How to Use the

HKI FOOD FREQUENCY METHOD

TO ASSESS COMMUNITY RISK OF VITAMIN A DEFICIENCY

HELEN KELLER INTERNATIONAL
VITAMIN A TECHNICAL ASSISTANCE PROGRAM

How to Use the HKI Food Frequency Method to Assess Community Risk of Vitamin A Deficiency

Helen Keller International
Vitamin A Technical Assistance Program

David S. Rosen, MPH, MPA

Nancy J. Haselow, MPH

Nancy L. Sloan, DrPH

HELEN KELLER
INTERNATIONAL

CAMPINAS • COLOMBO • DHAKA • DODOMA • JAKARTA • KATHMANDU • MANILA
NEW YORK • NIAMEY • OUAGADOUGOU • PHNOM PENH • RABAT • YAOUNDÉ

Helen Keller International
90 Washington Street
New York, NY 10006, USA

Bangladesh: P.O. Box 6066 Gulshan, Dhaka 12
Brazil: c/o Nucleo de Prevencão de Cegueira, UNICAMP, CP 1170, Campinas, SP 13100
Burkina Faso: 01 B.P. 5658, Ouagadougou 01
Cambodia: P.O. Box 168, Central Post Office, Phnom Penh
Cameroon: B.P. 13-201, Yaoundé
Indonesia: 10th Floor, Jl HR Rasuna Said Kav. 10, Jakarta 12950
Morocco: 3, rue Sekkoura, Rabat
Nepal: c/o P.O Box 3255, Kathmandu
Niger: B.P. 11728, Niamey
Philippines: 2139 Fidel A. Reyes St., Malate, Manila
Sri Lanka: 17 Rajawatte Terrace Sieble Ave., Colombo 5
Tanzania: P.O. Box 76, Dodoma

© 1993 Helen Keller International, Incorporated.
Reprints or reproduction of portions or all of this document are encouraged, provided the publication and publisher are acknowledged.
Printed in the United States of America.

Library of Congress Cataloging-in-Publication Data

How to use the HKI food frequency method to assess community risk of vitamin A deficiency / Helen Keller International Vitamin A Technical Assistance Program ; David S. Rosen, Nancy J. Haselow, Nancy L. Sloan.
p. cm.
Includes bibliographical references.
:
1. Vitamin A deficiency. 2. Vitamin A deficiency in children. 3. Nutrition surveys. I. Rosen, David S. (David Scott). II. Haselow, Nancy J. III. Sloan, Nancy L. IV. Helen Keller International. Vitamin A Technical Assistance Program.
RA645.V56H69 1994
614.5'939--dc20 94-7390
CIP

ISBN 0-915173-30-1

This production of this manual was supported by
the United States Agency for International Development,
Office of Private and Voluntary Cooperation under Cooperative Agreement No. OTR-0284-AA-00-8253-00.

Super Carrot illustrations by Joey San Luis, Manila, Philippines
Cover design by Silvio da Silvia, Rio Station Graphics
Layout design and production supervision by Barbara Bochnovic
Editorial assistance by Christopher Caiazza and Krisann Karaviotis

MarkerThinFelt is a shareware typeface by Pat Snyder

Preface

One of the most difficult tasks that I have found as a nutritional epidemiologist has been to collect only data that is relevant and timely — data that is both needed and understood by program implementers. Such data about vitamin A deficiency is needed to design and implement community-based interventions. In response to this need, Helen Keller International (HKI), through its Vitamin A Technical Assistance Program (VITAP), has developed a method that yields understandable information about vitamin A deficiency and consumption of vitamin A-rich foods in communities.

The HKI Food Frequency Method puts the power of information gathering directly in the hands of those who are in a position to take action. There is no need for sophisticated computer programs, extensive consultations with costly outside experts, or waiting so long for the data to be analyzed that the information is no longer relevant. The data produced using the HKI Food Frequency Method can be analyzed *by hand* within hours. The resulting information is timely — so that program implementers can take action almost immediately.

The HKI Food Frequency Method has been validated against World Health Organization standards to classify vitamin A deficiency. The validated cutoff values enable program implementers to decide whether or not vitamin A deficiency exists in communities with greater confidence. Thus, they can make better informed decisions about whether and where to expend their often scarce resources.

The HKI Food Frequency Method has standard cutoff values that can be used to compare the relative impact of different food-based interventions or the relative impact of programs in different areas. Such comparisons can inspire program managers to develop innovative, cost-effective interventions or adapt such interventions to their own particular conditions.

The HKI Food Frequency Method generates information about the availability, accessibility, preparation, and seasonality of foods. This information contributes to the planning of sustainable foods-based interventions to control vitamin A deficiency.

I believe that as a reader and *user* of this manual, you will have a tool that gives you the information you need to participate in the global effort to "virtually eliminate vitamin A deficiency by the year 2000." Your insights and practical experience are valuable, and I encourage you to send us suggestions about how we can improve this manual or method. It is only through our continuing, combined collaboration that we can reduce the risk that vitamin A deficiency poses to the health and survival of millions of children worldwide.

Susan E. Burger PhD, MHS
Director of Nutrition Programs
Helen Keller International

Acknowledgments

The Vitamin A Technical Assistance Program of Helen Keller International acknowledges the individual contribution of each of the following people who provided expert advice for the development of the HKI Food Frequency Method: Dr. Noel Solomons, Dr. Lou Pizzarello, Dr. Al Sommer, Dr. Keith West, and Dr. Barbara Underwood. For extensively and carefully reviewing the method and this manual, we acknowledge the tremendous contribution of Dr. Susan Burger and Ms. Barbara Bochnovic. For providing encouragement for the development of this method, we thank our friends at UNICEF particularly, Dr. Peter Greaves and Dr. David Alnwick. We thank all of our colleagues at Helen Keller International throughout the world for their ongoing assistance and support.

We also give special thanks for assistance with the validation of the method to Davao Medical School Foundation in the Philippines, the Center for Studies of Sensory Impairment, Aging, and Metabolism (CeSSIAM) and the International Eye Foundation in Guatemala, the Tanzania Food and Nutrition Center in Tanzania, and especially, Dr. John Gmunder and the Task Force Sight and Life of Hoffmann LaRoche in Switzerland. Assistance was also provided by Ms. Agatha Ryder and Ms. Lilly Clement of Johns Hopkins University, Dr. Bill Moore and Ross Laboratories, and Curtis Matheson Services.

We gratefully acknowledge the contribution of Dr. Laxmi Rahmathullah and the Aravind Children's Hospital, and the Association of Sarva Seva Farms (ASSEFA) for invaluable assistance with pre-testing this manual in India. Appreciation also is given to the Ministry of Public Health and the National Health and Information System of Niger; and to Mr. Shawn Baker and other staff of Helen Keller International for pre-testing this manual in Niger.

The case study used in this manual is excerpted from a joint Helen Keller International, Aravind Children's Hospital, and ASSEFA survey report. Acknowledgment and thanks are given to the following collaborators in India who assisted with the survey and pre-testing of this manual: CARE, Christian Children's Fund, Catholic Relief Services, Plan International, World Vision of India, SNDT Women's University in Bombay, Agricultural College and Research Institute in Madurai, Avinashilingam Deemed University in Coimbatore, Shri AMM Murugappa Chettiar Research Centre in Madras, and Aravind Eye Hospital in Madurai.

Finally, this method or manual would not have been possible without the generous support of the Office of Private and Voluntary Cooperation of USAID.

Contents

How to Use This Manual

I. Introduction to the HKI Food Frequency Method 1

II. Steps to Complete the HKI Food Frequency Method 5

Step 1. Define Survey Area 6
Step 2. Select Season and Time of Day for Survey 7
Step 3. Develop Sampling Plan 8
Step 4. Determine Locally Available Foods 12
Step 5. Modify Food Frequency Questionnaire 18
Step 6. Select and Train Interviewers 25
Step 7. Translate Questionnaire 30
Step 8. Field Test, Refine, and Finalize Questionnaire 31
Step 9. Conduct Survey 33
Step 10. Analyze Survey Data 34
Step 11. Interpret and Use the Data — A Case Study from India 39

III. Planning for the HKI Food Frequency Method 51

IV. Share Your HKI Food Frequency Results 53

End Notes 57

Appendices

I. How to Select a Random Sample 60
II. Conversion Formula (RE and IU) 66
III. Additional Suggested Reading 67

How to Use This Manual

This manual is the second of a two-part series on assessment. The first, *Conducting a Qualitative Assessment of Vitamin A Deficiency: a Field Guide for Program Managers*, emphasizes the use of existing data sources and qualitative research to identify communities at risk of vitamin A deficiency. We recommend that you use the *Field Guide* before using this second manual. In the *Field Guide*, the following approach is suggested:

1) Answer a brief series of questions to determine whether vitamin A deficiency may potentially be a problem in your project areas.

2) Conduct a 7-Step qualitative assessment using literature and document reviews, key informant interviews, market surveys and group discussions.

3) If adequate information is collected in points one and two, further assessment may not be necessary. If, however, the information collected is outdated, contradictory or inadequate, we recommend that you use the HKI Food Frequency Method described in this manual.

This manual describes step-by-step how to use the HKI Food Frequency Method. The HKI Food Frequency Method can be used:

- to identify **communities** where vitamin A deficiency is a problem of public health importance;
- to provide baseline and endline data which can be used to evaluate changes in frequency of intake of vitamin A-rich foods as a result of project interventions in communities; and
- to provide guidance for when vitamin A-rich food consumption in the community may be sufficient to discontinue mass distribution of high dose vitamin A supplements.

Although the HKI Food Frequency Method is presented in a step-by-step fashion, many of the steps are interdependent and may be carried out concurrently. This manual should, therefore, be read thoroughly before attempting to use the HKI Food Frequency Method to assess vitamin A deficiency.

In addition, it is strongly recommended that users of this manual have prior experience conducting community-based surveys. If any questions regarding the use of this method are not satisfactorily addressed after reading the entire manual, please contact the Nutrition Program Director at Helen Keller International, New York, for clarification.

I. Introduction to the HKI Food Frequency Method

Why a Food Frequency Method?

The standard tools used to assess vitamin A deficiency include clinical exams, biochemical tests, and dietary methods. Clinical and biochemical surveys, however, are costly and can be logistically difficult for many community-based organizations to undertake. Likewise, many dietary methods require personnel with formal training in nutrition. By emphasizing a simplified, semi-quantitative dietary approach, the HKI Food Frequency Method is designed to make the assessment process accessible to organizations implementing health, agriculture, or development programs at the community level.

A food frequency method counts how often certain foods are eaten over a period of time. Unlike other dietary methods, such as 24-hour recall, *a semi-quantitative food frequency method* does not estimate the precise amount of nutrient intake. Portion size is usually not measured. This type of method is, therefore, not as accurate as other techniques to determine whether an individual is deficient in a specific nutrient, like vitamin A. It can, however, be used to predict whether or not a nutritional deficiency is a public health problem in a population.

The ability of food frequency methods to explain relationships between intake of foods and disease has been well-established.[1] Research has shown that estimating the exact amount of nutrient intake in individuals is not necessary to predict the prevalence of inadequate nutrition in a community.[2] In addition, general eating habits are easier to remember and, therefore, more reliably reported than specific quantities of foods. Seven-day food frequency methods can capture eating patterns over a week, which may include important dietary days, such as religious days, holidays, and market days.

In order to develop a food frequency method specific for vitamin A deficiency, HKI analyzed dietary data from several national and regional surveys.[3] In these areas, other data affirmed the existence of vitamin A deficiency as a public health problem. Building upon the previous work of Sommer, Tarwotjo, Underwood, West, Darton-Hill, Sheffield, and others, HKI identified the most commonly consumed vitamin A-rich foods. HKI then conducted a study to test the validity of its food frequency method in 15 communities — 5 each in the Philippines, Guatemala, and Tanzania. The study assessed the ability of the HKI Food Frequency Method to predict whether vitamin A deficiency is a

public health problem (as defined by the WHO criteria for serum retinol, a measure of vitamin A in blood) in communities. The HKI Food Frequency Method correctly identified 11 out of 15 communities as having or not having a vitamin A deficiency problem of public health importance.[4]

HKI Food Frequency Method – An Overview

The HKI Food Frequency Method is essentially a one-question survey: "How many days, in the past seven days, did (child's name) eat (a specific food item)?" This question, the "food frequency question," is repeatedly asked by the survey interviewers for up to 28 food items exactly as written each time.

For the HKI Food Frequency Method to be able to determine whether vitamin A deficiency is a public health problem in a survey area, 15 communities should be surveyed. In each community, 50 mothers or primary caretakers of children from 1 through 5 years of age (12 through 71 months) must be successfully interviewed.

The HKI Food Frequency Method provides a ready-made questionnaire with specific food items that have already been carefully selected and tested. These food items include:

- *A staple food* that is consumed by most children on a daily basis. The food frequency question is asked first regarding the most commonly consumed staple food, which puts a respondent at ease by eliciting a positive ("seven days a week") response.

- *A food that is almost never consumed* by young children in the survey area. The food frequency question is asked second regarding a spicy, hot pepper, such as red or green chilies or whole hot peppers, which in most cultures will elicit a negative response. Asking about such a food item makes a respondent comfortable with saying that she never or rarely provides some of the other food items to her children.

- *Major sources of vitamin A.* These foods contain at least 100 retinol equivalents (RE) of vitamin A per 100 grams of the food. At this concentration, a serving is likely to contribute significantly to the overall dietary intake of vitamin A, and it can be considered a major source of the nutrient.

- *Major sources of fat, oil, and protein.* Adequate consumption of these foods is necessary for the absorption and utilization of vitamin A in individuals.

Of course, children's diets vary from place to place. The Food Frequency Questionnaire is always adapted to local dietary practices. Certain food items can be replaced with ones which are more locally appropriate. For example, if *zapote*, a vitamin A-rich food found in Latin America, is part of the local diet, it can replace the food item *apricots*, a vitamin A-rich food already on the questionnaire. Indeed, identifying and documenting local dietary practices is an important aspect of the HKI Food Frequency Method. Two activities, a simple shop survey and a group discussion, serve to gather this information systematically.

In practice, because the most common vitamin A-rich food items are already on the questionnaire, few replacements or substitutions actually need to be made. Certain food items cannot be replaced even if they are not consumed or available locally. These food items are introduced during the group discussion activity as the "Preliminary Food List."

The data from the completed Food Frequency Questionnaires are analyzed to identify whether vitamin A deficiency is a problem of public health importance in each of the surveyed *communities,* and then in the entire *survey area.*[5] Whether or not a community has a vitamin A deficiency problem is determined by either of two threshold values:

> ≤ 4 days per week for mean frequency of consumption of animal sources of vitamin A;

or

> ≤ 6 days per week for mean frequency of total consumption of animal and plant sources of vitamin A (weighted by the source).

If at least 70% of the surveyed communities (11 of the 15) have a vitamin A deficiency problem, vitamin A deficiency is likely to be a public health problem in the *entire* survey area. All of this analysis can be easily calculated by hand. A more complete analysis can be accomplished in a few days.

The HKI Food Frequency Method can also be used to gather data for program planning and evaluation purposes. In areas where vitamin A supplementation has taken place, a question may be added regarding the recent (within the past 6 months) receipt of vitamin A syrup or capsules. This question can be used to estimate the current coverage of the vitamin A supplementation program. Other possible questions may address maternal education, current breastfeeding practices, frequency of breastfeeding, age of weaning, or recent childhood illnesses.

Who should use the HKI Food Frequency Method?

Important Note on Using this Manual: Please read this entire manual thoroughly before attempting to use the HKI Food Frequency Method. Many of the steps are interdependent and may be carried out concurrently.

