived current and future economic contribution as being the primary individual characteristics which determine intrahousehold food allocation patterns. Based on the available evidence in Nepal, the following research hypotheses were developed:

- H1: Food distribution within rural Nepalese households will meet the nutrient requirements of some household members more adequately than others.
- H2: Preferential food distribution in Nepalese households is associated with sex differences, with females of all age groups receiving less or poorer quality food than males of the same age group.
- H3: Preferential food distribution in these households is associated with a cultural valuation of the older generation, so that senior members (of both sexes) will tend to receive more and/or better quality food than junior members.
- H4: Preferential food distribution in these households is also associated with food classification beliefs concerning appropriate or inappropriate foods for special physiological state categories. That is, certain foods are regarded as inappropriate for infants, children, women, pregnant or lactating women, the sick, and so on.

In the process of testing these hypotheses, this study described and measured intrahousehold food distribution in a field setting; specifically, it identified and quantified types and mechanisms of preferential food distribution.

**THEORETICAL FRAMEWORK FOR EXAMINING PREFERENTIAL FOOD DISTRIBUTION**

From an examination of theoretical perspectives concerning intrahousehold food distribution [2, 6, 36-38], the reported behavior of individual household members, and the observation of specific events that regularly occur in Nepali meals, a conceptual framework was devised for studying the components of preferential food allocation (Fig. 1). In this scheme, intrahousehold food allocation is viewed as a part of an integrated system of household food behavior. Intrahousehold food behavior involves four components: food selection, food preparation, food serving, and associated food allocation patterns. Food selection refers to how the household chooses to provision itself in relation to foods available in the community. Food preparation involves cooking and related activities. Food serving involves five elements related to allocation:

1. The identity of the food server.
2. The order in which individuals are served.
3. What is served to whom.
4. How much is served to whom.
5. How individuals are served; this includes whether they must request food, are automatically served, or if food is forced on them by the server.

Food allocation patterns refer to the outcomes of the selection, preparation, and serving components. These food allocation patterns can take four main forms:

1. Egalitarian (no overt favoritism for any individual(s) over others).
2. Persistent or permanent favoritism for designated individual(s) in terms of food quality.
3. Persistent or permanent favoritism for designated individual(s) in terms of food quantity.
4. Temporary shifts in allocation to designated individual(s) due to transitory states (e.g. pregnancy, illness).

The second and third forms of food allocation pattern can be distinguished from the fourth in that they are more or less permanent modes of differential allocation, while the fourth is transitory; a woman

stops menstruating, a sick person becomes well. When an individual is favored over another with a food, both individuals should be culturally 'able' to consume the food. A child denied soybeans because he has diarrhea is not being disfavored, but experiences a temporary shift in food allocation [39]. When 'favoring' food allocation patterns are evidenced among household members, we can speak of types of preferential food distribution. When temporary food restrictions or prescriptions are imposed, existing types of preferential food distribution are modified.

Food intake is not dependent solely on intrahousehold dynamics. Individuals can acquire foods through other means, including begging from other households, stealing, buying, gathering wild foods for personal consumption, and other forms of personal food acquisition [2, 40]. This study focused on recording food allocation during household meals, but also recorded instances of personal food acquisition and the consumption of meals outside the household (by recall).

**DESCRIPTION OF THE RESEARCH SITE**

Research was conducted in six villages in Pahargaon (१०१), a *panchayat* in the western development region of Nepal. The *panchayat* ranges from 1000 to 6000 ft in altitude, and has a temperate climate. Like the majority of Nepalese, the people of Pahargaon are relatively isolated from urban centers. It is a day and a half's travel to the nearest market center in Tulsipur, by foot, as there are no motorable roads. The *panchayat* is not electrified and all water must be carried long distances from springs. The area is largely deforested, and firewood and fodder collection may take 3-6 hr. The *panchayat* contains a great deal of ethnic diversity within its borders. The people of Pahargaon are Hindu, with four main caste divisions (*jaathara*) represented: Brahmin, Chhetri, Vaisya and Sudra, and also large subpopulations of Sunyasi, Magar, and some Newar [42].

The economy of Pahargaon *panchayat* has a subsistence agricultural base. All households studied reported owning some land, although there is great variation in the quantity and quality of owned land from household to household. A wide variety of

STAGE 1: FOOD SELECTION	STAGE 2: FOOD PREPARATION	STAGE 3: FOOD SERVING	FOOD ALLOCATION PATTERNS
Who Selects	Who Prepares	Who Serves	Egalitarian
Selection Method	Preparation Method	Order	Favoritism in Terms of Quality
		Food Quality	Favoritism in Terms of Quantity
		Food Quantity	Foods for Transitory States
		Serving Method	
ACTUAL CONSUMPTION			
PERSONAL FOOD ACQUISITION			

Fig. 1. Conceptual scheme: intrahousehold food behavior.



crops are grown throughout the *panchayat*, including maize, wheat, millet, rice, legumes, fruits, and vegetables. Cattle, water buffalo, goats, pigs, sheep, and chickens are raised, though the usage of animal products varies significantly by caste. In total, over 200 different foods were reportedly consumed over the course of a year by all households, although most foods are only available seasonally.

#### METHODS

Methods from both anthropology and nutritional sciences were combined to gather a wide range of data pertaining to household food behavior. One hundred and fifteen households were randomly selected from six study communities for inclusion in the research, about 30% of all households in each community. Data collection took place from November 1986 through August 1987, and focused on three levels of information: community, household, and individual. Qualitative data-gathering methods provided most of the information on study communities and included focussed discussion groups, key informant interviews, and the use of archival sources [43]. Household level data were primarily quantitative, including surveys of household environment and sanitary conditions, economic status, weekly food frequencies, decision-making, and foodways (food classification systems, interhousehold food sharing, and infant feeding practices), but also included case histories and unstructured direct observations of household behaviors. Within the household, the following data were collected on individual household members ( $n = 767$ ): demographic data (age, sex, education level, occupation, etc.), weekly morbidity recalls, anthropometry, time allocation, and 24 hr dietary recalls.

