Surveys assessing protein-energy and micronutrient nutritional status in emergency-affected populations

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PROJECT OVERVIEW

Protocol summary

Nutrition assessment surveys in emergency-affected populations are carried out to determine the extent and severity of several types of nutritional deficiencies. Data are collected from a randomly chosen population-based sample. Data collection procedures for individual surveys may include interview, anthropometric measurement, physical examination, and collection of biologic specimens.

Investigators and roles

In such nutrition assessment surveys, staff of the International Emergency and Refugee Health Branch (IERHB) work most frequently with several United Nations agencies, including the United Nations Children's Fund (UNICEF), the United Nations High Commissioner for Refugees (UNHCR), and the World Food Programme (WFP). We also work closely with local and national health authorities and many nongovernmental organizations, such as the International Rescue Committee (IRC), CARE, and World Vision. Funding for such surveys often comes from UNICEF or UNHCR. In collaboration with personnel from these organizations, IERHB personnel often manage all aspects of the survey, including hiring and training survey workers; organizing the logistics of data collection; supervising data collection, computer data entry and analysis; and writing reports and delivering verbal debriefings.

INTRODUCTION

Justification for survey

Food and nutrition related problems represent a major cause of excess morbidity and mortality in many emergency-affected populations. Nutritional status frequently deteriorates because emergency-affected populations are often displaced from their usual sources of food and income. Moreover, many displaced populations are composed largely of subsistence farmers who are removed from their land and who have little or no alternate sources of income with which to purchase food. Wage earners in displaced populations lose their source of income with which to purchase food. In addition to these factors which lead to a deficit in families' ability to procure food, warring factions will often directly interfere with food production and distribution in order to adversely affect specific populations. Even in the absence of population displacement, civil conflict often disrupts the normal mechanisms of food production and distribution, leading to a decline in access to food among part or all the affected population.

In addition to factors determining the available supply of food, an increase in the incidence of communicable diseases often leads to deterioration in nutritional status. Communicable diseases are generally more common in emergency-affected populations because disease prevention programs, such as immunization, are disrupted by conflict, economic chaos, and general social disruption. Moreover, population displacement often leads to settlement in camps with high population densities, poor sanitation, few health services, and other factors facilitating the spread of communicable diseases.

The peak disruption and subsequent population displacement are frequently preceded by a period of gradual social breakdown. Health, education, economic, and other activities are

partially or completely disrupted. The final population displacement is often an indicator of chronic disruption which has finally become severe enough to threaten survival. As a result of all these factors, many affected populations suffer from both protein-energy malnutrition and micronutrient deficiencies.

In populations with such extensive food shortages and severe malnutrition, relief organizations must supply emergency food in order to prevent widespread mortality. In order to initiate such life-saving interventions, relief workers must carry out assessments to determine the specific needs in each population. However, the relief food provided to emergency-affected populations is often deficient in many important micronutrients, such as iron, vitamin A, B vitamins, and others. As a result, although a relief operation may provide sufficient protein, energy, and fats, many individuals in the recipient population may manifest symptoms and signs of micronutrient deficiencies.

Both the initial assessment of an emergency-affected population and evaluation of existing food and nutrition programs require reliable data about the prevalence and severity of protein-energy and micronutrient malnutrition. Such data are usually gathered by population-based surveys. This protocol describes the activities which are commonly included in such assessment surveys.

Intended and potential use of the findings

As stated above, organizations providing aid to emergency-affected populations need data on the type, prevalence, and severity of nutritional deficiencies in order to plan nutritional interventions. For example, the type of feeding programs implemented in a relief dependent population is often largely determined by the prevalence of acute protein-energy malnutrition in children less than 5 years of age. If acute protein-energy malnutrition is not very common, there may be no need for programs providing nutritional rehabilitation for individual children. If malnutrition is widespread, several different types of nutritional rehabilitation, including supplemental and therapeutic feeding, should be offered. In addition, specific programs, such as iron supplementation of pregnant women or children less than 5 years of age, should not be implemented without some indication that iron deficiency is a substantial public health problem in a specific population.