The HKI Food Frequency Method is designed to be a simple and rapid assessment tool for the staff of community-based health, agricultural, and development programs. One of its advantages is that through the process of using the Method, program staff gain a better understanding of food availability issues and dietary choices. This knowledge provides a strong foundation for planning nutrition or other food-based interventions to prevent and control vitamin A deficiency.

The HKI Food Frequency Method is most appropriately used in areas where other health indicators or anecdotal evidence suggest that vitamin A deficiency may be a public health problem. How to use the HKI Food Frequency Method to assess community risk of vitamin A deficiency is explained step by step in the next chapter. The steps are presented in order. Keep in mind that some steps are interdependent, so all steps must be understood before using the Method.

II. Steps to Complete the HKI Food Frequency Method

O.K. You are working for a community-based health program. A lot of people have been talking about vitamin A deficiency and how improving the vitamin A status of young children can reduce overall childhood mortality and prevent the needless loss of sight. You have completed the process outlined in the manual, *Conducting a Qualitative Assessment of Vitamin A Deficiency: A Field Guide for Program Managers*. Based on your findings, you have decided that you should undertake a community-based survey to assess the risk of vitamin A deficiency in the communities where you work.

Now let "Super Carrot" show you how!

The HKI Food Frequency Method

Step 1. Define Survey Area
Step 2. Select Season and Time of Day for Survey
Step 3. Develop Sampling Plan
Step 4. Determine Locally Available Foods
Step 5. Modify Food Frequency Questionnaire
Step 6. Select and Train Interviewers
Step 7. Translate Questionnaire
Step 8. Field Test, Refine, and Finalize Questionnaire
Step 9. Conduct Survey
Step 10. Analyze Survey Data
Step 11. Interpret and Use the Data — A Case Study from India

Step 1. Define Survey Area

The first step is to define the area where the survey will take place. Out of this area, 15 communities should be randomly selected to serve as a representative sample of the entire survey area.

Plan to survey an area where vitamin A deficiency is a suspected problem. For example, if night blindness is commonly reported from one particular region, this may be an indicator of widespread vitamin A deficiency. Health indices, such as infant mortality, malnutrition, measles, and respiratory infection rates are also useful indicators that can help identify areas at high-risk for vitamin A deficiency.

Throughout the survey area, dietary habits should be similar. Food availability and dietary practices can vary from one community to another. Religious and cultural habits and degree of urbanization may strongly influence dietary practices. Where food availability or dietary practices vary greatly, divide the area into sub-areas and conduct separate surveys. As a rule, survey urban and rural areas as separate survey areas. Survey agricultural and pastoral communities separately as well.

The size of the survey area may also be limited by logistics, funding, or other practical considerations. Always budget enough travel time or transportation costs to visit any community in the survey area. If it is not feasible to visit a location, redefine the survey area and exclude those locations where travel is not possible.

For some organizations, an existing service delivery or project area may appropriately define the survey area. For others, given the above considerations, a project area may need to be divided and each sub-area surveyed separately.

Step 2. Select Season and Time of Day for Survey

Important Note on Mango Season: Avoid conducting the survey when mangoes are harvested and widely available. Mangoes are a major source of vitamin A — especially for young children. Mango season is almost certain to be a period of high, not low, availability of foods.

Important Note on Holidays: Avoid conducting the survey during extended religious holidays when food consumption is likely to be substantially increased.

The second step is to identify the best time of year to conduct the survey. The prevalence of vitamin A deficiency in a community may vary from one season to another. Schedule the survey during the period of highest risk of vitamin A deficiency. Risk is highest when availability of food, including foods rich in vitamin A, is lowest and when disease rates are highest. Existing data sources, including key informants, agricultural surveys, and health information systems, can be used to identify this period in the survey area. The *Field Guide* explains this process in greater detail.

Why is the season important?

- If the survey is conducted during a season of high availability of vitamin A-rich food, the results may indicate that there is not a vitamin A deficiency problem when one actually exists.
- For evaluation purposes, conducting a baseline and endline survey in the "lean" season will help determine whether an intervention has improved the consumption of vitamin A-rich foods during the season when increased intake of vitamin A is needed the most.
- Selecting the appropriate season will also guide judgments about whether intake of these foods is adequate during the most important period in order to discontinue mass distribution of high dose vitamin A supplements.

In addition to identifying the time of year, also identify the time of day when the survey should be conducted. Complete this task before any logistical plans for the survey are made.

Schedule the survey during the time of day most convenient for mothers or caretakers of young children to participate in the survey. Determine the daily and weekly work schedule of community women in the survey area. If the majority of women spend all morning and afternoon in the field, for instance, then interviewers should interview women in the late afternoon or evening when they are available at home.

Why is the time of day important?

- For reasons related to sampling, the time of day that the interviewers go to the communities is very important. Each child (and each mother) must be given an equal chance of being included in the sample. If some or most mothers or caretakers are unavailable when the interviewers arrive, some mothers (and their children) will not have the chance to be included in the sample.

Step 3. Develop Sampling Plan

Important Note on Sampling: If there is any confusion or questions about sampling, or if a national or multi-regional survey is desired, the organization should consult with an epidemiologist, demographer or sociologist.

The third step is to apply the sampling plan of the HKI Food Frequency Method to the survey area defined in Step 1. This step is best performed by someone with prior experience conducting surveys and with some formal training in sampling techniques. Following the directions described in this section, this person should prepare a written plan that:

- identifies the communities to be visited in the survey area; and
- explains how the survey team should do any sampling related tasks.

Certain aspects of the sampling plan, such as the number of communities surveyed and the number of interviews conducted in each community, cannot be changed. The HKI Food Frequency Method has been validated for this specific size and type of sample. Other aspects of the sampling plan, such as the method used to randomly select communities or households, can be adapted to meet local needs.

To assure that the HKI Food Frequency Method provides reliable results, 15 communities in the survey area should be surveyed.[6] In each of these 15 communities, 50 mothers or primary caretakers of children from 1 through 5 years of age (12 through 71 months) must be successfully interviewed.[7]

In order to obtain the required sample for the HKI Food Frequency Method, follow the directions in Steps 3a, b, c, and d. To select a random sample, simple or systematic sampling methods are recommended. Describe all sampling methods used in the sampling plan.

Step 3a. Randomly select 15 communities to be surveyed

Important Note on Number of Households in Each Community: The community is the unit of analysis for this survey. Therefore, each community or community cluster must have more than 50 households with eligible children.

In the survey area, 15 communities must be selected at random. Before selecting communities, first define the term *community*. In urban areas, communities may be neighborhoods within a city. In rural areas, communities may be villages or groups of villages. After defining community:

- Make a list of *all* communities in the survey area.
- Estimate the number of households with children 12 months through 71 months of age in each community using the best available data. For any community that has less than or equal to 50 households with children aged 12 through 71 months, group that community with the next geographically closest community to form a *community cluster,* which must contain more than 50 households with children 12 through 71 months of age. Update the list to reflect any combining of communities.

- Sequentially number the communities (and community clusters) on the list.

Important Note on Alternate Communities: Record the order in which alternates are selected. If needed, they should be surveyed in that order.

- Randomly select 30 communities or community clusters (15 survey communities and 15 alternative communities) from the list of communities using the most appropriate method: simple random sampling, random start systematic sampling, or population proportional to size sampling. The table below summarizes which method may be most appropriate, given the number and size of the communities in the survey area. Each of these methods is further described in Appendix I.

Regardless of the sampling method, the first 15 communities selected must be the first 15 communities surveyed. 15 alternative communities are selected as a safeguard, in case one or more of the communities selected to be surveyed is inaccessible or no longer exists. Alternative communities can only be visited in the order of selection, after all initially selected communities have been visited. Alternative communities should only be used if needed.

Total Number of Communities or Community Clusters in Survey Area	Estimated Number of Households with Children 1 through 5 years of age in Each Community	Method Recommended to Randomly Select Communities	
Less than 100	All communities have approximately the same number of households	Simple random sampling	Communities are randomly selected by drawing chits or using random numbers table.
100 or more	All communities have approximately the same number of households	Random start systematic sampling	First community is randomly selected and then, depending on total number of communities, a specified number of communities are systematically skipped.
Any number	Number of households varies greatly from community to community	Population proportional to size sampling	Similar to random start systematic sampling, but differences in population sizes are taken into account. Method requires reliable census data. If census data is not available, use either simple random sampling or random start systematic sampling whichever is more convenient given the total number of communities in the survey area.

Step 3b. Randomly select 50 households within each community or community cluster

Important Note on Random Selection of Households: Convenience and logistics for the survey team tend to influence household selection. To counteract this tendency, always use a random technique to make the selection. For example, spinning a pen or a bottle to pick the first house to survey in a community increases the randomness of the selection process.

In each of the 15 communities selected in the step above, randomly select 50 households with at least one child aged 12 through 71 months. For the HKI Food Frequency Method, like other dietary assessment methods, conducting the survey house-to-house is generally preferable to conducting the survey at a central site.[8]

To randomly select households within a community, the following methods are recommended: house to house with a random start, community mapping, or segmenting large communities. Use the method most practical given the estimated number of households or availability of accurate maps. The choice of sampling method may also be affected by local settlement patterns. The same method does not have to be used for all the communities selected to be surveyed. The table below summarizes which method may be most appropriate, given the number of households and the distance between households in the community to be surveyed. Each of these methods is further described in Appendix I.

Estimated Number of Households with Children 1 through 5 years of age in Each Community	Distance between Households	Method Recommended to Randomly Select Households	
50 to 100		House to house with a random start	Starting at a house that is randomly selected, every household is visited until 50 are surveyed.
More than 100	Households relatively close	Community mapping	Using a map of the community, 50 households are selected using either simple random sampling or random start systematic sampling.
More than 100	Households very distant	Segmenting large communities	The community is divided into sections with approximately the same number of households in each; an equal number of households are then selected from the geographic center of each section.

Step 3c. Randomly select one respondent within each household

Important Note on Training: Interviewers must be carefully trained to do these two steps, Step 3c and Step 3d, correctly.

If a household has more than one mother or primary caretaker with a child from 12 months through 71 months of age, the interviewer must choose one mother at random.[9] Use chits or slips of paper to randomly select one mother. This mother will be the respondent for all questions on the Food Frequency Questionnaire. How to use chits is explained in Appendix I.

Step 3d. For each mother, randomly select one of her children from 12 months through 71 months of age

After selecting a mother, the interviewer must randomly choose *one* of her children who is from 1 through 5 years of age. With the HKI Food Frequency Method, dietary information is recorded for only *one child 12 months through 71 months of age, chosen by random selection, from each household.*[10] Write down the names of the selected mother's children who are 12 months through 71 months of age on the Food Frequency Questionnaire. Use chits to randomly select one child. Again, see Appendix I for an explanation of how to use chits.

Step 4. Determine Locally Available Foods

The fourth step is to identify and document which foods are readily available in the survey area, especially those that are a good source of vitamin A for children. The information obtained here will then be used in the next step to adapt the Food Frequency Questionnaire to local dietary practices. The information will also be very useful to guide program development after the survey. Two activities, a simple shop survey and a group discussion, ensure that this information gathering process is thorough and complete.

Step 4a. Identify foods fortified with vitamin A (shop survey)

Important Note about Units: The amount of vitamin A may be listed in either international units (IU) or retinol equivalents (RE). Refer to Appendix II for the formulas to convert IUs to REs.

Important Note on supplementary feeding programs or food-for-work projects: Note whether food products distributed through these programs are fortified with vitamin A. Include any food fortified with at least 100 REs of vitamin A per 100 grams in the next activity, a group discussion.

A quick survey of stores serves to identify locally available food items that may be fortified with vitamin A. Examples of such foods include weaning foods, infant formulas, breastmilk substitutes, powdered milk, vitamin supplements, supplementary foods, and, in some countries, margarine or butter substitutes. One or two people from the survey team can undertake this task.

In the survey area (or areas), visit several boutiques, stores, markets, pharmacies, and other vendors who sell food products. At each location, check the content label of any food product that may be fortified and note if vitamin A is listed. For those foods fortified with vitamin A, list on a piece of paper the name of the food item, the amount of vitamin A per quantity of food, and price per quantity. Make all attempts to identify the price normally charged to local people.

For each food listed, calculate whether it contains greater than or equal to 100 retinol equivalents (REs) per 100 grams of food. Cross off the list any food that contains less than 100 REs per 100 grams of food — these foods do not contain a high enough concentration to be counted as a *major* source of vitamin A. Only those foods fortified with vitamin A greater than or equal to 100 REs per 100 grams of food will be discussed during the next activity, a group discussion.

Step 4b. Conduct group discussion using the Preliminary Food List

Important Note on Group Discussions: The *group discussion* is not the same as a *focus group*. In a focus group, the purpose is to understand the underlying reasons that motivate people to behave in a certain fashion. In the group discussion, the primary purpose is to rapidly identify and document information.

In a community that is typical of the survey area, hold a group discussion. The goal of the group discussion is to identify all locally available vitamin A-rich foods, major sources of fat and oil, and protein-rich foods. The goal is also to document availability, cost, and consumption practices for these food items and for the fortified foods identified through the shop survey. Approximately one day is needed to complete the group discussion.

First, select discussants and a discussion leader. Discussants should include the following people, if available: local nutritionists, health workers, agricultural agents, mothers from the community, and project personnel familiar with local dietary practices. Their familiarity with local eating practices is essential. A group of 7 to 12 people is recommended to attain adequate interaction and information. This assures a variety of responses while maintaining a manageable size for productive group discussion.

The discussion leader should have experience in working with people from the community. This person should also have an understanding of basic nutrition in order to distinguish among different food groups. Finally, the discussion leader has an obligation to ensure that all opinions are heard and that all opinions are carefully recorded. Experience has shown that following a few do's and don'ts will ensure that the group discussion is meaningful. In the box below are some helpful hints for leading a group discussion.

Helpful Hints for a Group Discussion

- ✓ *Do stick to the agenda — your main aim is to gather information, not give information*
- ✓ *Do keep the introductory comments short*
- ✓ *Do encourage participation from all discussants*
- ✓ *Don't lecture — You have come to ask "the experts," not to be the expert*
- ✓ *Do have someone record responses carefully*
- ✓ *Do use flip-chart paper to record comments*
- ✓ *Do talk at the same level as the discussants in a comfortable, non-intimidating setting*

Begin the group discussion with introductions. Then explain the purpose of the group discussion and lead a brief (10-15 minutes) discussion about vitamin A deficiency.

- What is vitamin A deficiency?
- Why is it important?
- Who is at risk?
- How can we prevent vitamin A deficiency?

Refer to the *Field Guide* for answers to these questions.

Next, review what types of foods are considered to be rich in vitamin A. These are foods that are likely to be a significant or *major* source of vitamin A in a diet. Examples of major sources of vitamin A are given below in the table of vitamin A-rich food groups. Consult a nutritionist if necessary.

Important Note on Misclassified Foods: Avocado, coconut, and olives are commonly misclassified as major sources of vitamin A; instead they are foods high in fat or oil. Yellow corn, plantains, bananas, green beans, tomatoes, onions, and oranges are also often misclassified as *major* sources of vitamin A when they are not.

Important Note on Milk: Milk and cream are not considered *major* sources of vitamin A because they are almost always given to young children in a very diluted form.

Vitamin A-Rich Food Groups

Foods Groups	Examples
Dark green leafy vegetables	Spinach, amaranth leaves, baobab leaves, drumstick leaves
Dark yellow or dark orange fruits	Ripe mango, ripe papaya, zapote, jack fruit, ripe peaches, apricots, nectarines, palm nuts (and red palm oil)
Dark yellow or orange vegetables	Yellow or orange sweet potato, pumpkin, yellow or orange squash, carrots
Animal sources of vitamin A	Breastmilk, liver, eggs with yolk, small fish with liver intact, fish liver, cod liver oil, butter
Foods fortified with vitamin A or supplements	Some infant formulas, fortified powdered whole milk, vitamin supplements (other than high-dose vitamin A capsules), some brands of margarine

Use the Preliminary Food List below as a starting point for the next part of the discussion. Have the group identify other locally available foods that are either:

- major sources of vitamin A (including those foods fortified with vitamin A which were identified during the shop survey);
- major sources of fat and oil; or
- major sources of protein.