The core part of the research consisted of the direct structured observation of meals in 105 households [44]. These observations had two purposes: to record types and quantities of foods consumed by household members during meals, and to record associated behaviors. Meal observations were performed three to four times in each household, during the period of May to August 1987, yielding a total of 318 complete observations. Each meal observation period centered

around either the morning meal (*kharcha*) or the evening meal (*ratiko kharcha*), the two main meals of the day in Pahargaon.

Only one meal was observed per day. Each day, the study community was selected randomly. Observers were randomly assigned to households and continued to observe that household throughout the study. Households were not notified in advance that their meal was to be observed, as households might alter their food consumption patterns if they were given prior notification.

When a household met inclusion criteria [45], the observer first recorded the current activity of each household member and the type and quantity of previously prepared foods, if any. At this point, the actual meal events record began, with a systematic listing of all activities and conversation of interest, especially if they were food-related. Each line of the meal events record included the time, actors, and activity observed, plus the food, food condition, and food quantity associated with each activity (see Fig. 2). As meals are eaten in sight of the cooking area, observers were based in the kitchen while a household member was present so no food consumption activities would be missed.

Food quantities were estimated by observers, for fear of disrupting meal time behavior by weighing foods. The author and his two Nepali assistants trained themselves to estimate quantities by eye. The capacity of household serving utensils was measured by the data collector after the first meal observation and was used as an aid in estimating amounts of foods served.

Daily food intakes were determined for all household members through the use of dietary recalls conducted at the end of the meal observation. In most cases, recall by household members was verified by the food server (usually the female head of household). In the case of small children, the food server provided a proxy recall. Informants were asked to recall their dietary intake for the previous 24 hr, ending with the current meal. Thus, a morning meal observation would include a dietary recall starting from the end of the previous day's morning meal. Informants were not asked to recall the meal that had just been observed, but were asked to recall intake up to the point the observer arrived.

OBS	TIME	ACTOR	RECIP	ACTIVITY	FOOD	CONDITION	QUANTITY
23	5:00	RKR		Short Recall	Wheat Roti	Large	1
24	5:00	RKR		Short Recall	Vegetable	Potato	1 cup
25	7:53	ARR		Brings firewood			
26	7:54	OBR		Playing in yard			
27	7:56	TPR	FBR	Breastfeeding			
28	7:58	TPR	OBR	Recipient Asks For, and is Served Food	Wheat Roti	Large	1/2
29	8:00	TPR	OBR	Serves Food	Vegetable	Potato	1 ladle

Fig. 2. Sample from a meal events record.

**Table 1. Types of food serving and consumption events recorded**

<b>Food serving</b>
Serves food to recipient
Server asks, then serves food
Server asks, but recipient refuses food
Server takes food away from recipient
Serves self food
Recipient asks for and is served food
Recipient asks for and is served food (server's own)
Recipient asks for and is refused food (see specific reasons in Table 5)
Shares own food (server gives to recipient)
Forces consumer to eat food (already served)
Forces consumer to eat new food
Breastfeeds infant or child
<b>Food consumption</b>
Consumer refuses to eat a particular food already served
Eats or is eating food (mode of serving not observed)
Consumer waits for someone else to be served before eating
Consumer wants for someone to finish before eating
Feeds infant or child by hand
<b>Non-meal food acquisition and interhousehold food sharing</b>
Steals food
Begs for food from other household
Gives food to other household (gift pay)
Receives food from other household (gift pay)
Sells food to Buys food from other household

**IDENTIFYING AND OPERATIONALIZING MECHANISMS OF PREFERENTIAL FOOD DISTRIBUTION**

All food-related 'events' that took place during the meal were recorded, with special emphasis on different kinds of food serving (see Table 1). By recording the occurrence of these different types of serving events, and the kinds and amounts of foods associated with them, the behavioral elements of meals were linked with actual food consumption. Based on the direct observation of 318 meals, the research found three major means of expressing food preference in this region of Nepal: food serving behaviors; differences in the quality of distributed foods; and differences in the quantity of distributed foods. These were broken down into six individual mechanisms: priority in serving order, serving method, second helpings, serving refusals, substitution quality, channeling quality and food quantity.

The following sections describe these mechanisms of preferential food allocation, and operationalize them into scores. Data are presented on variation in these 'scores' broken down by sex and age group. Individual *t*-tests by age group present differences between males and females. The mean mechanism scores of infants are presented, but as they are primarily breastfed, *t*-tests comparing sexes were not calculated.

*Serving order score*

Serving order refers to the sequence in which household members are served. People served early in

the meal may consume most of the food or of certain foods, with little left for those who come later. The effect of serving order was observed in many instances, when food items in short supply were exhausted before the adult female—who usually eats last—was served. A serving order score was calculated in the following manner:

$$\text{Serving order score} = \frac{\text{Order in which individual is served}}{\text{Total number of individuals served}}$$

Serving order scores ranged from 0.0 to 1.0, with higher scores reflecting greater priority in serving [46]. If individuals were served within one minute of each other, they were given the same order number. There were few individuals with mean serving order scores greater than 0.7, due partly to day to day variation in eating schedules (relating to the timing of agricultural work, the need for children to leave early for school, and so on), and partly because roughly a quarter of the meals had four or fewer individuals in attendance (e.g. in a meal with three persons present, the individual served second would receive a score of 0.67).

Small children of both sexes have top priority in serving order (Table 2). There is little difference between males and females up to 10 years of age. After 10 years, male serving order scores remain fairly constant, while female scores decrease with age, reaching a mean low of 0.09 by adulthood. Female scores increase somewhat with old age, reflecting the increased status of elderly women in the household. These differences in mean serving score for adolescents and adults by sex are significant.