Add these items to the list.

HKI Food Frequency Method
Preliminary Food List

Name of Food item

Main staple food *(such as rice, bread, millet, cassava, tortillas, etc.)*

Spicy, hot peppers *(such as green or red chilies, in a form seldom eaten by children)*

Dark green leafy vegetables *(as a food group)*

Milk

Carrots

Ripe mango

Dark yellow or orange squash *(includes pumpkin)*

Ripe papaya

Eggs with yolk

Small fish *(must be eaten with liver intact)*

Yellow or orange sweet potato or yam

Liver *(any kind)*

Beef *(or other red meat or pork)*

Butter

Red palm oil

Cod liver oil

Foods cooked in oil

Important Note on Using Information: The *Field Guide* provides an extensive discussion on how information gathered during the group discussion can be used to guide the development of intervention strategies.

Important Note on Infant Formulas: For the purpose of assessing vitamin A deficiency, it is important to have information related to consumption of fortified infant formulas. The discussion leader should *not* promote the use of these formulas, but should instead emphasize the importance of breastfeeding.

After identifying major sources of vitamin A, fat and oil, and protein-rich foods, the group then answers questions for each food item regarding its availability, cost, consumption, and preparation. This information is vital in determining whether food items are available to the community, and to preschool-aged children, in particular, and whether they are still likely to be vitamin A-rich in the form actually fed to children. This information is also useful for guiding the development of an intervention strategy, should one be needed.

Ask the following questions for each food item that appears on the Preliminary Food List and all additional items identified during group discussion as major sources of vitamin A (including fortified foods), fat and oil, and protein:

- What is the name of this food item in the local language?
- Is this food item usually purchased in the market, grown in a home garden, or does it typically grow wild?
- Is this food item expensive, moderately priced, or inexpensive?

  Very Expensive means the food can only be purchased by a few families.

  Moderately expensive means some can afford the food item, others cannot.

  Not expensive at all means the food is generally within the purchasing power of all families.
- During which months is this food generally available?
- Is this food generally eaten by children less than 6 years of age? If no, why not?
- Is this food generally eaten by pregnant women?
- Is this food generally eaten by lactating mothers?
- How is this food usually prepared? *(i.e., chopped, mashed, served in a soup, etc.)*
- How is this food usually cooked? *(i.e., boiled, fried, eaten raw, etc.)*
- Is this food used primarily as a spice or condiment?

Important Note on Taking Notes: Very careful notes should be taken during the group discussion, particularly for the question on food preparation. How a food is prepared may determine whether it should replace a food item already on the Food Frequency Questionnaire.

Record all responses to each question, even if the foods are not locally available or consumed by preschool children. Flip-chart paper and colored pens are useful for recording answers during the group discussion. Compile the information in a table format, as illustrated by the sample summary sheet below. Some discussion groups prefer to record their responses directly on the summary sheet as they discuss each food item. Other groups prefer to record their responses and then complete the summary sheet as a review of the discussion.

At the end of the group discussion, be sure that seasonal availability, consumption, preparation, *etc.* has been noted for:

- all foods on the Preliminary Food List;
- all other major food sources believed to be vitamin A-rich, including foods fortified with vitamin A; and
- all foods that are major sources of fat, oil, or protein.

Sample Summary Sheet for Group Discussion

Name of Food	Local or other name	Market, garden, or wild?	Expensive or affordable?	Month(s) available	Eaten by children ? *(age1 through 5 years)*	Eaten by pregnant women?	Eaten by lactating mothers?	Typical preparation *(chopped, mashed, etc.)*	Cooking method *(fried, boiled, etc.)*	Comments *(i.e. used as spice or condiment)*

Step 5. Modify Food Frequency Questionnaire

The fifth step is to adapt the Food Frequency Questionnaire to local dietary practices. The HKI Food Frequency Method is essentially a one-question survey: "How many days, in the past seven days, did (child's name) eat (a specific food item)?" This question is repeated for up to 28 food items exactly as written each time. *All food items on the Preliminary Food List must remain on the Food Frequency Questionnaire — even if these foods are not available locally.* Other food items may be replaced by locally available food items, according to the criteria explained in this step. The information obtained from the previous two activities, the shop survey and group discussion, is used extensively in this process. *After* the food frequency question, up to ten questions related to program planning or evaluation may be added to the end of questionnaire. Replacing certain food items or adding program-related questions are the only changes permitted to the Food Frequency Questionnaire.

Components of Food Frequency Questionnaire

The Food Frequency Questionnaire is reproduced on pages 20 and 21. The first question helps the interviewer randomly select one child from 1 through 5 years of age. The second question records the sex of the selected child. The information on age and sex can be used to determine if the sampling process was representative. The third question is the food frequency question. This question produces the key data from the survey: the number of days certain food items are eaten by children each week. The order in which these food items are listed on the questionnaire is very important and cannot be changed. These food items include:

- *A staple food* that is consumed by most children on a daily basis. First, the food frequency question is asked regarding the most commonly consumed staple food to put a respondent at ease by eliciting a positive ("seven days a week") response. For example, every day most people typically consume tortillas (corn or flour flat bread) in Guatemala, *nsima* (millet-based porridge) in Tanzania, and rice in the Philippines.

- *A food that is almost never consumed* by young children in the survey area. Second, the food frequency question is asked regarding a spicy, hot pepper, such as red or green chilies or whole hot peppers, which in most cultures will elicit a negative response. Asking about such a food item makes a respondent comfortable with saying that she never or rarely provides some of the other food items to her children.

Important Note on Validity: Asking about a staple food first and then an uncommonly eaten item second puts the respondent at ease to answer positively and negatively about food items, without trying to "please the interviewer" with the "correct" answers. This improves the validity of the interview.

An Important Note about DGLVs: Consumption of DGLV's as a group is important for the analysis of vitamin A consumption in the community. Individual DGLV's, such as spinach, are not included in this analysis. They appear on the Food Frequency Questionnaire to assist in the development of program activities including nutrition education messages, social marketing campaigns, and gardening strategies.

- *Major sources of vitamin A.* These foods contain at least 100 RE of vitamin A per 100 grams of the food. At this concentration, a serving is likely to contribute significantly to the overall dietary intake of vitamin A, and can be considered a major source of the nutrient. The most common vitamin A-rich foods already appear on the Preliminary Food List and include ripe mango, ripe papaya, liver, carrots, small fish with liver intact, eggs with yolk, dark yellow or orange sweet potatoes or yams, dark yellow or orange squash (pumpkins), "dark green leafy vegetables (DGLV's)" as a food group, and red palm oil. If other locally available food items are vitamin A-rich in the form prepared for children, they may replace certain food items already listed. Note that on the questionnaire, food items that are animal (or fortified) sources of vitamin A have a circle, ○. Food items that are plant sources of vitamin A (except *individual* DGLVs), have a square, □. The square and the circle facilitate the analysis of the food frequency data.

- *Major sources of fat, oil, and protein.* Adequate consumption of these food items is necessary for the absorption and utilization of vitamin A in individuals. Several common sources of fat, oil, and protein already appear on the Preliminary Food List. If other locally available foods are major sources of fat, oil, or protein for children, they may replace certain food items on the questionnaire.

HKI Food Frequency Method
Food Frequency Questionnaire

For Supervisor	
Animal	=.....(a)
Plant = ...(b) + 6	=.....(c)
Weighted Total (a + c)	=.....(d)

Questionnaire Number .....

Date..... Community.....

Introductory questions to select child (pretest carefully & reword as needed):

1a. What are the names of your children who are one through five years old? (12-71 months)
child 1.....(name)
child 2.....(name)
child 3.....(name)
child 4.....(name)
child 5.....(name)

1b. What are their ages?
.....(age in years)
.....(age in years)
.....(age in years)
.....(age in years)
.....(age in years)

Note to interviewer: Randomly select one child from the list above.
Circle the child's name and fill in the blank for child's name below.
Proceed to interview the caretaker about the selected child only.

2. Is ..... (child's name) a boy or a girl? ..... (girl) ..... (boy)

Note to interviewer: For each food listed in the table below, ask the following question in the order that the food items are listed:

3. How many days, in the past seven days, did ..... (name of selected child) eat ..... (specific food item)?

Name of food item	Number of days eaten per week
Main staple food *(such as rice, cassava, tortillas, etc.; select only one)*	
Spicy, hot peppers	
Dark green leafy vegetables *(DGLVs as a food group)*	
Milk	
Carrots	
Ripe mango	
Dark yellow or orange squash *(includes pumpkin)*	
▶ Spinach *(or other DGLV)*	

Continued...

HKI Food Frequency Method (continued)

	Name of food item	Number of days eaten per week
	Ripe papaya	□
▶	Noodles *(or other staple food)*	
	Eggs with yolk	○
	Small fish *(liver intact)*	○
▶	Peanuts *(or other legume or meat)*	
	Yellow or orange sweet potato or yam	□
▶	Chicken or other fowl *(or other meat or legume)*	
▶	Amaranth leaves *(or other DGLV)*	
	Any kind of liver	○
▶	Sweet potato leaves *(or other DGLV)*	
	Beef *(or other red meat or pork)*	
	Butter	○
▶	Lentils *(or other legume or meat)*	
	Red palm oil	□
	Cod liver oil	○
	Foods cooked in oil	
▶	Apricots *(or other plant source rich in vitamin A)*	□
▶	Coconuts *(or other fat or oil)*	
▶	Weaning food fortified with vitamin A *(or other food fortified with vitamin A)*	○
▶	Margarine fortified with vitamin A *(or other food fortified with vitamin A)*	○

▶ These food items can be replaced with similar foods that are locally available.

○ Animal sources of vitamin A □ Plant sources of vitamin A

Interviewer Name .....

How to Modify the Food Frequency Questionnaire

The food frequency question *cannot be asked for more than 28 food items* without invalidating the HKI Food Frequency Method; *nor can the order of the food items that appear on the questionnaire be changed.*

Follow the directions outlined here:

1) From the summary sheet created in Step 4b, make a master list of all foods discussed.

2) From the master list developed above, cross off all food items found on the Preliminary Food List and all food items used only as condiments or spices.

3) On a separate piece of paper make five columns as follows:

D G L Vs	Other Vitamin A-Rich Foods	Fats and Oils	Protein-Rich Foods	Staple Foods

4) From the food items remaining on the master list after step #2 above, place all DGLVs in the column for DGLVs.

5) From the food items remaining on the master list after step #4, place in the column for Other Vitamin A-Rich Foods all foods that are *major sources of vitamin A in the form actually served to young children.* For example, if a weaning food is served to young children in a very diluted form, do not place it in the table. Use the food preparation practices noted on the summary sheet as a guide.

   If uncertain whether certain foods contain enough vitamin A to be considered vitamin A-rich, consult the table of vitamin A-rich food groups on page 14. All other foods are likely to be a poor source of vitamin A. If necessary, consult a food composition table or a nutritionist.

   Similar fortified foods may be grouped together as one food item. For example, if all available brands or types of weaning food are major sources of vitamin A for young children, they may be

Important Note on Breastmilk: Breastmilk is only a *major* source of vitamin A during the first year of lactation. Colostrum is especially rich in vitamin A. Because the survey concerns only children who are already at least 1 year old, breastmilk is *not* listed as a vitamin A-rich food item on the Food Frequency Questionnaire.

grouped together as one food item called, "weaning foods," and placed in the column for Other Vitamin A-Rich Foods.

6) From the food items remaining on the master list after step #5, place all foods thought to be a major source of fat or oil in the column for Fats and Oils.

7) From the food items remaining on the master list after step #6, place all foods thought to be a major source of protein in the column for Protein-Rich Foods.

8) From the food items remaining on the master list after step #7, place all foods thought to be a staple in the column for Staple Foods.

Important Note on Less than 28 Food Items: The Food Frequency Questionnaire may not have more than 28 food items, but it may have less. If any of the *last four* food items, (apricots, coconuts, weaning food, or fortified margarine) are not locally available and have not been replaced by a similiar, locally available food item, they may be deleted. Do not delete or remove any other food items.

9) Replace the food items on the questionnaire marked with a triangle, ▶, with similar types of foods from the five columns. Do not be concerned if any of the columns are blank. Because the most common vitamin-A rich foods are already on the Preliminary Food List, it is typical to replace only one or two food items of this type.

   Should there happen to be more food items in the table than similar items marked with a triangle, use the information on the summary sheet to choose food items that will be a *major source in the form actually eaten by children*. However, do not add extra lines or spaces to the questionnaire for more food items. The Food Frequency Questionnaire may have only 28 food items.[11]

10) *Optional:* Identify a limited number (no more than 10) additional *survey* questions related to program planning or evaluation. For example, in areas where vitamin A supplementation has taken place, add a question about recent (within the past 6 months) receipt of vitamin A syrup or capsules. This question can be used to estimate the current coverage of the vitamin A distribution program. Other possible questions may address maternal education, current breastfeeding practices, frequency of breastfeeding, weaning practices, or recent childhood illnesses.

    The answers to these questions may be useful for program planning purposes for developing a community profile of vitamin A deficiency. They are not, however, essential to evaluate community prevalence of vitamin A deficiency.

11) Review the entire questionnaire, line by line, with members of the survey team. Do all questions make sense? Do they flow in a natural progression? Are the questions likely to be understood by mothers or primary caretakers in the surveyed communities?

12) Proofread the questionnaire carefully.

- ✔ Check that all food items from the Preliminary Food List are on the questionnaire.
- ✔ Check that the *order* of food items is the same as the Food Frequency Questionnaire on pages 20 and 21.
- ✔ Check that animal (or fortified) sources of vitamin A have a circle, ○, and that plant sources of vitamin A (except *individual* DGLVs), have a square, □.

13) Ask several members of the survey team to take the questionnaire home and interview neighbors or friends (preferably mothers of young children). The next day, discuss the questionnaire and rectify noted difficulties.

14) If necessary, translate the questionnaire into another language spoken in the survey area. Step 7, Translate Questionnaire, outlines the recommended procedure for a successful translation. Translation can be done by 2-3 interviewers during the training of interviewers. This training is described in the next step, Step 6, Select and Train Interviewers.

Step 6. Select and Train Interviewers

Of all the steps involved in the HKI Food Frequency Method, the selection and training of interviewers is perhaps the most critical for a successful survey. The overall quality of the results depends on how well interviewers can randomly select a child, interview the child's caretaker, and record the answers, among other tasks. Experience from the validation study has shown that interviewers can do these tasks consistently well when ample time and resources are allocated for training and supervision. This step outlines how to choose interviewers and provide training. It also discusses the role and responsibilities of the supervising personnel.

Interviewer Selection and Training

The HKI Food Frequency Method is essentially a one-question survey: "How many days in the past seven days did (child's name) eat (specific food item)?" It seems very simple, but still, answers may not always be straightforward or unbiased.

For instance, what happens if a person responds that a food item was eaten on Monday, Wednesday, and two times yesterday? What type of response would an interviewer get if she does not ask the question *exactly* as written, but rather asks a leading question such as, "You fed your child milk last week, didn't you?" or alters the question to ask, "Last week, how many days did *you feed* Maria pumpkin?" For this reason, careful selection and thorough training of interviewers for the survey is essential.

Interviewer selection

At the very least, interviewers should be high-school graduates, speak the local language, be able to develop a rapport with those who will be interviewed, and understand the importance of following instructions. In most cultures, it is preferable to use female interviewers because most caretakers of young children are women. To avoid bias, interviewers should not conduct interviews in areas where they work or are well-known. Ideally, it is preferable to recruit people with good references and previous interviewing experience. It is also preferable to avoid using health and nutrition workers because they may feel compelled to give advice rather then remain neutral when answers are revealed. During the validation study this was found to be extremely important.