*Serving method score*

Serving method refers to how food is offered/served to the individual. In most households, serving methods varied dramatically by age and sex. For instance, small children tended to request food, whereas adult males were served automatically. During the meal observations, many different methods of serving were recorded (see Table 1). For this analysis, serving methods identified in the research have been grouped into five general categories:

1. (AS) Automatically served (where the food server serves without asking or being asked by the consumer).
2. (SA) Server asks if the consumer would like food.
3. (RA) Recipient asks server for food.
4. (SS) Serves self.
5. (BR) Breastfeeding [47].

These methods of food serving were operationalized as follows:

$$\text{AS Method} = \frac{\text{No. of times individual is automatically served (AS)}}{\text{No. of times individual is served/asked for food during the meal (AS + SA + RA + SS + BR)}}$$

$$\text{SA Method} = \frac{\text{No. of times server asks if individual would like food (SA)}}{\text{No. of times individual is served/asked for food during the meal (AS + SA + RA + SS + BR)}}$$

Table 2. Mean serving order score by sex and age group

Age (yr)	Male (n)	Female (n)	T	PROB > [T]
0-0.9	0.65 (21)	0.61 (18)		
1.0-2.9	0.54 (36)	0.57 (22)	1.34	
3.0-6.9	0.51 (80)	0.54 (52)	1.45	
7.0-9.9	0.51 (32)	0.49 (25)	0.80	
10.0-14.9	0.49 (42)	0.42 (59)	3.18	‡
15.0-17.9	0.46 (31)	0.35 (15)	3.24	‡
18.0-24.9	0.50 (42)	0.15 (46)	11.43	§
25.0-49.9	0.41 (109)	0.09 (116)	23.89	§
50.0+	0.43 (28)	0.18 (23)	9.35	§

\*P < 0.05; †P < 0.01; ‡P < 0.005; §P < 0.0001

Each formulae yields a score ranging from 0.0 to 1.0, with the five scores for any individual for a particular meal, totaling 1.0 (Table 3). There is little variation in serving method by sex up until 18 years of age. Infants receive the majority of food servings as breastmilk (72%). They are also automatically served other foods, but usually only a taste. Toddlers (1-3 years) receive their food by a variety of methods. The most common food serving method is automatic (36% and 43%), but many instances of food requests by toddlers were observed (27% and 33%). Breastfeeding was also observed in this age group (24% of serving events for males, 14% of events for females). Small children (3-7 years) have a similar pattern of serving methods, although breastfeeding is all but nonexistent for this group. The server is somewhat more likely to ask the child if s/he would like some food, than is the case for toddlers. In the 7-10 year age group the majority of serving events for both

hood, women are much less likely to be automatically served (18%) and much more likely to serve themselves (74%). In most households, adult women are the food servers, and due to food pollution rules (*path*) must first serve others, then finally themselves. Elderly women are often not food servers, are automatically served (36%) with greater frequency than their younger counterparts, and are less likely to serve themselves (41%).

*Second helpings score*

Second helpings, are servings received by a meal participant after the initial serving. During the meal observations, guests were frequently forced to eat second helpings, but lower status household members had to ask for more. This variable becomes especially relevant when there is little food available for second helpings. The second helpings score was calculated in the following manner:

$$\text{Second helpings} = \frac{\text{No. of times foods offered to served to a mealtime participant more than once during a meal}}{\text{No. of different foods offered to served to a mealtime participant during a meal}}$$

boys and girls are automatic (51 and 53%, respectively). They ask for foods one quarter of the time, and are beginning to serve themselves. This pattern is repeated for the age 10-15 year group, with increased incidence of self-serving.

With early adulthood, food serving methods begin to vary substantially by sex. Males are served automatically, with increasing frequency (56%), while women tend to serve themselves more often (49%). The trend for increased automatic serving of males continues into the old age group (62%). In adult-

This score considers all foods that are offered or served in the numerator, even if they are not accepted by the consumer. An individual is only being discriminated against in terms of second helpings if he or she is not offered or is refused in his or her request for a food. In the denominator, this formula only uses those foods an individual was served at least once, foods never received but received by others indicate channeling. The second helpings score can be greater than one, because a person can be offered a food many times during a meal. An alternative method is

Table 3. Mean serving method scores by sex and age group

Age (yr)	Male					Female				
	AS	SA	RA	SS	BR	AS	SA	RA	SS	BR
0-0.9	0.27	0.00	0.01	0.00	0.72	0.26	0.01	0.01	0.00	0.72
1.0-2.9	0.36	0.11	0.27	0.02	0.24	0.43	0.06	0.33	0.03	0.14
3.0-6.9	0.44	0.16	0.35	0.04	0.02	0.48	0.16	0.31	0.04	0.01
7.0-9.9	0.51	0.16	0.26	0.07	0.00	0.53	0.16	0.25	0.07	0.00
10.0-14.9	0.46	0.24	0.17	0.13	0.00	0.49	0.14	0.19	0.17	0.00
15.0-17.9	0.48	0.17	0.23	0.12	0.00	0.58	0.21	0.04	0.16	0.00
18.0-24.9	0.56	0.17	0.14	0.12	0.00	0.36	0.10	0.04	0.49	0.00
25.0-49.9	0.60	0.15	0.12	0.12	0.00	0.18	0.04	0.03	0.74	0.00
50.0+	0.62	0.14	0.08	0.15	0.00	0.36	0.08	0.15	0.41	0.00

Serving methods: AS: automatic; SA: server asks; RA: recipient asks; SS: self-serve; BR: breastfeeding.