Interviewer training:

The purpose of the interviewer training is:

- to ensure that all interviews administered during the survey contain valid information;
- to ensure that each household, each respondent and her child is randomly selected; and
- to ensure that all responses are coded correctly.

Make logistical and financial arrangements for the training, as well as the survey, before interviewer training begins. Plan on 2 to 3 days for interviewer training, depending on the experience of the interviewers. Use no more than 5 to 6 interviewers for any one survey area. The recommended training schedule appears below.

Recommended Interviewer Training Schedule		
Day 1.	**Morning:**	Explain survey objectives, survey procedures, and survey calendar. Articulate expectations. Discuss financial arrangements and logistical arrangements for the training and survey.
	Afternoon:	Review survey instrument. Discuss survey questions. Translate questionnaire. (See Step 7.)
	Evening:	Review questionnaire at home.
Day 2.	**Morning:**	Review first day of training. Discuss sampling, with emphasis on proper selection of the primary caretaker-child pair within the household. Discuss proper recording of responses. Demonstrate probing techniques for unclear responses. Demonstrate a correct interview. Review checklist for interviewers on the next page.
	Afternoon:	Practice interviews with each other, role-play, peer review, and critique role-play.
	Evening:	Conduct mock interviews on family members, especially mothers.
Day 3.	**Morning:**	Conduct field test in a community that is near, but not part of, the communities to be surveyed. (See Step 8.)
	Afternoon:	Discuss, make final refinements, and reproduce questionnaire.

Checklist for Interviewers

- ✔ *Greet the mother (or caretaker) warmly. Ask her permission to conduct the interview.*
- ✔ *Be presentable, relaxed, and non-judgmental. Work efficiently to avoid taking too much of the mother's (or caretaker's) valuable time.*
- ✔ *Ask questions exactly as they are written, in the order they appear on the questionnaire.*
- ✔ *Always read the question exactly as written. If the respondent is unable to answer the question the first time, repeat the question exactly as written. Never acknowledge surprise, agreement, or disagreement with answers by facial, verbal, or other expressions.*
- ✔ *Ask all questions. Never skip questions unless instructed to do so. Never skip a question and come back to it later.*
- ✔ *Never leave a question blank. Always write a 0 when the answer is "none" or "on no days last week." Write "don't know" when the respondent says they do not know.*
- ✔ *Always review the completed questionnaire to ensure that all questions are answered and properly coded.*
- ✔ *Always thank the respondent for her (or his) time and cooperation.*

During the training session, review the checklist above with interviewers. Emphasize that *all survey questions must be asked exactly as written* and, therefore, questions will be asked the same way by all interviewers for all respondents. Improvisation on the part of the interviewers can bias responses. Interviewers must read the questions *exactly as written* from the survey questionnaire. Stress this point throughout the entire interviewer training.

Also emphasize careful and neat recording of answers. After completing the questionnaire, the interviewer should ask the respondent to give her a moment to review the questionnaire. The interviewer should be sure that all questions are answered and properly recorded, and that all stray marks are crossed out clearly with a ball point pen. The interviewer should then take the survey form to the supervisor for review.

Questions commonly asked by interviewers regarding the HKI Food Frequency Method are answered on page 29.

Supervisor's responsibilities

The supervisor (one for each survey team) should ideally be able to speak the local language (although not essential), have good communication and counseling skills, know the questionnaire intimately, have experience conducting interviewer training, and have prior survey experience.

It is the supervisor's responsibility to provide quality control during the survey, to ensure that the survey protocol is respected and that the morale of the survey team remains high.

Specifically, the supervisor is responsible for:

- Checking each questionnaire for completeness and accuracy.
- Ensuring that the selection of households and a child within each household is properly conducted.
- Ensuring that community leaders and local government authorities are informed of the survey objectives and activities prior to arrival of survey team.
- Ensuring that interviewers work efficiently, yet take sufficient time to thoroughly complete each interview.
- Ensuring that the survey team arrives in communities on time.
- Ensuring that provisions for food and water are made each day prior to departure of the survey team for the communities to be surveyed.
- Ensuring that vehicle and driver arrangements are verified each day prior to departure of the survey team for the communities to be surveyed.

Questions Commonly Asked By Interviewers About the HKI Food Frequency Method

Question: **What should I do if the mother has difficulty remembering how many days in the past seven days her child ate certain food items?**

Answer: *Repeat the question using exactly the same words as before.* Do not reword the question or make up an explanation. If she continues to have difficulty, say "Try to remember," and then repeat the question to the mother. Experience from many countries indicates that reliable responses are generally attained after repeating the question and encouraging the mother to remember.

Question: **What if, instead of responding to the food frequency question with a number, the respondent names the days of the week that her child ate a specific food item, for instance, on Monday, Thursday, and twice on Sunday?**

Answer: Interviewers should repeat the food frequency question — exactly. If the respondent still responds the same way, or if she does not know how to count the days of the week, the interviewer should add up the number of days. For instance, the above response should be coded as 3 days. Monday counts as one day; Thursday counts as one day; and twice on Sunday is counted as one day since number of times per day does not matter.

Question: **Should I write down the amount of food served or the number of servings that the child ate, if the mother tells me this information?**

Answer: *No!* This information will not be used to identify communities with vitamin A deficiency. Do not slow down the survey by recording information that will not be analyzed.

Question: **What if the mother responds that her child is eating almost everything — including foods not available or in season?**

Answer: Occasionally, during the course of an interview, it becomes apparent that the mother's responses may be seriously over-reporting food intake. In such a case, complete the interview, record the abnormality on the questionnaire, and report this to the survey supervisor. [12]

Question: **What happens if I finish all my interviews before the other interviewers?**

Answer: All interviews should take approximately the same time. An interview that is hurried is seldom complete or accurate. At the same time, an interview that is prolonged is probably gathering unnecessary information and delaying the survey. Should you finish early, ask directions from the survey supervisor.

Question: **What should I do if the primary caretaker is unavailable to be interviewed but a secondary caretaker (eldest daughter, grandmother, grandfather *etc.*) is available?**

Answer: If the secondary caretaker is involved in the daily feeding of the young children in the family, then the interview may be done with the secondary caretaker. If you are uncertain how to proceed, ask the advice of the survey supervisor.

Step 7. Translate Questionnaire

The seventh step is to translate the Food Frequency Questionnaire into the language or dialect spoken in the survey area. Translation of the questionnaire is an integral part of the interviewer training because during the process of translation, interviewers become intimately familiar with the survey questionnaire.

Verification of the translation is a critical step. After the questionnaire is translated, someone who has not seen the questionnaire should translate it back to the original language. For instance, if the questionnaire is translated from English into Tamil (a language spoken in India), give a copy of the Tamil translation to someone unfamiliar with the original English version. This person should then translate the questionnaire written in Tamil back into English. Compare this English translation to the original English version. If they are similar, then the Tamil translation accurately conveys the intent of the survey questions.

Step 8. Field Test, Refine, and Finalize Questionnaire

The eighth step is to test the Food Frequency Questionnaire by using it to interview mothers of children from 1 through 5 years of age. The Food Frequency Questionnaire has three questions, including the main food frequency question. These questions, plus any optional questions that have been added, should be pre-tested (field tested) to determine if they are understood by most respondents — the mothers or primary caretakers of young children. This step is the last activity of the interviewer training.

Step 8a. Field test

Choose, as the survey pre-test site, a community in the survey area that was *not* selected for the actual survey. The pre-test site should be relatively close to the interviewer training area and, at the same time resemble most communities in the survey area. Have each interviewer conduct at least 3 to 4 interviews, recording the responses exactly as they would during the actual survey. Have the supervisors check each questionnaire for completeness just as they would during the actual survey. Have supervisors note problems for discussion after the field test.

Afterwards, all questionnaires should again be carefully reviewed by the survey leader for completeness and accuracy. Upon returning to the training area, interviewers and survey personnel should discuss survey procedures and difficulties related to the questionnaire. Did activities take place smoothly? What worked well? What did not? Were all questions understood clearly by the respondents? Note any difficulties and clarify them. Constructive feedback should be given to all interviewers, individually, based on their performance during the pre-test.

Step 8b. Modify and finalize questionnaire

Based on the interviewer's comments, refine the questionnaire to eliminate ambiguity and increase accuracy. For instance, slight translation changes may need to be made. Pay careful attention to the food frequency question and to each food item. Are the respondents confused? Is each question interpreted the same way by all respondents? Do respondents recall the same seven days?

Some helpful hints:

- Translating "in the last seven days" as "in the last week" could be misinterpreted. "Last week" may be a different time period to different respondents.

- Certain essential food items may not be eaten in some communities and may, therefore, not be well understood—yet, they must remain on the questionnaire. It is important to find an interpretation that will not confuse respondents. For instance, DGLVs may not be eaten by themselves, but always in prepared dishes, so the interpretation might be "DGLVs eaten in any sort of prepared dish." Cod liver oil may not be known in a community so an interpretation might be, "oily medication that smells like fish." Spicy, hot peppers are eaten by everyone in West Africa — including children — so spicy, hot peppers could be phrased as "whole hot pepper eaten all by itself." Any interpretation must be carefully pre-tested to make sure it is understood by the majority of respondents.

Important Note on Time Needed: Allow a lot of time for finalizing and copying the questionnaires. This task always takes longer than one thinks it will.

When all changes are incorporated into the questionnaire, make copies of the final version of the Food Frequency Questionnaire. The team leader or survey supervisors should number the survey questionnaires sequentially before distributing them to interviewers at the survey site.

Step 9. Conduct Survey

The ninth step is to conduct the survey in the survey area. On average, each interview will take about 10 to 15 minutes. A well-trained interviewer should be able to complete between 15 to 20 interviews in a day. Schedule fewer interviews if other time-consuming survey components, such as anthropometric measures or clinical examinations, are added to the survey.

Some interviewing considerations: Make sure each mother or caretaker is comfortable and has sufficient privacy during the interview. Avoid placing her in a position where she may feel compelled to give answers which she thinks would please other family members nearby or to give the same answers that she may hear other mothers giving.

Some medical considerations: Bring along a clinician to treat minor cases, give referrals, and administer vitamin A for cases of xerophthalmia or measles, according to WHO guidelines. Interviewers, regardless of their training, should not provide clinical services to the community during the survey. The survey team should focus only on conducting the survey.

Some logistical considerations: Make provisions for food and water prior to departure of the survey team. Vehicle and driver arrangements must be made well in advance of the survey and verified daily prior to departure of the survey team.

Step 10. Analyze Survey Data

This step explains how the data from the completed Food Frequency Questionnaires is analyzed to identify whether vitamin A deficiency is a problem of public health importance in each of the surveyed *communities*, and then in the entire *survey area*. The questionnaire does not provide the information necessary to determine whether an *individual* child is vitamin A deficient.

Whether or not a community has a vitamin A deficiency problem is determined by either of two threshold values:

> ≤ 4 days per week for mean frequency of consumption of animal sources of vitamin A;

or

> ≤ 6 days per week for mean frequency of total consumption of animal and plant sources of vitamin A (weighted by the source).

If at least 70% of communities surveyed (11 of the 15) have a vitamin A deficiency problem, vitamin A deficiency is likely to be a public health problem in the *entire* survey area. All of this analysis can be easily calculated by hand.

Step 10a. Calculate the animal and weighted total scores on each questionnaire

The Food Frequency Questionnaire has been designed to facilitate easy tabulation of the data. For each vitamin A-rich food item that comes from an animal source, the questionnaire has a circle, ○, where the interviewer must record the number of days the food is eaten. Vitamin A-rich food items that are fortified foods also have a circle. Similarly, for each vitamin A-rich food item that comes from a plant source, the questionnaire has a square, □. DGLVs are included in the analysis as a *food group*. Individual DGLVs (such as spinach) are not included in the analysis and thus do not have a square.

For each questionnaire:

- Add the number of days written in the circles, ○ _____(a)
  (a) is the total consumption of animal sources
- Add the number of days written in the squares, □ _____(b)
  (b) is the total consumption of plant sources
- Divide (b) by 6 _____(c)
  (c) is the adjusted consumption of plant sources
- Add (a) and (c) for the weighted total consumption _____(d)

During the survey, the supervisor can calculate these scores directly on the Food Frequency Questionnaire when checking each questionnaire for completeness and accuracy. The box in the upper-left-hand corner of the questionnaire facilitates this task.

A completed Food Frequency Questionnaire is reproduced below. Practice calculating the animal and weighted total scores. The answer is in the box below.

HKI Food Frequency Method
Food Frequency Questionnaire

For Supervisor
Animal =_____(a)
Plant =_____(b) ÷5 =_____(c)
Weighted Total (a + c) =_____(d)

Questionnaire Number 2-40

Date 2 January

Community # 2 Biguiri, Biri N'Konni

Introductory questions to select child (pretest carefully & reword as needed):

1a. What are the names of your children who are one through five years old? (12-71 months)
child 1 Saaba (name)
child 2 Demi (name)
child 3 _____ (name)
child 4 _____ (name)
child 5 _____ (name)

1b. What are their ages?
2 (age in years)
3 (age in years)
_____ (age in years)
_____ (age in years)
_____ (age in years)

Note to Interviewer: Randomly select one child from the list above. Circle the child's name and fill in the blank for child's name below. Proceed to interview the caretaker about the selected child only.

2. Is Demi (child's name) a boy or a girl? X (girl) _____ (boy)

Note to Interviewer: For each food listed in the table below, ask the following question in the order that the food items are listed:

3. How many days, in the past seven days, did Demi (name of selected child) eat _____ (specific food item)?

Name of food item	Number of days eaten per week
Main staple food (such as rice, cassava, tortillas, etc.; select only one)	7
Spicy, hot peppers	0
Dark green leafy vegetables (DGLVs as a food group)	[1]
Milk	4
Carrots	[0]
Ripe mango	[1]
Dark yellow or orange squash (includes pumpkin)	[0]
▶ Spinach (or other DGLV)	0

Continued...

HKI Food Frequency Method (continued)

Name of food item	No. of days food eaten per week
Ripe papaya	[0]
▶ Noodles (or other staple food)	0
Eggs with yolk	(1)
Small fish (liver intact)	(0)
▶ Peanuts (or other legume or meat)	2
Yellow or orange sweet potato or yam	[0]
▶ Chicken or other fowl (or other meat or legume)	0
▶ Amaranth leaves (or other DGLV)	0
Any kind of liver	(1)
▶ Sweet potato leaves (or other DGLV)	1
Beef (or other red meat or pork)	0
Butter	(0)
▶ Lentils (or other legume or meat)	3
Red palm oil	[0]
Cod liver oil	(0)
Foods cooked in oil	0
▶ Apricots (or other plant source rich in vitamin A)	[0]
▶ Coconuts (or other fat or oil)	2
▶ Weaning food fortified with vitamin A (or other food fortified with vitamin A)	(0)
▶ Margarine fortified with vitamin A (or other food fortified with vitamin A)	(0)

▶ These food items can be replaced with similar foods that are locally available.

○ Animal sources of vitamin A [ ] Plant sources of vitamin A

Interviewer Name Mariatou

Answer: The Animal score (a) equals 2. The Weighted Total (a + c) equals 2.33.

Step 10b. Calculate average scores for each community

Use all the correctly completed questionnaires to calculate the average scores for each community. Note that if the survey was well conducted, the total number of correctly completed questionnaires should be 50. If analyzing the data by hand, use a tally sheet, like the example reproduced on the opposite page. [13]

For each community:

- Add all animal scores (a) together.
- Divide this total by the total number of questionnaires. The result is the average or mean frequency of consumption of animal sources of vitamin A.
- Add all weighted total scores (d) together.
- Divide this total by the total number of questionnaires. The result is the average or mean frequency of total consumption of animal and plant sources of vitamin A (weighted by the source).

The *community* has a vitamin A deficiency problem if:

the mean frequency of consumption of animal sources of vitamin A is 4 days per week or less;

or

the mean frequency of total consumption of animal and plant sources of vitamin A (weighted by the source) is 6 days per week or less.

To practice, use the data on the tally sheet reproduced on the opposite page. Determine whether this community has a vitamin A deficiency problem or not. The answer is in the box below.

Answer: The mean frequency of consumption of animal sources of vitamin A equals 2.2 days per week. The mean frequency of the weighted total consumption of animal and plant sources of vitamin A equals 3.1 days per week. Because either one of these values is below the threshold values, this community has a vitamin A deficiency problem. Activities are needed to increase the vitamin A status of all children in this community.

Tally Sheet Example

Community: *# 2 Binguiri, Birni N'Konni*

	Questionnaire Number	Animal (a) (days per week)	Weighted Total (d) (days per week)		Questionnaire Number	Animal (a) (days per week)	Weighted Total (d) (days per week)
1.	2-1	7	7.00	26.	2-26	2	2.50
2.	2-2	0	0.33	27.	2-27	3	3.66
3.	2-3	1	1.33	28.	2-28	1	1.00
4.	2-4	7	8.16	29.	2-29	0	1.50
5.	2-5	2	2.33	30.	2-30	0	0.16
6.	2-6	2	3.00	31.	2-31	2	2.16
7.	2-7	0	0.50	32.	2-32	5	7.00
8.	2-8	7	8.00	33.	2-33	0	1.50
9.	2-9	0	0.33	34.	2-34	10	12.33
10.	2-10	1	1.50	35.	2-35	3	4.16
11.	2-11	1	1.50	36.	2-36	6	7.33
12.	2-12	0	0.33	37.	2-37	0	0.66
13.	2-13	0	0.83	38.	2-39	0	0.83
14.	2-14	0	0.83	39.	2-38	1	1.16
15.	2-15	3	3.50	40.	2-40	2	2.33
16.	2-16	0	0.16	41.	2-41	2	2.83
17.	2-17	7	9.33	42.	2-42	0	0.16
18.	2-18	1	2.16	43.	2-43	0	2.33
19.	2-19	0	0.33	44.	2-44	2	3.66
20.	2-20	0	2.33	45.	2-45	3	4.66
21.	2-21	1	1.83	46.	2-46	9	11.66
22.	2-22	1	2.66	47.	2-47	3	3.66
23.	2-23	0	0.83	48.	2-48	7	8.16
24.	2-24	1	1.50	49.	2-49	0	0.83
25.	2-25	6	6.66	50.	2-50	0	0.66
				Total	50	109	154.15
				Mean	—		

Step 10c. Determine whether the survey area has a vitamin A deficiency problem

Important Note on Complete Data Analysis: Data from the Food Frequency Questionnaire can be used to answer other questions, including whether the sampling process was representative and how often individual foods items were consumed. The case study in the next step illustrates how this analysis may be done.

Use the results from all 15 communities to determine if vitamin A deficiency is a public health problem in the survey area. If at least 70% of surveyed communities (11 of the 15) have a vitamin A deficiency problem, then vitamin A deficiency is likely to be a public health problem in the *entire* survey area.

To practice, use the data [14] presented in the table below. Determine whether this *survey area* has a vitamin A deficiency problem or not. The answer is in the box below.

Name of Community (or community cluster)	Mean Frequency of Consumption of Animal Sources of Vitamin A (days per week)	Mean Frequency of Weighted Total Consumption of Vitamin A (days per week)
Trapieng Rovieng	3.5	4.4
Cha	3.0	3.2
Dob Por	3.0	3.3
Trapieng Veng	2.0	2.5
Kompong Tria	3.2	3.6
Reussei Chum	1.8	2.2
Dong	3.7	4.0
Tria Ldu	3.1	3.4
Svay Tong	3.4	3.7
Oh	2.9	3.1
Liak Roteh	2.5	3.3
Tram Kool	4.0	4.5
Prosiath	3.5	3.5
Khvao	3.7	3.7
Kdol	3.2	3.2

Answer: 15 of the 15 communities have a vitamin A deficiency problem. Since this rate (100%) is greater than 70%, vitamin A deficiency is likely to be a public health problem in the entire survey area, including the communities not surveyed. Activities are needed to improve the vitamin A status of all children living in this survey area.

Step 11. Interpret and Use the Data - A Case Study from India

The HKI Food Frequency Method described here was used as part of a practical workshop on vitamin A assessment sponsored by Aravind Children's Hospital and the Vitamin A Technical Assistance Program of Helen Keller International.[15] The Association of Sarva Seva Farms (ASSEFA) is an Indian private voluntary organization active in community development and health. ASSEFA personnel suspected that vitamin A deficiency was a serious public health problem in the ASSEFA project areas in and around Madurai District of Tamil Nadu State in southern India. The purpose of the workshop was:

- to train non-governmental organizations in the use of the HKI Food Frequency Method; and
- to use the HKI Food Frequency Method to identify communities in the ASSEFA project area where consumption of vitamin A-rich foods is inadequate.

In order to develop a comprehensive picture of vitamin A deficiency in the ASSEFA project area, the workshop participants began with a review of existing information using techniques described in the *Field Guide*.

In brief:

- India is classified by WHO as a country where vitamin A deficiency is a public health problem.[16] The Government of India has a vitamin A policy and an operational plan to address vitamin A deficiency nationwide. The official policy is to give vitamin A to all children from six months to three years.[17]
- Vitamin A deficiency and xerophthalmia have been widely documented in Tamil Nadu State, Madurai District in southern India by the staff of Aravind Hospital and others. The most recent study conducted in Tamil Nadu found that supplementing preschool children with vitamin A deficiency resulted in a 54% reduction in mortality.[18] This study used a weekly, low-dose supplement to achieve these effects. The low dose was intended to simulate weekly consumption of vitamin A-rich foods in well-nourished populations.
- In Tamil, the local language, a local term for night blindness, "*malaikannu*," is widely recognized as a phenomenon that afflicts young children.[19]

Using the HKI Food Frequency Method in the ASSEFA project area

The survey area was defined as the Kallupatty block within the ASSEFA project area near Madurai.

Because this survey was conducted as part of a training exercise, it was scheduled at a time that was convenient for participants rather than the time of least food availability. Consequently, the survey activities took place during the planting season, prior to the annual monsoon rains. As mangoes were widely available, the survey was expected to coincide with a period of relative abundance of vitamin A-rich foods. Nevertheless, participants used data from the group discussion and key informant interviews to determine when foods rich in vitamin A were least available. A seasonal chart produced by the participants is on the opposite page. Ideally the survey should have been conducted between August and November.

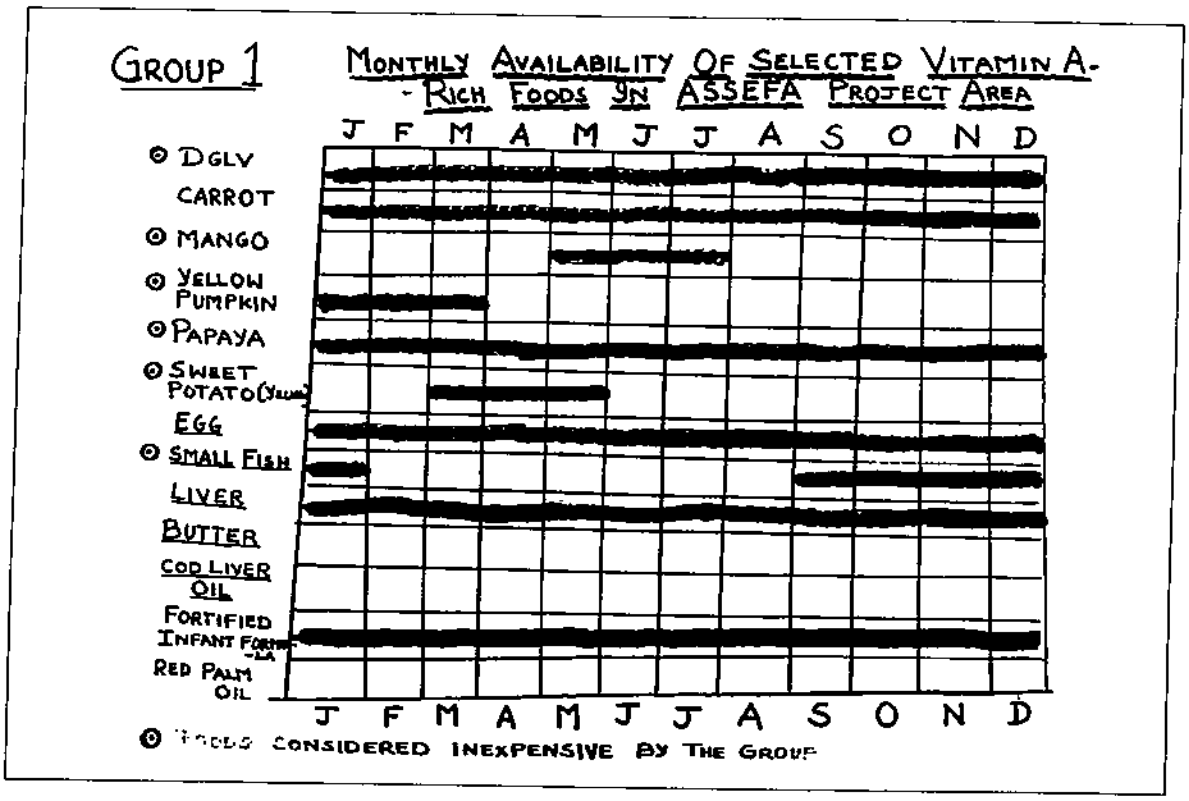
Participants defined "community" as a village or a geographic group of villages. Communities were randomly selected using the simple random sampling method. However, because of time limitations for the workshop participants, only 6 communities were actually surveyed.

Participants conducted a shop survey and held a group discussion with local ASSEFA health workers and mothers to compile information on local dietary practices, including the consumption of food items on the Preliminary Food List. A summary sheet created by the participants is also reproduced on the opposite page. The participants used this information to adapt the Food Frequency Questionnaire to local dietary practices. The table below lists those foods that were not already on the Preliminary Food List and that were used as substitutes for similar type foods.

D G L Vs	Other Vitamin A-Rich Foods	Fats and Oils	Protein-Rich Foods	Staple Foods
Amaramthus Drumstick		Dalda Coconut	Peanuts Pulses Seasonal Insect	Potatoes

ASSEFA personnel added several program-related questions regarding breastfeeding practices and coverage of the most recent distribution of vitamin A supplements. Participants field-tested the questionnaire to check its validity and to practice interviewing mothers and caretakers. They also practiced randomly selecting households and children within households. The final questionnaire is reproduced on pages 42 and 43.

ASSEFA Seasonality Chart



Summary Sheet from ASSEFA Group Discussion

Food Item	Local Name	Market, Garden Grows Wild ?	Expensive or not ?	Months Available	Eaten by Kids < 6 w (Lactating mothers)	Preparation	Cooking Method
அசிவி	அரிசி	கடை 11 [illegible] 2	அவை அதிகம்	3 months – E.A.M 9 months – [illegible]	Yes No	5 – Cooker 7 – Direct	→ more than 4
மிளகு	மிளகு	Market	"	always available	No twice/week	[illegible]	
கீரை/[illegible]	கீரை	Market	அவை [illegible]	all seasons	yes monthly twice	[illegible]	
பால்	பால்	"	அவை அதிகம் (Diluted milk)	all seasons	Diluted milk	Diluted milk	
கேரட்	கேரட்	(T. [illegible]) கடை ([illegible])	(1 kg – 6/=)	"	No	—	—
மாம்பழம்	மாம்பழம்	"	அவை [illegible]	3 months (May – July)	Yes	([illegible])	—
[illegible]	[illegible]	[illegible]	—	3 மாதம் (Jan – March)	i) [illegible] ii) [illegible]	[illegible]	
பப்பாளி	பப்பாளி	[illegible]	—	[illegible]	[illegible]	—	—
[illegible]	[illegible]	(shop) own	Expensive	All season	yes	[illegible] Scrambled Bailed egg	Bailing shallow pan frying
மீன் (small) (Yellow)	மீன்	Pond (raising season)	Not expensive	Sep – Jan	Yes (Not for infants)	Bailed fish Fish curry	Bailing
Sweet potato (Yellow)	[illegible]	Market garden	Not expensive	Mar – May	Yes	Bailed seasons	Bailing curry

Animal -
Plant -
X

படிவ எண்:

வாரத்தில் குறிப்பிட்ட உணவினை குழந்தை உட்கொண்ட நாட்களின் எண்ணிக்கை பற்றிய ஆய்வு

தேதி (Date) :

கிராமத்தின் பெயர் (Village) :

குடும்பத் தலைவரின் பெயர் (Head of the Family) :

உங்களுக்கு ஒரு வயசிலிருந்து ஆறு வயசுக்குள்ளே எத்தனை குழந்தைங்க இருக்கு (No. of Children 1-6yrs.) :
Note: (12 months to 72 months) ☐

குழந்தைகளோட பேரு? (Names) (1) _____
(2) _____ (3) _____

(சமவாய்ப்பு (Random) முறைப்படி ஒரு குழந்தையை தேர்ந்தெடுக்கவும் இப்போது ---------- (தேர்ந்தெடுத்த குழந்தையின் பெயர்) பற்றி சில விபரங்களைக் கேட்கிறேன்.

---------- (குழந்தையின் பெயர்) வயது என்ன? (Age) ☐ வருடம் (Yrs.)

குழந்தையின் பாலினம்- ஆண் (Male) ☐ பெண் (Female) ☐

பதிலளிப்பவர் குழந்தையின் முதன்மை பாதுகாப்பாளர் என்பதை உறுதிபடுத்தியபின் இந்த கேள்வியை கேளுங்கள்
"கடந்த 7 நாட்களில் எத்தனை நாட்கள் _____ (குழந்தையின் பெயர்) (குறிப்பிட்ட உணவு சாப்பிட்டான்/சாப்பிட்டாள்-?"

உணவு	வாரத்தில் உணவு உட்கொள்ளப்பட்ட நாட்களின் எண்ணிக்கை
+ அரிசி சோறு (Rice)	
+ பச்சை மிளகாய் (Green chillies)	
** + கீரைகள் (GLV)	☐
+ பால் (Milk)	
** + கேரட் (Carrots)	☐
** + மாம்பழம் (Ripe Mangoes)	☐
** + மஞ்சள் பூசணிக்காய் (Yellow Pumpkin)	☐

உணவு	வாரத்தில் உணவு உட்கொள்ளப்பட்ட நாட்களின் எண்ணிக்கை
அரைக் கீரை (Amaranthus)	
** + பப்பாளிப்பழம் (Ripe Papaya)	☐
உருளைக் கிழங்கு (Potato)	
* + முட்டை (மஞ்சள் கருவுடன்) (Egg with Yolk)	○
* + சிறிய மீன் (ஈரல் உள்பட) (small fish)	○
நிலக்கடலை (Peanuts)	
** + மஞ்சள் சர்க்கரை வள்ளிக் கிழங்கு (Yellow Sweet Potato)	☐
பருப்பு வகைகள் (Pulses)	
ஈசல் (A seasonal flying insect)	
* + ஈரல் (Liver)	○
முருங்கைக் கீரை (Drumstick leaves)	
+ மாமிச வகைகள் (Meat Varieties)	
* + வெண்ணை (Butter)	○
டால்டா (வனஸ்பதி) (*Dalda (Vanaspathi)* Vegetable Oil)	
** + சிவப்பு பனை எண்ணெய் (Red Palm Oil)	☐
* + மீன் எண்ணெய் (Fish Oil - Cod liver)	○
+ எண்ணெயில் வறுத்த உணவுகள் (Foods fried in oil)	
டப்பாப்பால் (செரிலாக், பேரக்ஸ், லாக்டோடெக்ஸ்) (Tinned Milk for Infants)	
தேங்காய் (Coconut)	

உங்க குழந்தைக்கு தாய்ப்பாலோடு சேர்த்து முதமுதல என்ன உணவு கொடுத்தீங்க?
உணவின் பெயர்_____ எந்த மாசத்திலே? _____

போன நாலு(4) மாசத்திலே குழந்தைக்கு மீன் எண்ணெய் மாத்திரை அல்லது மருந்து கொடுத்தாங்களா ?