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Table 4. Mean second helping score by sex and age group

Age (yr)	Male	Female	T	PROB >  T
0-0.9	0.67	0.52	...	...
1.0-2.9	0.70	1.03	0.61	
3.0-6.9	0.91	0.78	1.39	
7.0-9.9	0.77	0.83	2.41	*
10.0-14.9	0.59	0.57	0.22	
15.0-17.9	0.65	0.36	2.69	†
18.0-24.9	0.69	0.73	0.31	
25.0-49.9	0.60	0.79	3.04	‡
50.0+	0.66	0.52	1.32	

\*P < 0.05; †P < 0.01; ‡P < 0.005.

to count the repeat offering of a food only once--even if it is offered or served many times. However, this alternative method cloaks the incidence of multiple offerings of food (or 'forcing').

The second helpings score shows great variation by age and sex (Table 4). From ages 3-18 years, and for the elderly, males appear to receive higher second helping preference than females. The difference is significant only for the 7-10 and 15-18 year-old age groups. In particular, the second helping score for women 15 to 18 years is quite low. At that age, women tend to marry and move into their husband's household. There they have very low status and are expected to be undemanding with regard to food. In Table 3, it can be observed that 15-18 year-old female requests to the food server for food drop off from earlier levels, and yet there is not a corresponding increase in self-serving which would indicate the woman is serving food. As junior females in the

served because it is preferentially given to or reserved for another household member. Often, it was difficult to decide whether a refusal was discriminatory or not. For instance, if the food-server ignores a child's request for food, does this mean she intends to give the food to another, or is she temporarily busy with other work? Due to the limited number of refusals, and the fact that most refusals are not discriminatory in nature, I dropped the refusal score from further analysis. Still, refusals may be a significant mechanism of preferential food distribution in other cultural settings.

*Substitution score*

Substitution occurred when the food-server would give the individual a culturally defined 'less desirable' food rather than an available 'more desirable' food. For example, of the main staples (wheat, rice, and corn), rice is considered superior to the other grains. In households with a rice shortage, I often observed senior males receiving rice, whereas other household members were served corn porridge instead.

This score was operationalized using a locally derived list of the status classification of foods. Foods were divided into six food groups: animal products; grains, beans, nuts, and legumes; fruits; green leafy vegetables; and tubers and other vegetables. Particular foods within these six groups were then ranked into four status groups by local informants. A substitution score was operationalized in the following manner.

$$\text{Substitution score} = \frac{\text{Mean status of all foods consumed by an individual meal participant}}{\text{Mean status of all foods consumed by the individual meal participant who showed the highest food status score for the meal}}$$

household, these women are being served automatically, but are not asking for food.

In adulthood, women tend to receive second helpings more frequently than men. This may be due to the fact that they are serving themselves frequently, in small portions. Also, adult women's second helping scores are increased because they commonly eat the leftover food of other household members, especially that of small children.

*Refusals*

Refusals refer to situations when the server denies a consumer's request for a food, perhaps because the server was saving it for someone else, such as a senior male. In many cases, refusals will not reflect preferential treatment; for instance, if the request is made before the food is ready to be eaten. Table 5 presents the types of food refusals recorded in the 318 meals observed. In total, there were only 245 refusals noted. Of these, the majority (55.9%) were clearly non-discriminatory food refusals, where for instance, the foods had not been prepared yet or were not available in the household. A discriminatory food refusal occurs when the food requested is available, but is not

The score ranged between 0.0 and 1.0 for each individual meal participant for each meal, with a mean of 0.93. However, there was little variation in substitution score by age. T-tests indicated no significant differences between mean substitution scores for males and females for any age group. Scores for infants (0.96) [48] and elderly males (0.94) were

Table 5. Types of refusals recorded in meal observations

Form of refusal	Frequency	Per cent
<b>Discriminatory</b>		
'No' (doesn't want to give)	56	22.7
Ignores person	43	17.4
Not enough food	10	4.0
Subtotal	109	44.1
<b>Non-discriminatory</b>		
'Wait until later'	40	16.2
Food not ready	39	15.8
Not available at household	33	13.4
'It will make you sick, polluted'	11	5.3
'Finish your other food first'	9	3.6
'Serve yourself'	4	1.6
Subtotal	136	55.9
<b>Total</b>	<b>245</b>	<b>100.0</b>

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Table 6. Mean channeling score by sex and age group

Age (yr)	Male	Female	T	PROB >  T
0-0.9	0.38	0.37		
1.0-2.9	0.78	0.80	-0.57	
3.0-6.9	0.82	0.82	-0.12	
7.0-9.9	0.82	0.81	0.32	
10.0-14.9	0.80	0.76	1.23	
15.0-17.9	0.73	0.69	0.73	
18.0-24.9	0.80	0.72	1.92	*
25.0-49.9	0.76	0.70	3.31	**
50.0+	0.75	0.69	1.14	

\* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.005$ .

marginally better than for other age groups. These results do not bear out the early observation that substitution is an important mechanism of preferential food distribution in the Nepali setting.

$$\text{Food quantity score} = \frac{\text{Total grams of all foods consumed by an individual meal participant} / \text{Total grams of all foods consumed by meal participants}}{\text{Individual meal participant's weight (kg)} / \text{Total weight of all meal participants (kg)}}$$

#### Channeling score

Channeling occurred when a food was offered/served to one person, but not to another [49]. Quite often channeled foods were the more expensive or higher status foods, especially animal products. For instance, on several occasions we observed *ghee* being served to the male head of house, but not to other household members. The channeling score was calculated according to the following formula:

$$\text{Channeling score} = \frac{\text{No. of different foods offered to served to an individual mealtime participant during a meal}}{\text{No. of different foods offered to served to all household mealtime participants during a meal}}$$

A food was considered to be channeled to an individual if s/he had the opportunity to receive the food, regardless of whether s/he chose to eat the food. Thus, the preceding formula includes any food in the numerator which is offered to the consumer. It does not include a food that the consumer asks for, but the server refuses to give, evidence that the food is being channeled away from the consumer.