ஆம் ☐ இல்லை ☐ தெரியாது ☐

+ கேள்விப்பட்டியலில் கொடுக்கப்பட்டுள்ள வரிசைப்படி அவ்வாறே இருக்க வேண்டிய உணவுகள்
* அரசை உணவு வகையிலிருந்து பெறப்படும் வைட்டமின் ஏ
** ரசை உணவு வகையிலிருந்து பெறப்படும் வைட்டமின் ஏ

Interviewer's Name: _____

A total of 302 mothers or primary caretakers of children were surveyed in six community clusters. Twelve questionnaires were discarded because mothers of children six and older were inadvertently interviewed. The remaining 290 questionnaires were used in the final analysis.

HKI Food Frequency Method results

Using tally sheets, the participants analyzed the results by hand. The average scores for each surveyed community are listed below in the table of mean frequency of consumption of vitamin A. In all surveyed communities, vitamin A consumption was considerably lower than the HKI Food Frequency Method threshold values.

Note on number of communities: Only six community clusters were surveyed because of the time constraint of training participants. Ideally, 15 communities or community clusters should be surveyed within each survey area.

Mean Frequency of Consumption of Vitamin A

	Mean Frequency of Consumption (days per week)	
Community Cluster	**Animal Sources**	**Weighted Total**
A	0.5	1.0
B	1.2	1.9
C	1.7	2.6
D	1.5	2.0
E	1.5	2.2
F	1.4	1.9

The participants then used the data to answer other questions, including whether the sampling process was representative and how often individual foods items were consumed.

- The age and sex distribution of surveyed children was fairly even across all age groups and village clusters. There were slightly, but not significantly, more boys than girls. The average age of children selected was 3.2 years.
- The staple food, rice, was consumed by 93% of the children at least once in the last week, with a mean frequency of consumption of 6.7 days.
- Dark green leafy vegetables (DGLVs) as a food group were consumed at least once in the past seven days by 51.0% of surveyed children. The average frequency of consumption of DGLVs was low, at 0.9 days per week.

Specific Vitamin A-Rich Foods Consumed

Food Item	Mean Frequency of Consumption (days per week)	Proportion (%) of Children Eating Food at Least Once
Mango	2.1	66.9
Egg	1.1	58.6
Amaranth leaves	0.5	31.0
Carrot	0.5	19.3
Drumstick leaves	0.3	19.3
Liver	0.1	6.9
Papaya	0.1	5.9
Pumpkin or yellow squash	0.1	5.2
Small fish with liver	0.04	3.1
Butter (ghee)	0.1	2.8
Sweet potato	0.02	1.4
Cod liver oil	0.02	1.0
Red palm oil	0	0

Fats and Oils and Protein-Rich Foods Consumed

Food Item	Mean Frequency of Consumption (days per week)	Proportion (%) of Children Eating Food at Least Once
Fats and Oils	2.1	64.8
Fried foods [a]	1.1	39.0
Proteins	6.2	96.2
Milk [b]	3.5	55.2
Tinned milk [b]	0.1	2.07

a Fried foods may overlap with some of the fats and oils.

b Tinned milk and milk are mainly consumed by young children in a very diluted form (often in coffee) and were, therefore, not considered major sources of protein in the analysis.

- Mangoes and eggs were consumed at least one day in the past week by 66.9% and 58.6% of the surveyed children, respectively. The average frequency of consumption, however, was low, with mangoes eaten about two days per week and eggs eaten about one day per week in the communities surveyed. Mangoes did contribute to the overall consumption of vitamin A-rich foods, but not as substantially as expected because mangoes were generally sold for export and not readily available to the local population. The table on page 45 lists the specific vitamin A-rich food items that were most commonly consumed.

- The major sources of fat and oil in the survey were vegetable oil, coconut, and butter (in the form of clarified butter, or *ghee*). No child ate red palm oil. Foods containing fat and oil were consumed by 64.8 percent of children at least once in the past week. Foods cooked in oil were consumed by 39 percent of children at least one day per week. Mean frequency of consumption of foods containing fat and oil was 2.1 days and fried foods 1.1 days in the previous week.

- The major sources of protein included peanuts, fish, lentils, *essel* (a seasonal flying insect), meat, eggs, and liver. Protein-rich foods were consumed by 96.2 percent of the children at least once per week. The average weekly intake of protein-rich foods, 6.2 days per week, was high because most children ate *pulses* or lentils every day.

- The average age at which foods other than breastmilk were introduced was 8.4 months. The main first foods introduced were diluted cow's milk, rice, millet gruels and biscuits.

- Most mothers knew whether or not their child had received vitamin A capsules. The coverage of vitamin A capsules was not high (about a third).

Other information noted during the survey:

- Several cases of night blindness and Bitot's spots were encountered by interviewers. These cases were confirmed by a local physician experienced in xerophthalmia screening and treated.

- ASSEFA personnel and mothers from the survey area were familiar with the local term for nightblindness, "*malaikannu.*"

- Based on information gathered during the group discussion, it appears as if vitamin A-rich foods are both available and affordable

in the survey area, but that there may be some cultural taboos against consumption that need further exploration.

- Health information gathered from ASSEFA suggests that morbidity associated with vitamin A deficiency, such as protein-energy malnutrition, diarrheal disease, and lower respiratory infections, is commonly encountered among preschool children.

General conclusion

Given that the frequency of consumption of vitamin A-rich foods in all surveyed communities was well below the threshold values of the HKI Food Frequency Method, vitamin A deficiency is a problem of public health importance in the ASSEFA/Kallupatty survey area. Although 15 communities should have been surveyed, the very infrequent consumption in all six communities justifies extending this conclusion to the entire survey area.[20] Other evidence supports these dietary findings — existence of a local term for night blindness and case findings of Bitot's spots.

Group discussion notes suggest that vitamin A-rich foods are both available and affordable year-round in the Kallupatty block. Thus, the major constraint to adequate vitamin A nutrition seems to be related to consumption of vitamin A-rich foods rather than production.

Discussion

Eggs, an important source of vitamin A and protein, were eaten by a majority of children (58%), but the average frequency of consumption was low, at 1.1 days in the past week. Field notes suggest that an ongoing, biweekly government food distribution program is reaching its target audience. Mean weekly consumption of foods containing protein was higher than expected because of this distribution program. Similarly, mean weekly consumption of foods rich in vitamin A was also increased due to the distribution of eggs.

Foods containing fat and oil were also consumed by a majority of children in the past week. Frequency of consumption of foods containing fat and oil and foods cooked in oil suggest that consumption is insufficient to ensure adequate absorption of vitamin A in most children. These foods should be eaten daily to ensure adequate intake.

It should be noted again that this survey was conducted during mango season, the period when vitamin A deficiency was least suspected among preschool children. Indeed, mangoes were consumed by the majority of children at least once in the week prior to the survey although mean frequency of consumption was low (which may be due to economic conditions in the surveyed area — mangoes were generally sold for export to cities and mango trees

are owned primarily by large landholders). Consumption of vitamin A-rich foods may be slightly lower during other times of the year.

Health data collected from the survey area indicate that the burden of disease in the surveyed communities follows morbidity patterns seen in other developing countries. Thus, level of infection coupled with inadequate food consumption may place these children at additional risk of vitamin A deficiency. In addition, during illness, vitamin A deficiency may be exacerbated by cultural norms. For instance, feeding "hot" food items such as mangoes, papaya, and green leafy vegetables to sick children is not encouraged.

Recommendations

A program to control vitamin A deficiency is needed in the ASSEFA/ Kallupatty project area. Where possible, interventions should be integrated into current health or agriculture activities. Both long- and short-term measures to control vitamin A deficiency should be implemented. Specific recommendations are as follows:

1) Prophylactic and disease-targeted distribution of vitamin A supplements should be strengthened as a short-term measure to counteract the severe deficiency in consumption of vitamin A-rich foods.

   - Prophylactic distribution should be in accordance with WHO protocols for children aged six months to six years and postpartum women within one month of delivery. Distribution should take place every four to six months in all villages in the survey area. Vitamin A supplements administered to post-partum women will increase the likelihood that young infants will receive vitamin A during breastfeeding, in addition to boosting the mother's vitamin A stores.

   - Disease-targeted distribution should also be undertaken in accordance with WHO protocols. Cases of xerophthalmia, severe protein-energy malnutrition, acute lower respiratory infection, measles, and acute or prolonged diarrhea should be treated with high-dose vitamin A capsules or syrup.

   - A monitoring system should be developed to ensure that vitamin A distribution activities follow standard guidelines, that distribution personnel are adequately trained, and that overdosing is minimized and coverage optimized.

   - ASSEFA personnel should receive training in xerophthalmia case detection and distribution of vitamin A capsules/syrup according to standard treatment schedules.

- Adequate and multiple supply lines for procurement and receipt of vitamin A capsules/syrup should be secured. Possible sources of vitamin A include UNICEF and, in the immediate future, Aravind Children's Hospital.

2) Activities aimed at increasing consumption of vitamin A-rich foods and increasing fat and oil consumption among preschool children should be implemented. Promotion should be undertaken only after substantial discussion with community members to understand beliefs and attitudes towards various vitamin A-rich foods. Possible options include:

   - Using the ASSEFA child-to-child model to increase awareness about the importance of eating vitamin A-rich foods daily and to increase knowledge of important sources of vitamin A.

   - Encouraging consumption of locally available, affordable, and widely consumed vitamin A-rich foods, such as amaranth leaves. Possible delivery mechanisms include developing songs and theater pieces related to vitamin A-rich foods for school children; distributing posters in the communities; and training ASSEFA field workers to counsel mothers to include vitamin A-rich foods in the diet.

   - Incorporating information about vitamin A-rich food items during health committee, community education, or women's group meetings.

3) Activities aimed at improving breastfeeding and weaning practices should be undertaken. Possibilities include:

   - Encouraging colostrum use through traditional birth attendants.

   - Promotion of vitamin A-rich weaning foods by health care workers to the community and by teachers to school children.

4) Health seeking behavior of villagers should be further investigated in order to better understand the importance of traditional healers. These traditional healers could be trained to recognize, treat, and prevent vitamin A deficiency.

III. Planning for the HKI Food Frequency Method

The following table outlines time, personnel, and cost considerations that should be taken into account when planning to conduct a community assessment using the HKI Food Frequency Method. As long as one member of the survey team has previous training and experience in conducting population-based survey research, significant external technical input is not required.

HKI Food Frequency Method
Timing, Personnel, and Cost Considerations

Task	Time Needed	Required Expertise Or Experience	Special Expenses
Develop sampling plan	1 day	sampling experience or technical assistance in epidemiology	
Conduct group discussion	1 day	experience leading groups, basic nutrition knowledge	per diem for local personnel
Conduct shop survey	1/2 day	ability to read food labels	fuel
Modify questionnaire	1/2 day	expertise in basic nutrition, food groups	
Train interviewers	2 -3 days	leadership and training skills, experience conducting surveys and non-biased interviewing	flip chart paper, markers, salaries, per diems
Field test questionnaire	1 day	prior survey experience	fuel, salaries, per diems, photocopy costs
Conduct survey	5-14 days	interviewers: high-school graduates supervisors: leadership skills	fuel, salaries, per diems
Data analysis and report writing	3 days	Prior experience in data analysis helpful	photocopy costs
Total	14-24 days		

Important Note on Costs: The costs associated with the survey can be minimized by linking it to ongoing data collection efforts. For instance, the survey can also serve as a baseline and endline for project evaluation. However to assure reasonable data quality, do not add more than 10 questions to the Food Frequency Questionnaire.

IV. Share Your HKI Food Frequency Results

If you use the HKI Food Frequency Method to assess the risk of [illegible] deficiency, HKI urges you to share your results with others. By doing [illegible] will help stimulate on-going action to eliminate vitamin A deficiency [illegible] wide and you will contribute to monitoring of progress towards [illegible] goals. So, after you have shared the results with your co-workers, [illegible] partners, and communities in the survey area, please take a moment [illegible] results with other health, agriculture, eduction, and development [illegible]

HKI is committed to making survey results, which are shared [illegible] accessible as possible. We plan on maintaining a computerized collection [illegible] survey results that will be accessible through a number of venues — including HKI's worldwide network of offices and collaborating partners. Likewise, we will disseminate the data via as many forms as possible. We hope that this collection of survey results will document, over time, the impact that programs to increase consumption of vitamin A-rich foods are having on the vitamin A deficiency problem throughout the world.

On the next two pages, we have provided a form to facilitate the sharing of HKI Food Frequency Method results. Please briefly describe the survey area, record the results from each of the communities surveyed, and enclose a copy of the Food Frequency Questionnaire used to produce the results. If you wish, you may send us a complete copy of your survey report. The survey report may be in any language. As noted on the form, we assume that permission has been given to photocopy and distribute any survey report that we receive.

Please keep your own survey data — the completed questionnaires, tally sheets, or data sets. Please also consider sending your survey report to national or regional resource centers and libraries.

We also warmly welcome any comments or suggestions on how this manual may be improved. We look forward to hearing from you.

HKI Food Frequency Method - Results

Please share your results with the worldwide public health community. Complete this form and mail it to Helen Keller International, 90 Washington Street, New York, NY 10006, USA. Attn: HKI Food Frequency Method.

A. Survey Results

Describe survey area in a way which would enable someone to readily outline the area on a map of the country:

Indicate which method was used to randomly select communities: *(Check one)*

- ☐ Simple random sampling
- ☐ Random start systematic sampling
- ☐ Population proportion to size sampling
- ☐ Other _____

Give dates survey was conducted: _____

Record results of the survey in the table below:

Name of Community (or community cluster)	Mean Frequency of Consumption of Animal Sources of Vitamin A (days per week)	Mean Frequency of Weighted Total Consumption of Vitamin A (days per week)

B. Food Frequency Questionnaire

Please attach a copy of the questionnaire used in the survey. Indicate language:

(over)

C. Survey Report

If a survey report is available please provide title, organizations or authors, and date.

Title: _____

Organizations/Authors: _____

_____

Date on report: _____

Address where anyone may write to obtain copies of the above report. Indicate any fees or charges.

Name: _____

Organization: _____

Address: _____

_____

Cost: _____

Name and address of the person or organization who may be contacted, should anyone wish to have additional information related to the above survey:

Name: _____

Organization: _____

Address: _____

_____

Telephone: _____

Fax or E-mail: _____

D. Suggestions Regarding HKI Food Frequency Method

Please tell us how this manual could be improved. Use a separate piece of paper if needed.

E. Person Completing This Form

Name: _____

Organization: _____

Address: _____

_____

Check if enclosed:

- ☐ Copy of food frequency questionnaire
- ☐ Copy of survey report

Helen Keller International assumes that the appropriate person or organization gives HKI permission to copy and distribute any survey report sent to HKI. HKI may charge those requesting copies a fee for photocopying or postage.

End Notes

1. Tarwotjo I, Sommer A, Soegihanto T, Susanto D, Muhilal. Dietary practices and xerophthalmia among Indonesian children. American Journal of Clinical Nutrition 1982; 35(3):574-581.

   Underwood, BA., *et al.* Guidelines for the Development of a Simplified Dietary Assessment to Identify Groups at Risk for Inadequate Intake of Vitamin A. IVACG, The Nutrition Foundation, Washington DC. 1989.

   Willet W. Nutritional Epidemiology. Oxford University Press, New York. 1990.

   Willet W, Sampson L, Stampfer MJ *et al.* Reproducibility and validity of a semi-quantitative food frequency questionnaire. American Journal of Epidemiology 1985; 122:51-65.

2. Block, G. A review of validations of dietary assessment methods. American Journal of Epidemiology 1982; 115 (4):492-505

   Hernandez-Avila, Master C, Hunter DJ, *et al.* Influence of additional portion size data on the validity of a semi-quantitative food frequency questionnaire. American Journal of Epidemiology 1988;128:891.

3. HKI reviewed data from surveys including surveys undertaken in Indonesia, Kiribati, and Mali. References are:

   Tarwotjo I, Sommer A, Soegihanto T, Susanto D, Muhilal. Dietary practices and xerophthalmia among Indonesian children. American Journal of Clinical Nutrition 1982; 35(3):574-581.

   The Government of Kiribati and The Foundation for the People of the South Pacific. Kiribati Vitamin A Deficiency Assessment. The Foundation for the People of the South Pacific, San Diego, CA. 1989. (Unpublished report.)

   Rosen D., Gaumerais H., Doumbia F. L'évaluation préliminaire de la carence en vitamine A dans les arrondissements de Kébila et de Fakola, l'arrondissements Central, dans le cercle de Kolondiéba au Mali. Vitamin A Technical Assistance Program, Helen Keller International, New York, January 1991. (Unpublished report.)

4. Using referent points of weighted intake of ≤ 6 days per week, and animal sources of retinol ≤ 4 days per week, seven of eight (sensitivity = 87.5%) communities where $\geq$ 15% of children had serum retinol levels < 20 µg/dl were correctly predicted to have a vitamin A deficiency problem ($p < 0.000$, $p = 0.067$, respectively; $n = 15$). Four of seven (specificity = 57.1%) communities were correctly identified as not having a vitamin A deficiency problem by the same criteria. Three of seven (42.9%) communities were incorrectly identified as likely to have a vitamin A deficiency problem. This method correctly identified 11 of 15 communities (73.3%) as having or not having a vitamin A deficiency problem.

   See abstract of poster session presented by Sloan NL, Rosen DS. Validation of the HKI Food Frequency Method to identify communities with vitamin A deficiency. XV IVACG Meeting Proceedings held in Arusha, Tanzania, March 1993.

5. The two threshold values are based on correlations between the community mean frequency of consumption and whether ≥ 15% of the community children had serum retinol levels < 20 μg/dl. Whether the community's mean total weighted weekly frequency was ≤ 6 days or the community's mean weekly frequency of animal sources was ≤ 4 days had the expected positive associations with whether the community had low serum retinol levels. The determination of whether the entire survey area is vitamin A deficient (at least 70% of surveyed communities are classified as vitamin A deficient) is based on a conservative estimate of where the distributions of specificity and sensitivity of the method overlap.

   Sloan NL, Rosen DS, de la Paz T, Arita ME, Temalilwa C. Validation of a semi-quantitative food frequency to identify community risk of vitamin A deficiency. (Submitted for publication.)

6. Smaller sample sizes (*i.e.* less than 15 communities) can be used in areas where subclinical vitamin A deficiency is suspected or known to be a serious problem (*i.e.* the expected prevalence is well above 15% of the population having serum retinol values < 20 μg/dl).

7. The sample size of each community for the survey was designed to identify a correlation of 0.20 between the food frequency and serum retinol values within each survey area, assuming an alpha error of 0.05, power = 80% and a two-tailed test.

   Sloan NL, Rosen DS, de la Paz T, Arita ME, Temalilwa C. Validation of a semi-quantitative food frequency to identify community risk of vitamin A deficiency. (Submitted for publication.)

8. For logistical convenience or cultural reasons, survey teams often interview respondents when they are gathered at a central site. For the HKI Food Frequency Method, central site interviewing is only recommended when the total number of households in a community is close to 50. If mothers or caretakers are interviewed at a central site, care should be taken that mothers cannot overhear the interview of others.

9. If the interviewer does not know how many families with small children live in a particular household, the interviewer should ask at the household, "How many mothers (primary caretakers) in this household have children 1 through 5 years of age?" If more than one mother with eligible children lives in the household, the interviewer should select one family at random using chits.

10. Be particularly careful to avoid over-sampling of toddlers, as mothers often prefer to be interviewed about their youngest child.

11. Only major sources of vitamin A are analyzed to determine whether vitamin A deficiency is a public health problem. Including minor sources of vitamin A which may not contribute significantly to vitamin A status will decrease the sensitivity of the method. Limiting the total number food items to 28 (including major sources of vitamin A, fat, oil, and protein) helps avoid this problem. In most developing countries, it is rare that more than 28 important foods are eaten per season since the variety of food tends to be limited in any one season. In order to keep the method rapid and simple, to prevent interviewer fatigue, and to collect only information that will be analyzed and used, no more than 28 food items should be on the Food Frequency Questionnaire.

12. These questionnaires should be reviewed by the supervisor, marked as invalid and excluded from the analysis.

13. The data comes from a survey done by Helen Keller International and the Ministry of Health in Niger during January 1994 using the HKI Food Frequency Method. Baker S, Seydou M, Sabou D, Magagi A. Enquête sur la consommation des aliments riches en vitamine A et la couverture de la distribution des capsules de vitamine A arrondissements de Birni N'Konni, Illela, Aguie et Mayahi d'après le Méthodologie de Helen Keller International, Rapport N.1, 25 Niamey. 1994. (Unpublished report.)

14. The data comes from a survey undertaken by the Ministry of Health and Helen Keller International in Cambodia during March 1994. Feldon K. Results of Helen Keller International Food Frequency Survey for Vitamin A Deficiency in Somrong District, Takeo, Cambodia. Helen Keller International, Phnom Penh. 1994. (Unpublished preliminary summary report.)

15. The workshop, held 5 to 14 July 1993, in Madurai, India, was called "Workshop for PVOs on Conducting a Community Assessment of Vitamin A Deficiency." 20 participants from US-based PVOs working in India, local NGOs and local universities attended the workshop. A draft survey report entitled, "Consumption of Vitamin A Rich-Foods in Rural Tamil Nadu," was produced by ASSEFA, Aravind Children's Hospital, Helen Keller International, and other private voluntary organizations.

16. India is considered a Category 1 country by WHO. Vitamin A deficiency is a significant public health problem in part or all of the country.

    From: Vitamin A Supplements: A guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia. Prepared by WHO/UNICEF/IVACG Task Force. WHO, Geneva. 1988.

17. Proceedings of the Workshop "Vitamin A Deficiency and its Control," organized by the Government of India and Aravind Children's Hospital, Madurai, 3-5 April 1991, supported by UNICEF.

18. Rahmathullah L, Underwood BA, Thulasiraj RD, *et al.* Reduced mortality among children in southern India receiving a small weekly dose of vitamin A. New England Journal of Medicine 1990; 323;929-35.

19. ASSEFA and Aravind Children's Hospital field staff confirmed that a local Tamil term for night blindness was widely recognized by villagers in the area that was to be surveyed. Group discussion participants and villagers from the pre-test community recognized the same local Tamil term for night blindness.

20. Smaller sample sizes can be used in areas where subclinical vitamin A deficiency is suspected or known to be a serious problem — well above 15% of the population with serum retinol values of less than 20 μg/dl. Because a high prevalence of subclincal vitamin A deficiency was noted by Rahmathullah (1990) in Madurai district, conclusions can be drawn from a smaller sample (less than 15 communities).

Appendix I: How to Select a Random Sample

Important Note on Choice of Sampling Method: These sampling methods can be adapted to meet local needs or conditions. If more information is needed than what is provided here, consult an epidemiologist, demographer, or sociologist who has used these sampling methods in an area similiar to defined survey area.

Like any survey, the HKI Food Frequency Method relies on data from a sample to draw a conclusion about a larger whole. In this case, data from 15 communities will be used to assess whether vitamin A deficiency is a public health problem in the entire survey area. For this conclusion to be valid, the sample must be representative. To successfully use the HKI Food Frequency Method, communities, eligible households, a respondent within a household, and one of the respondent's children must be selected or choosen randomly. Either simple or systematic sampling methods may be used.

This appendix describes how the sampling methods recommended in Step 3, Develop Sampling Plan, are used in the context of the HKI Food Frequency Method. It also explains how to use a random numbers table and "chits," small pieces of paper, to randomly pick a number.

Methods to randomly select communities

As explained in Step 3, make a list of all communities in the survey area. If necessary, group communities in clusters so every community contains more than 50 households with children 12 through 71 months of age. Update the list to reflect any combining of communities. Sequentially number the communities (and community clusters) on the list.

Simple random sampling

Use a random numbers table or chits to randomly pick a number from 1 through the total number of communities in the survey area. Select the community on the list whose order (number) corresponds to that number. Continue until 15 survey communities are selected, then 15 alternative communities.

For example, a survey area has 53 communities. Randomly picking a number 1 through 53, 24 is picked. Community #24 on the list is the first community selected. Randomly picking a second number 1 through 53, 4 is picked. Community #4 is then the second community selected. The process is repeated for the third community to be selected and so on, until 15 survey communities and 15 alternative communities are selected.

Random start systematic sampling

Divide the total number of communities in the survey area by 30, and round the result (the sampling frame number) to the nearest whole number. Randomly pick a number from 1 through the sampling frame number using chits. Select the community with the number corresponding to the number randomly picked. This is the random start.

To select the next community, add the sampling frame number to the number of the first selection. Keep adding the sampling frame number to the number of the previous selection to select the next. Continue until 15 survey communities are selected, and then 15 alternative communities.

For example, if a survey area had 200 communities, the sampling frame number would be 7 (200 ÷ 30 = 6.66, rounded to 7). Randomly picking a number from 1 through 7 using chits, 5 is picked. Community #5 is the start and the first community selected. Adding 7 to the start and then to each subsequent selection, communities #12, #19, #26, and so on are selected.

Population proportional to size sampling

Write the estimated population next to each community listed. Then in another column, cumulatively total the population of each descending row. In other words, add the population of each community to the total population of the communities listed above it. If done correctly, the cumulative total for the last community listed will be equal to the total population of the survey area. Divide the total population of the survey area by 30. The result is the sampling frame number. Randomly pick a number from 1 through the sampling frame number using a random numbers table.

Select the community with the cumulative total closest to the number randomly picked. This is the first community selected. To select the next community, add the sampling frame number to the cumulative total of the first one selected. Select the community with the cumulative total closest to this sum. Continue to add the sampling frame number to the cumulative total of the previous selection and then select the community with the closest cumulative total to the sum. Continue until 15 survey communities are selected, and then 15 alternative communities.

For example, the population estimates are listed and the cumulative totals are calculated for each community as illustrated in the table above. (Only the first five and last two communities out of the 236 in the survey area are shown).

#	Community Name	Population Estimate	Cumulative Total
1	Calderon	10,500	10,500
2	Alajuela	3,300	13,800
3	La Quebrada	4,100	17,900
4	El Viejo	15,200	33,100
5	La Chiquita	500	33,600
235	Pueblo Lejo	7,700	452,300
236	Los Lobos	4,600	456,900

The total population divided by 30 gives a sampling frame number of 15,230. (456,900 ÷ 30 = 15,230). Randomly picking a number 1 through 15,230, the number 14,200 is picked. Community #2, *Alajuela*, has the closest

cumulative total (13,800) to the randomly picked number (14,200) and is the first community selected. The sampling frame number is then added to the selected community's cumulative total (15,230 + 13,800 = 29,030). Community #4, *El Viejo*, has the closest cumulative total (33,100) to this sum (29,030) and is the next selected community.

Methods to randomly select households

House to house, with a random start

Find a central area (village square, market place, etc.) within the community. Spin a pen or a bottle. When the pen or bottle stops, it will point in one direction. Go to the first household in this direction. If the household has a child from 1 through 5 years of age, this is the first household to be surveyed. If not, visit the next nearest household, moving in a systematic fashion through the community (*i.e.* concentric circles or down streets). Continue to visit every household until 50 households with children aged 1 through 5 have been surveyed.

If it happens that there are not enough households with children from 1 through 5 years of age in the community, go to a neighboring community. Combine both communities together as one community cluster.

Community mapping

Use a map showing every household in the community or community cluster. (This map can be drawn especially for the survey or may be available for other reasons.) Number all households on the map. Use either the simple random sampling or random start systematic sampling as described above to randomly select 50 households to be surveyed and 50 households as alternatives. Indicate the selected households on the map. The survey team uses the map to identify which households should be visited.

An existing system of house numbers or addresses can be used in a similar way. However, only use a map or house numbers if they show or include every household in the community.

Segmenting large communities

Very large communities, especially those spread over large distances, can be divided into segments or sections. Divide the community into sections with approximately the same number of households. Make sure that the division of the community is not made on the basis of any characteristics that might influence child feeding patterns. From each section, approximately an equal number of households are surveyed so the total equals 50. To select households from each section, go to the geographic center of that section. Use the house to house with random start as described above to visit households until the appropriate number is surveyed.

For example, a community has an estimated 300 households with children from 1 through 5 years of age. The survey team leader divides the community into 4 sections. These sections appear to have the same number of households with children 1 through 5 years of age and do not appear to be made on the basis of any characteristics that might influence child feeding patterns. 12 households are surveyed from 2 sections, 13 from each of the other two sections, for a total of 50 households ($50 \div 4 = 12.5$). Going to the geographic center of one section, a pen is spun to determine the first household to visit. The next nearest household is visited until the 12 or 13 households with children 1 through 5 years of age are surveyed. The survey team then goes to the geographic center of the next section, and repeats the process until all of the four sections are surveyed.

Techniques to randomly pick numbers

The directions for the above sampling methods often require the use of a randomly picked number (or a series of numbers). Randomly picking a number is one way the above sampling methods can produce a *random* sample which, in turn, is highly likely to be representative of the whole. Random numbers can be picked using either chits or a random numbers table.

Chits

Numbers, (and their corresponding community, household, or child) can be randomly picked using chits. Chits are small, equal-sized pieces of paper. Each chit is uniquely numbered, starting with 1 through the total number of items from which a sample is to be drawn. For example, if a survey area has 53 communities, 53 chits are needed. One chit is numbered 1, another is numbered 2, and so on. No chits have the same number. All chits are mixed together in a bowl or bag. To randomly pick a number, one chit is chosen from the bowl without looking. To pick the next number, another chit is chosen. (In statistics, this is called random selection without replacement.) The "chit" technique works well if the total number of items is relatively small.

For instance, chits should be used by interviewers in order to randomly select one of the mother's children from one through five years of age. Each interviewer can have a ready-made set of 5 chits (the theoretical maximum number of children below the age of six one woman could have). Each chit is separately numbered starting with #1. After the interviewer has recorded on the Food Frequency Questionnaire the names and ages of children aged one through five, she selects from the set of chits those which correspond to the number next to each child's name. (One chit for each child.) For example, if she has written the name Sasha in space #1, and the name Demi in space #2, she selects chits numbered #1 and #2. The interviewer then mixes up the chits for each child and chooses (or asks the mother to choose) one chit with her eyes closed. The number on this chit determines which child is selected.

Random numbers table

It is often impractical to pick a random number by the chit method when the total number is too large to conveniently write out chits for every possible number. Under these circumstances, a table of random numbers may be used. The example below illustrates how to randomly pick numbers using the random numbers table on the following page.