In creating this score, several foods were not considered. The consumption of water was incompletely recorded during the meal observation, and was eliminated as a food. Food channeling occurs when foods that can be consumed by most household members are not. As breastmilk is reserved exclusively for infants, its consumption was also eliminated from the channeling score.

Children appear to be channeled more foods than adults (Table 6). Among children, the channeling scores appear to show no favoritism for males vs females. However, by ten years of age, mean channeling scores are higher for boys than they are for girls. This difference is only significant in early and mid-adulthood, when adult male channeling scores are higher than female channeling scores. Significant

differences in channeling scores were not observed between elderly males and females. For both sexes, channeling appears to decline somewhat with age.

#### Food quantity score

Food quantity preference was observed when some household members received more in total amount of food, even when adjusted for differences in relative body weight. For instance, we observed meals in which the senior male received a large portion of a desirable food such as a bowl of yogurt while adult women received a disproportionately smaller share, perhaps only a tablespoon. The key is to calculate how much food a person 'should' eat (relative to household supplies), compared to how much she or he does eat:

The method for calculating food quantity scores takes individual body weight and intakes as a proportion of the total household biomass and food intake for the meal. The results for food quantity scores are presented in Table 7. Scores ranged from close to 0.0 to above 3.0. A small child, representing a very small proportion of the total household body mass, who ate a large meal, would receive a high score. As well, personal food preferences may affect

food quantity scores. The food quantity scores presented here does not include guests, and other unweighed meal participants.

Food quantity scores generally decrease with increasing age. This is to be expected due to the greater nutrient requirements of children per kilogram of body weight [50]. There are no significant differences in mean food quantity scores between male and female children. Differences are only significant for adult males and females over the age of 18 years, with males having higher scores.

An alternative method for calculating food quantity scores would be to consider foods individually, instead of added together as total grams of food. It may be that the food quantity mechanism plays a role for certain foods only, such as animal products. Those who receive disproportionately smaller quantities of these foods may consume greater quantities of staple foods, masking low individual food quantity scores.

Certainly, these mechanisms are not the only components of Nepali meals that express differences between individuals. Status differences were emphasized by who used better serving and eating utensils

Table 7. Mean food quantity score by sex and age group

Age (yr)	Male	Female	T	PROB >  T
0-0.9	0.29	0.32	-	-
1.0-2.9	1.68	1.64	0.06	
3.0-6.9	1.39	1.42	0.29	
7.0-9.9	1.28	1.27	0.06	
10.0-14.9	1.08	1.04	0.61	
15.0-17.9	1.01	0.81	1.63	
18.0-24.9	1.00	0.87	2.66	†
25.0-49.9	0.94	0.79	3.06	‡
50.0+	0.92	0.77	2.80	†

\* $P < 0.05$ , † $P < 0.01$ , ‡ $P < 0.005$ , § $P < 0.0001$ .

or who sat on a stool and who on the ground. However, these features did not appear to be directly linked with preferential food allocation in study households.

#### Interrelationships between mechanisms of preferential food allocation

As well as observing age and sex variation in individual mechanisms of preferential food distribution, it is important to determine how they interrelate with each other. Table 8 presents a correlation matrix of the scores developed in the previous sections.

Those individuals who are served automatically tend to ask for food, and tend not to serve themselves food. Those asked by the host if they would like more food, also tend to ask for more food, and are less likely to serve themselves. Finally, those household members who serve themselves or are breastfed are less likely to be served in any other fashion.

High priority in serving, primarily associated with adult males and children, correlates with higher incidence of automatic serving, requests by recipients, and server asks serving mechanisms, but lower self-service. It also correlates with a greater incidence of channeled foods and increased food quantity scores. Those who are served automatically, generally adult males, tend to receive second helpings less frequently, perhaps because they are being served a large portion initially. Small children and others who ask for food tend to get second helpings more often and receive channeled foods and relatively greater food quantity. On the other hand, those who serve themselves (primarily adult women) tend to have lower serving priority, a significantly lower incidence of channeled foods and lower food quantity scores, but a higher frequency of second helpings. Those individuals with higher second helping scores tend to have higher food quantity scores, as do those with higher channeled scores. Thus, many of the mechanisms of preferential

food distribution appear to be linked, and an individual favored in one way is likely to be favored in other ways.

#### Modifiers of preferential food distribution

In the literature, much attention has been paid to food proscriptions and prescriptions for transitory states and their potential affect on diet [51-55]. As previously stated, I consider these factors modifiers of the mechanisms (and thereby types) of preferential food distribution. Modifying conditions particularly relevant in Pahargaon include menstruation, pregnancy, the postpartum state, lactation, and illness. For example, a senior woman may have relatively high status in a Pahargaon household, but when she menstruates, she is considered polluted and is required to avoid certain foods, especially dairy products. Lactating women are encouraged to avoid foods that are considered 'indigestible' or 'cold', for fear the nursing infant may become ill. Ill people are often made to avoid foods of certain classification depending on their illness. Most of these modifying states are applicable only to women. In the Nepali setting, they appear to have an overall negative effect on women's diet through decreased dietary diversity and intake.

It is clear that there is a significant effect of food proscriptions and prescriptions on actual food intake. The evidence of significantly lower channeling scores for adult women versus all other household members indicates that certain foods are going to other household members and not to adult women. What are these channeled foods?