For example, if using the simple random sampling method to select 30 communities (15 selected and 15 alternative communities) from a list of 205 communities, numbers corresponding to the communities are randomly picked until the sample is selected. The "sampler" should take a pencil, close her eyes, and point to a spot on the random numbers table. The digit the pencil falls on, or is closest to, is the "start point." Because the communities are numbered 1 through 205, the random numbers table is read in groups of three digits or to the hundredth place. (If a greater range is needed, *i.e.* a random number between 1 and 15,230, read the table in groups of the largest number of possible digits needed.) From the "start point," the "sampler" reads across the row, three digits at a time. For instance, if the "start-point" is 5 in the second row, fifth column, the "sampler would then read, 583, 314, 420, 238, 901, 917, 933, 348, 766, 138, (continuing to the next row) 140, 092, 402, 529, 471, 554, *etc.* Of these numbers, three correspond to the communities on the list, #138, #140, #92, and these are the communities selected. Continue to read the random numbers table until the 30 communities are selected. If necessary, one can pick a new start point.

Random Numbers Table

734	566	223	801	857	563	812	688	619	518	300	772	[illegible]	[illegible]	529
219	618	389	053	345	833	144	202	389	019	179	386	[illegible]	[illegible]	[illegible]
400	924	025	294	715	544	728	664	885	566	044	736	[illegible]	[illegible]	[illegible]
833	450	273	179	207	166	209	903	220	631	887	489	[illegible]	[illegible]	[illegible]
313	457	611	378	939	516	427	675	049	052	040	308	[illegible]	[illegible]	[illegible]
363	264	693	752	236	206	613	454	671	006	654	329	[illegible]	[illegible]	[illegible]
703	809	926	195	648	174	162	335	159	197	671	372	[illegible]	[illegible]	[illegible]
897	180	961	116	306	140	567	721	047	818	575	939	[illegible]	[illegible]	[illegible]
379	923	162	876	468	723	298	925	325	894	553	618	[illegible]	[illegible]	[illegible]
696	352	636	905	926	349	488	310	613	478	713	849	[illegible]	[illegible]	[illegible]
674	581	316	323	467	756	801	620	497	457	583	981	[illegible]	[illegible]	[illegible]
309	252	942	107	447	703	430	557	709	018	798	602	[illegible]	[illegible]	[illegible]
437	773	157	971	766	505	632	768	012	312	072	753	[illegible]	[illegible]	[illegible]
069	939	268	604	494	548	293	505	747	943	730	930	[illegible]	[illegible]	[illegible]
472	792	858	545	128	946	517	232	120	551	191	354	[illegible]	[illegible]	[illegible]
695	546	613	719	398	791	877	248	648	646	879	657	446	[illegible]	[illegible]
376	141	698	215	960	150	262	672	264	827	926	461	340	[illegible]	[illegible]
913	514	343	202	151	777	061	897	289	644	007	574	296	166	[illegible]
569	808	766	600	755	892	843	477	296	705	391	504	132	384	680
265	541	461	549	351	428	947	129	070	117	842	945	926	119	785
582	653	755	615	326	340	448	562	902	993	359	203	876	030	856
485	644	887	374	353	744	746	493	470	704	055	703	943	919	525
463	311	915	716	397	016	503	637	411	773	271	562	182	477	146
543	952	037	209	630	686	108	156	707	987	960	408	888	652	864
992	337	398	402	412	605	083	836	444	646	453	550	469	177	849
800	652	073	914	348	623	358	962	085	920	765	253	187	419	789
192	233	202	433	133	940	416	103	814	422	819	516	862	254	956
559	659	682	504	968	520	778	033	677	366	210	918	598	310	222
172	488	103	658	028	646	638	374	941	252	788	683	405	687	424
550	967	970	429	853	177	677	883	135	875	100	124	766	013	984
157	809	866	391	567	879	677	595	336	642	560	163	959	635	312
646	698	640	619	024	282	933	263	934	330	594	659	110	310	726
054	900	210	791	124	840	300	144	684	691	859	105	991	901	772
080	058	689	631	463	289	151	836	075	705	926	338	797	152	220
551	121	492	277	739	232	530	125	261	589	002	118	521	590	471
821	336	949	974	947	447	954	238	488	351	428	063	783	116	757
947	277	519	686	385	943	146	355	818	971	175	216	931	130	656
906	726	199	622	337	739	527	588	179	818	869	668	956	324	359
513	523	357	974	079	438	014	339	955	843	544	452	970	487	065
365	472	077	776	647	220	732	385	339	505	068	942	299	787	865

Appendix II: Conversion Formulas (RE and IU)

There are many units used to measure the different forms of vitamin A and its precursors, like beta-carotene. The unit of Retinol Equivalent (RE) is the preferred way of describing vitamin A values in foods, as it provides a comparison between all foods regardless of whether they are of plant or animal origin. Also, the FAO/WHO estimated daily requirements for vitamin A are given in terms of REs. For many diverse reasons, REs are not always used or provided on food content lables or food composition tables. Note, for example, that the vitamin A content of high-dose capsules is traditionally given as 200,000 IUs or International Units.

IUs are also used to measure retinol and beta-carotene — but not as equivalent units. Technically, IU_a is used for retinol (vitamin A) and IU_c is used for beta-carotene and other carotenoids. However, this distinction is rarely made in most food composition tables. In such tables assume that IU refers to IU_a.

By definition:

1 μg (or microgram) RE = 1 μg retinol

In general, animal sources contain retinol and are absorbed as direct retinol. Plant sources contain beta-carotene and other provitamin A carotenoids which are then converted into retinol by the body. Beta-carotene is the major provitamin A and converts into approximately twice the amount of retinol compared to other carotenoids. However, not all beta-carotene is converted into retinol or absorbed by the body. Beta-carotene is believed to have 1/6 the vitamin A activity of retinol. Thus:

1/6 (or 0.167) μg RE = 1 μg beta-carotene; which is the same as:

1 μg RE = 6 μg beta-carotene.

In the table below are the formulas to convert various units of retinol and beta-carotene to REs.

Conversion Formula for Vitamin A-related Units

1 IU_a	=	0.3 μg RE
1 IU_c	=	0.1 μg RE
1 μg retinol	=	1.0 μg RE
1 μg beta-carotene	=	0.167 μg RE

Sources:

Olson, JA. *American Journal of Clinical Nutrition* 1987; 45:704-716.
Requirements of Vitamin A, Iron, Folate, and Vitamin B_{12}. Report of a Joint FAO/WHO Expert Consultation. (FAO Food and Nutrition Series, no. 23) FAO, Rome. 1988.

Appendix III: Additional Suggested Reading

Conducting a Qualitative Assessment of Vitamin A Deficiency: A Field Guide for Program Managers. Helen Keller International Vitamin A Technical Assistance Program and Rosen D. : Helen Keller International, New York, 1992.

This field guide explains how to use secondary data sources, qualitative information, and, if necessary, small scale food consumption surveys to develop a community profile of vitamin A deficiency in a program area. The field guide is available from Helen Keller International, 90 Washington Street, New York NY 10006 USA.

Field guide to the detection and control of xerophthalmia. Sommer A. WHO, Geneva, 1982.

This field guide gives a brief overview of methods used to assess the prevalence of xerophthalmia. The focus of the book is on case detection and categorization of eye signs. The book is a practical guide for use by clinicians and public health officials. The guide is available from World Health Organization, CH-1211 Geneva 27, Switzerland.

Guidelines for the Development of a Simplified Dietary Assessment to Identify Groups at Risk for Inadequate Intake of Vitamin A. Underwood B, *et al.* IVACG, 1989.

This guide explains how to use a dietary method to assess vitamin A deficiency. The method utilizes both 24 hour recall and food frequency approaches. It is a more quantitative method than the HKI Food Frequency Method. The guide is available from IVACG, The Nutrition Foundation Inc, 1126 Sixteenth Street NW, Washington DC 20036 USA.

Guidelines for the Eradication of Vitamin A Deficiency and Xerophthalmia. IVACG, Washington DC, 1977.

This book provides an overview of aspects related to the control of vitamin A deficiency and xerophthalmia. It includes chapters on assessment, selection of intervention strategies, evaluation of vitamin A interventions, and future research needs. The guide is available from IVACG, The Nutrition Foundation Inc, 1126 Sixteenth Street NW, Washington DC 20036 USA.

Assignment children: vitamin A deficiency and xerophthalmia: recent findings and some programme implications. Eastman S. UNICEF, New York, 1987.

This book provides a very good overview of vitamin A deficiency including a review of scientific findings and policy and program options for future consideration. The book is available from UNICEF, 3 United Nations Plaza, New York NY 10017 USA.

Controlling Vitamin A Deficiency: A Practical Guide. Helen Keller International Vitamin A Technical Assistance Program. In press.

This guidebook provides an overview of vitamin A's importance for child survival and gives example interventions for preventing vitamin A deficiency. It provides child health program managers with the background and information needed to plan and implement activities to control vitamin A deficiency. The guide is available from Helen Keller International, 90 Washington Street, New York NY 10006 USA.

A field guide for adding vitamin A interventions to PVO child survival projects: recommendations for child survival project managers. Storms D, and Quinley J, editors. PVO Child Survival Support Program, Baltimore, 1989.

This guide gives practical field-based suggestions on assessment of need, design, operation, management and evaluation of vitamin A intervention activities. The guide was developed for use by managers of child survival programs. The field guide is available from the PVO Child Survival Support Program, Institute for International Programs, Johns Hopkins University, 103 E Mount Royal Street, Baltimore MD 21202 USA.

Vitamin A Training Activities For Community Health and Development. Helen Keller International Vitamin A Technical Assistance Program, New York, 1993.

This manual outlines training activities for combatting vitamin A deficiency in an engaging, learner centered manner. The activities are designed as group learning experiences that enhance knowledge, skills, and attitudes necessary to provide effective nutrition education. The manual is available from Helen Keller International, 90 Washington Street, New York NY 10006 USA.

Vitamin A Supplements: A guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia. WHO/Unicef/IVACG Task Force. WHO, Geneva, 1988.

This book gives treatment and prevention schedules for vitamin A supplementation. Indications are also given as to how vitamin A distribution can be integrated into a variety of health services. It is available from World Health Organization, CH-1211 Geneva 27, Switzerland.

Nutrition Communications in Vitamin A Programs, A Resource Book. IVACG, Washington DC, 1992.

This book provides a collection of nutrition communication success stories. Though focused on the control of vitamin A deficiency, the communication concepts and techniques are readily applicable to other health and nutrition issues. This book is available from IVACG, The Nutrition Foundation Inc, 1126 Sixteenth Street NW, Washington DC 20036 USA.

Methodologies for Monitoring and Evaluating Vitamin A Deficiency Intervention Programs. Arroyave G, *et al.* IVACG, Washington DC, 1989.

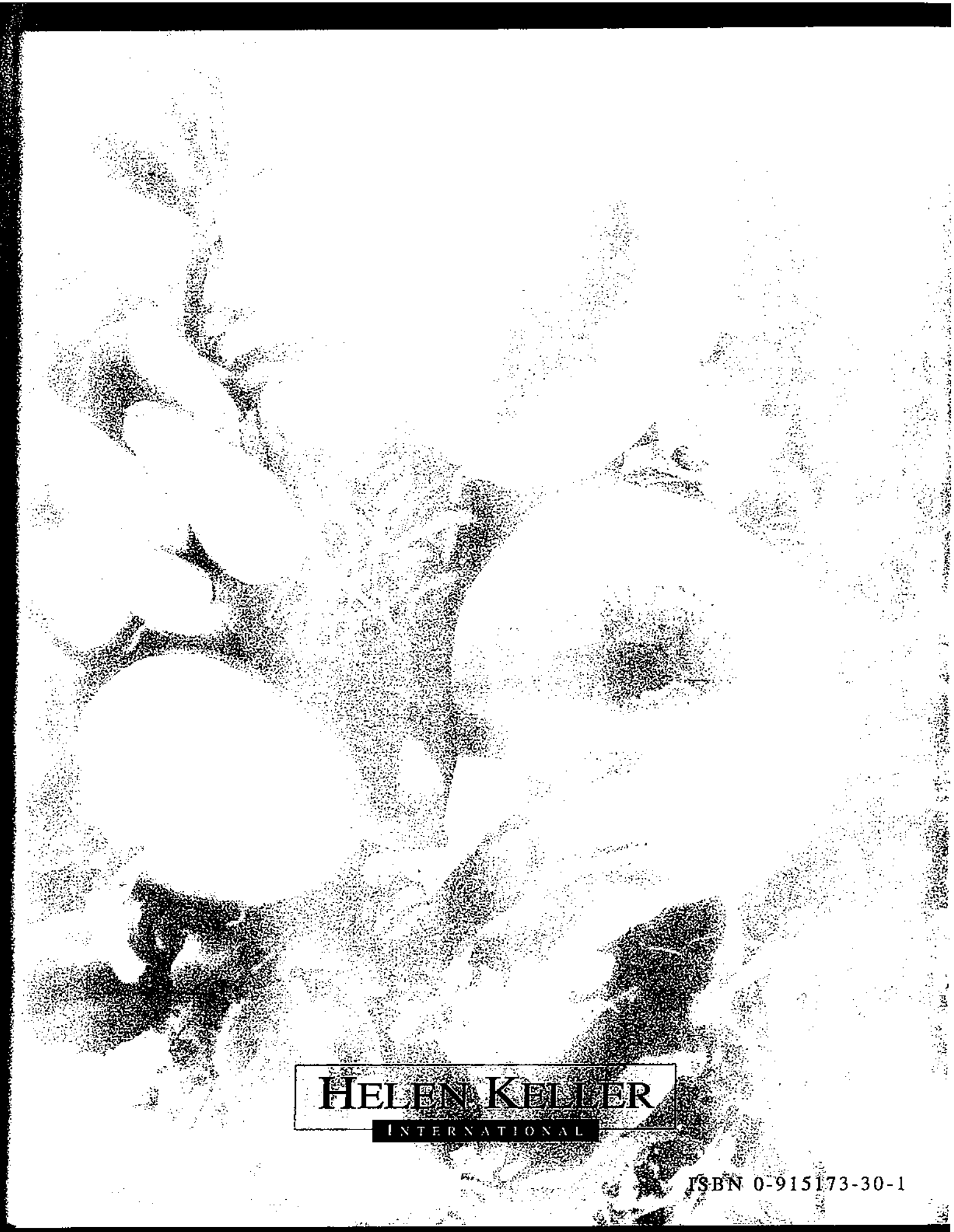
This book promotes evaluation of vitamin A interventions as an integral part of program design. The evaluation process is presented as practical steps under four broad headings; planning, assessment of operational adequacy, interpretation of evaluation data, and reporting. The guide is available from IVACG, The Nutrition Foundation Inc, 1126 Sixteenth Street NW, Washington DC 20036 USA.

Bellagio Meeting on Vitamin A Deficiency & Childhood Mortality. Helen Keller International, New York, 1993.

These complete proceedings explore the physiologic and epidemiologic roles of vitamin A in health and its impact on childhood mortality. They serve as a state-of-the-art review on the body of knowledge existing today on vitamin A deficiency. A concise summary of the meeting's conclusions are also available in, *Bellagio Brief - Vitamin A Deficiency and Childhood Mortality.* The proceedings and summary are available from Helen Keller International, 90 Washington Street, New York NY 10006 USA.

About Helen Keller International

Helen Keller International (HKI) has been a pioneer in combatting vitamin A deficiency, the major cause of childhood blindness, since 1972. HKI's early work with other organizations established the critical role of vitamin A in reducing childhood mortality. Since then, HKI has helped develop interest and commitment and it has provided extensive in-country technical assistance and support to more than 10 national vitamin A deficiency control programs. Through its Vitamin A Technical Assistance Program, HKI has also directly assisted over 50 private voluntary organization or non-governmental organization (PVO/NGO) projects throughout Asia, Africa, and Latin America to incorporate activities to improve vitamin A status into their ongoing child survival programs.



HELEN KELLER
INTERNATIONAL

ISBN 0-915173-30-1