An analysis of the 318 observed meals was conducted to ascertain which foods women were not receiving that other household members did receive. The following foods were often served to other household members, and not to adult women: soybeans, wild green leafy vegetables, potato pickle, banana, mango, fish, eggplant, cow milk yogurt, cow milk *ghee*, buffalo milk *lassi*, and chili. Even less frequently consumed by adult women were: wheat *pur*, wheat *roti* with oil, *jamuna*, pork, chicken, eggs and liquor. Many of the above foods are considered difficult to digest by infants (i.e. soybeans, chili, oily foods) and tend to be avoided by nursing women. These foods tend not to be in short supply during meals and there was no reason to avoid them, except due to food belief systems. This observation is supported by key informant interviews with women in Pahargaon. Other foods, especially animal products, tend to be in great demand, but are in short supply during meals. These foods appear to be preferentially

Table 8. Correlations between mechanisms of preferential food distribution

Means	A	B	C	D	E	F	G	H	I
Serving order (A)									
Automatic (B)	0.29§	—							
Server asks (C)	0.14§	0.04	—						
Recipient asks (D)	0.34§	0.08‡	0.09§	—					
Self service (E)	-0.60§	-0.34§	-0.26§	-0.18§	—				
Second helping (F)	-0.03	-0.20§	0.04	0.19§	0.06†	—			
Substitution (G)	0.02	0.00	0.01	0.00	-0.01	0.03	—		
Channeling (H)	0.14§	0.01	0.03	0.14§	-0.09†	0.03	0.15§	—	
Quantity (I)	0.24§	0.03	0.01	0.26§	-0.21§	0.16§	0.04	0.32§	—

\* $P < 0.05$ , † $P < 0.005$ , ‡ $P < 0.0005$ , § $P < 0.0001$ .

Note: Raw numbers were used for correlations between serving methods (B-E), while serving method ratio scores were used for correlations with other mechanisms (A, F-I).

Table 9. Mean intakes of kcals by age and sex

Age (yr)	Male			Female			<i>P</i> > [ <i>T</i> ]
	Mean intake	Mean recommended*	MNAR	Mean intake	Mean recommended*	MNAR	
0.0-0.9 <sup>b</sup>	70	389	18.9	84	322	22.2	
1.0-2.9 <sup>b</sup>	684	719	87.7	742	711	112.6	
3.0-6.9	1327	1201	111.3	1087	1224	89.1	‡
7.0-9.9	1444	1421	99.6	1452	1237	118.2	
10.0-14.9	1750	1877	107.7	1731	2051	84.2	*
15.0-17.9	2277	2472	90.3	1935	2447	78.6	
18.0-24.9	2171	2571	82.2	1914	2437	76.5	
25.0-49.9	2343	2759	87.0	1801	2398	74.9	†
50.0+	2046	2233	91.7	1644	1762	94.5	

\**P* < 0.05; †*P* < 0.01; ‡*P* < 0.005.

\*Recommended intake for energy based on WHO formula (1985).

<sup>b</sup>Diet primarily breastmilk, not measured.

<sup>c</sup>Substantial portion of diet is breastmilk, not measured.

distributed to adult males, and small children who request them. Thus, much of the food channeling away from women that occurs appears to be related to food belief systems employed during modifying conditions, while other instances of channeling appear related to true 'disfavoritism' of adult females (often by their own hand, as they are the food servers).

One consideration is the possibility that women snack during food preparation as a means of counterbalancing reduced intake during formal meals. However, in our observations women were rarely observed to eat while cooking, and then only when preparing 'snack foods', such as roasted corn or soybeans. This behavior reflects a cultural rule prohibiting the food preparer from eating while cooking most foods, as this will pollute (*jutho garne*) the foods and thereby pollute other household members who eat the food [56].

#### PREFERENTIAL FOOD DISTRIBUTION AND DIETARY ADEQUACY

What are the nutritional consequences of these patterns of food allocation? As described earlier, meal observation and dietary recall techniques were combined to quantify daily food intakes of household members. Two to three days dietary intake records were obtained per household member. Indian Council for Medical Research (ICMR) food composition tables were utilized to calculate individual nutrient intakes [57].

Recommended levels of intake for the nine nutrients (energy, protein, calcium, iron, beta-carotene, thiamin, riboflavin, niacin, and vitamin C) were derived from ICMR and WHO recommendations, considering the individual's age, sex, and current fertility status [57, 50]. Daily average energy requirements for individuals also considered activity levels and weight [50]. Recommended safe levels of protein intake for individuals were calculated by multiplying the average safe protein allowance per kilogram of body weight (for a particular age-sex group) by the average weight (kg) of a person in the corresponding age-sex group. Additional recommended intakes for energy, protein, and several micronutrients were recognized for pregnant and lactating women [57].

Tables 9-12 present variation in specific nutrient intakes by age and sex groups. Data are not presented for protein, thiamin, niacin, calcium, and iron, as intakes were generally adequate for all groups. The adequacy of the intakes was gauged by estimating a mean nutrient adequacy ratio (MNAR), calculated by dividing the individual nutrient intake by the recommended daily allowance for that nutrient (safe level of intake in the case of protein), and multiplying by 100. *T*-tests were calculated to indicate differences in MNAR scores between males and females within specified age groups. The distribution of scores validated the assumption of a Gaussian curve and equal variances. While nutrient intake data on infants are presented in the following tables, it should be noted that their diets are primarily breastmilk; their MNAR scores are well below 100.

Table 10. Mean intakes of beta-carotene ( $\mu\text{g}$ ) by age and sex

Age (yr)	Male			Female			<i>P</i> > [ <i>T</i> ]
	Mean intake	Mean recommended*	MNAR	Mean intake	Mean recommended*	MNAR	
0.0-0.9 <sup>b</sup>	30	1000	3.0	206	1000	20.6	—
1.0-2.9 <sup>b</sup>	1286	1000	128.6	1022	1000	102.2	
3.0-6.9	2950	1152	259.4	1712	1154	154.0	*
7.0-9.9	3013	1592	203.7	2376	1550	156.1	
10.0-14.9	2935	2405	135.6	3611	2587	138.4	
15.0-17.9	7373	3000	245.8	2837	2925	102.5	
18.0-24.9	2110	3000	70.4	2756	4425	67.2	
25.0-49.9	2872	3000	95.8	1959	4204	53.2	*
50.0+	2805	3000	93.5	1274	3000	42.5	*

\**P* < 0.05.

\*Recommended intake for nutrient based on ICMR standards.

<sup>b</sup>Diet primarily breastmilk, not measured.

<sup>c</sup>Substantial portion of diet is breastmilk, not measured.

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Table 11. Mean intakes of riboflavin (mg) by age and sex

Age (yr)	Male			Female			P >  T
	Mean intake	Mean recommended*	MNAR	Mean intake	Mean recommended*	MNAR	
0.0-0.9 <sup>b</sup>	0.02	0.70	3.3	0.08	0.70	11.0	--
1.0-2.9 <sup>c</sup>	0.38	0.70	55.0	0.38	0.70	54.3	
3.0-6.9	0.75	0.78	97.5	0.56	0.78	72.4	†
7.0-9.9	0.84	1.00	86.7	0.72	0.97	76.5	
10.0-14.9	0.88	1.22	74.2	0.91	1.19	75.9	
15.0-17.9	1.34	1.53	92.3	0.95	1.33	74.6	
18.0-24.9	1.04	1.88	54.9	0.92	2.02	45.6	
25.0-49.9	1.20	1.60	75.1	0.86	1.68	52.9	§
50.0+	0.90	1.31	69.5	0.76	1.03	74.3	

\*P < 0.05; †P < 0.01; ‡P < 0.005; §P < 0.0001.

\*Recommended intake for nutrient based on ICMR recommendations.

<sup>b</sup>Diet primarily breastmilk, not measured.

<sup>c</sup>Substantial portion of diet is breastmilk, not measured.

Non-breastmilk foods account for a small proportion of the total kcal intake of infants (Table 9). The diets of children one to nine years appear to be adequate in terms of kcals on average. However, beginning at 10 years, the kcal intake of females appear to be low, varying from 74.9 to 84.2% of recommended intakes on average. Apparently, energy intake is insufficient to meet the high levels of activity of girls and young women, or their additional recommended intakes for pregnancy and lactation. Energy intakes for adult males also appear low, particularly as young adults 18-25 years (82.2% of recommended levels), though not so poor as those for females. Only in the case of small children are mean energy intakes in excess of recommended levels. Children appear to be favored in terms of overall food intake in Paharpan household.

Mean intakes of beta-carotene are close to or above recommended levels for all age groups of males, except males 18-25 years (70.4%) (Table 10). Children appear to exceed minimum recommended levels for this nutrient, probably because vitamin A rich foods such as milk, are often channeled only to them. All adult women are quite low for beta-carotene, with levels decreasing with increasing age. Significant differences are observed in MNAR scores for beta-carotene between adult males and females, with males having better scores.

There are two primary sources of vitamin A in the diet, retinol from milk and other animal products,

and beta-carotene from green leafy vegetables and other vegetables. Many of the plant sources of beta-carotene, particularly green leafy vegetables, are avoided by women in phase states, as they are considered 'cold' foods. These data are one indication of the effect of food restrictions on dietary adequacy in the *panchayat*.

In many instances, intakes for riboflavin appear far lower than recommended levels (Table 11). The Nepali diet is generally low in animal products, a primary source of riboflavin, although this varies considerably from household to household. Riboflavin intakes for females tend to be lower than for males, reflecting differential access to animal products and green leafy vegetables, a main source of this nutrient in the local diet. This sex difference is significant in terms of MNAR scores of 3-7 year-olds, and particularly between adult males and females.

For males, vitamin C intakes appear adequate for all age groups, except perhaps for elderly men (Table 12). Intakes for adult women appear low, showing decreasing MNAR scores with age. Adult women, ages 25-50 years, are the only age group with significantly lower MNAR scores for vitamin C than their male counterparts. The main sources of vitamin C in the diet are fruits and some vegetables. Decreased intake of this nutrient is associated with food beliefs regulating the intake of fruits and vegetables, often seen as cold and unhealthy for post-partum or lactating women.

Table 12. Mean intakes of vitamin C (mg) by age and sex

Age (yr)	Male			Female			P >  T
	Mean intake	Mean recommended*	MNAR	Mean intake	Mean recommended*	MNAR	
0.0-0.9 <sup>b</sup>	0.3	40.0	0.9	1.6	40.0	3.9	--
1.0-2.9 <sup>c</sup>	22.9	40.0	57.1	17.8	40.0	44.5	
3.0-6.9	44.0	40.0	109.9	30.1	40.0	75.2	
7.0-9.9	57.0	40.0	142.5	39.1	40.0	97.8	
10.0-14.9	46.7	40.0	116.7	62.1	40.0	155.2	
15.0-17.9	100.4	40.0	251.1	55.7	44.2	134.0	
18.0-24.9	52.3	49.2	104.8	62.9	75.4	84.3	
25.0-49.9	54.1	49.9	108.3	42.2	71.9	63.6	‡
50.0+	42.2	50.0	84.3	29.2	50.0	58.4	

\*P < 0.05; †P < 0.01; ‡P < 0.005.

\*Recommended intake for nutrient based on ICMR recommendations.

<sup>b</sup>Diet primarily breastmilk, not measured.

<sup>c</sup>Substantial portion of diet is breastmilk, not measured.

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In general, the dietary adequacy of children appears to be better than that of adults. Sex differences in dietary quality appear to be pronounced only in adulthood. Although most of the people appear to have adequate diets, the data presented raise concerns about nutrient intakes for some age and sex groups, particularly adult women. It is these women, active in the day to day work routine of the household, who are faced with additional nutrient requirements based on pregnancy and lactation, and have culturally prescribed dietary restrictions [58].

#### DISCUSSION AND SUMMARY

When considering the original research hypotheses, it is clear that food and nutrient distribution in the study communities does meet the requirements of some household members more adequately than others. These patterns of food allocation are related to age and sex factors, but not always in the ways hypothesized.

As predicted, adult males received preferential food allocation in terms of all mechanisms described above. Although usually served after small children, they were automatically served, and often received second helpings of foods automatically. They also received particular favoritism in terms of substitution and channeling, often given foods no other household members ate. In terms of high-status foods, such as animal products, they would often receive disproportionately larger shares than other household members. Also as predicted, adult women, were generally disfavored. They tended to eat last and had decreased access to second helpings (often due to limited quantities). Except when in modifying physiological states (e.g. pregnancy, lactation), they almost never received channeled foods. They also tended to eat disproportionately smaller amounts of more costly and rare foods. The results of this sex-based differential in terms of adults is that men are much more likely to consume recommended levels of nutrients than women, with women having particularly low intakes of energy, beta-carotene, riboflavin and vitamin C.

Sex differences in feeding mechanisms were also observed for some younger age groups. Adult junior females (i.e. daughters-in-law) had very low status in the household, and were expected to do most of the heavy domestic work. They were almost always served last or next to last, even if they were not the food server. They rarely asked for second helpings, and were often under the critical eye of mother-in-laws who expected them to do more work and consume fewer special foods. In general, these women received the low-status foods; rarely were they given channeled foods, except under some of the modifying conditions such as pregnancy or the postpartum state. They tended to eat proportionately less food than other household members.

While differences were never as severe as for older household women, adolescent girls were disfavored in food allocation. It is at this stage of their lives that they begin to assume many household domestic responsibilities, such as water-fetching, wood collection and food preparation. No longer children, they were served later in the meal, often in the same eating group as the mother. They were expected to ask for

second helpings, and rarely received channeled foods. On the other hand, adolescent boys were automatically served and frequently offered second helpings, despite the fact they had only middle priority in terms of serving order. They were also given moderate-level preference in terms of substitution and channeling, occasionally receiving special foods, and they tended to receive a great amount of food proportionate to body size.

Elderly of both sexes have high status in their households; this is particularly true for males. Elderly men were served before other adult males, and elderly women before other adult females. Special foods were often channeled to them that were softer and perceived as more digestible.

It is important to note that no difference was observed in the treatment of small children (under 8 years) by sex. Small children of both sexes tended to be served first, and were usually offered second helpings. Quite often special foods, such as milk were channeled only to them. Small children repeatedly asked for foods in most meals observed. Relative to body size they received the largest quantities of food. They also frequently received preference in terms of substitution, receiving higher status foods if they asked for them.

Aspects of the study hypotheses on intrahousehold food distribution patterns for this region need to be revised on the basis of these results. While senior persons were favored over junior adults in households, small children appear favored over adults. While among adults, sex differences in the mechanisms of preferential food distribution and dietary adequacy were observed, they were not observed to a great extent among older children, and not at all among small children. The overall distribution of 'favoritism' appears to be bimodal; with the patterning of food allocation separate for adults and children.

These results are surprising considering the body of evidence suggesting the neglect of female children in South Asian settings [8, 59, 60]. Female children constitute a financial drain on the household, due to the high costs of dowry and the loss of the adult female's productive labor through her relocation to her husband's household after marriage. As well, females are unable to perform the critical funerary rituals which ensure the deceased individual's safe passage to their next life.

The relatively high valuation of female children in Pahargaon exists for several reasons. First, while the bride's household does give expensive gifts to the bride to take to her new household (*shai maashu*), usually the *shai maashu* consists of saris, household utensils and bedding, and limited amounts of jewelry. While still an economic burden on the bride's household, these gifts tend to have less value than the dowries given in North India, or even in the *terai* region of Nepal. These items remain the property of the bride after marriage, and are taken away from her husband's household in the event of divorce or separation. Second, girl children and adolescent girls in Pahargaon households are highly productive, often taking charge of the majority of domestic tasks (e.g. child care, fetching water and firewood, cleaning, food processing, etc.), giving their mothers and other

adult females time for agricultural work outside the household. Finally, Pahargaon residents were usually quick to assert that while son's represent the future of the household, children of both sexes are loved equally.

In this region of Nepal, it appears that nutrition programs need not worry unduly about the possibilities of strong overt favoritism towards little boys over girls. Efforts to improve children's nutrition should be directed at both sexes, and might instead focus on the interaction of the food server and the child, encouraging mothers to feed children who do not request food as well as those who do. On the other hand, young women, especially those who are pregnant and lactating are the most 'at risk' in terms of these household food allocation patterns. Special efforts should be directed at improving their intake of energy and specific micronutrients, perhaps through educational messages targeted at the food server.

The in-depth approach of this research, based on the direct, structured observations of meals, yields an extremely rich database for examining household dynamics relating to food, particularly the manner in which food is differentially allocated to household members. There are still a great number of questions to be answered concerning the significance of intrahousehold food distribution for health and nutrition programs. Of household-level characteristics (e.g. economic status, caste), food serving behaviors and individual food preferences, which play a greater role in determining dietary intake? How can anthropologists communicate findings on household food dynamics to policy makers? Once communicated, how can policy makers identify less-favored individuals within households and direct resources to them? There are no easy answers, but it seems clear that efforts must be made to work inside households, or to affect the dynamics within households, instead of merely directing resources to communities and households in general.

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46. The method selected for scoring serving order is affected by variation in household size. A person served first in a household of 5 would have a score of 0.8 while a person served first in a household of 10 would have a score of 0.9. An alternative is to create a grouped serving order scale, where the first and last individuals served are given a score of 1 and 4 respectively, and the remaining meal consumers are grouped into one to two internal categories, with scores of 2 and 3.
47. Breastfeeding could be grouped with any or all of the other methods of food serving. I have made it a separate category to obtain additional information on the feeding of infants and small children during mealtimes.
48. High substitution scores for infants appear to be related to the high status of breastmilk.
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