After the acute emergency period, when death rates have normalized and adequate health and public health programs are in place, nutrition assessment surveys are a valuable tool for outcome evaluation of various nutrition programs.

Study design and locations

Nutrition assessment surveys are most commonly cross-sectional descriptive surveys used to estimate the prevalence rates of various types of malnutrition. Surveys can also assess the role of risk factors and identify vulnerable subgroups. Surveys will often be carried out in many different situations and populations, such as 1) in refugee camps or camps for internally-displaced persons which are organized and run by local government authorities or international organizations; 2) in displaced populations which are integrated into a local host population; and 3) in emergency-affected populations which are not displaced. Surveys in non-displaced populations are similar to those done in stable populations not affected by emergencies.

Objectives

The objectives of nutrition assessment surveys in emergency-affected populations usually include at least some of the following:

1) Estimate the current prevalence of acute malnutrition (wasting) and chronic malnutrition (stunting) among children 6-59 months of age.
2) Estimate the current prevalence of protein-energy malnutrition among women of child-bearing age (15-49 years of age).
3) Estimate the current prevalence and severity of anemia among children 6-59 months of age, women of child-bearing age, and possibly adult men age.
4) Estimate the current prevalence and severity of vitamin A deficiency among children 6-59 months of age and women of child-bearing age.
5) Estimate the current prevalence and severity of other micronutrient deficiencies in various target population groups. Such deficiencies and target groups may include iodine deficiency in children 8-11 years of age; B vitamin deficiency in children, adolescents, or adults; vitamin D deficiency in children 6-59 months of age; or others.
6) Estimate current household food consumption patterns, household food security, and food consumption in children 6-59 months of age.
7) Estimate the measles immunization coverage among children 9-59 months of age.
8) Estimate the cumulative 2-week prevalence of diarrheal disease and acute lower respiratory infection in children 6-59 months of age.
9) Estimate the crude mortality rate and age-specific mortality rate for children less than 5 years of age.

Because surveys in emergency-affected populations must be carried out rapidly and are meant to evaluate only those nutritional deficiencies which are 1) most life-threatening, 2) affect the greatest number of persons, and 3) are amenable to immediate intervention, some important nutritional conditions are infrequently evaluated. One example of such a problem is anemia among pregnant women. Although an extremely important problem, achieving a sufficiently large sample of pregnant women in a population-based survey requires the inclusion of too many households to promptly complete an emergency assessment survey. Other assessment methods, such as surveys of antenatal clinic attendees, which are not described in this protocol, may have to be used for such assessment.

Conducting a population-based survey in an emergency-affected population is often a resource-intensive undertaking. Actually reaching remote households often requires the greatest expense and time. For this reason, other objectives may be added to nutrition assessment surveys. Such additions may include assessment of household water supply, source of income, access to health services, health care seeking behaviors, infant feeding practices, and other factors. Nutrition assessment surveys do not usually include the collection of highly sensitive information on sexual behavior, reproduction, or other sensitive topics.

Hypothesis or questions

There are no *a priori* hypotheses in nutrition assessment surveys in emergency-affected populations. The goal of such surveys is to determine the type, prevalence, and severity of nutritional deficiencies in the population in order to design appropriate interventions.

General approach

Nutrition assessment surveys in emergency-affected populations are generally descriptive and intended to provide data on the type, prevalence, and severity of nutritional deficiencies of greatest importance.

PROCEDURES/METHODS

Design

How study design or surveillance system addresses hypotheses and meets objectives

Because the objectives of a nutrition assessment survey in an emergency-affected population are to estimate the prevalence rates of various nutritional conditions, the most appropriate design is that of a cross-sectional survey. No other design will produce a population-based estimate of these outcomes.

Audience and stakeholder participation

The major stakeholder in nutritional assessment surveys in emergency-affected populations are the organizations providing food and nutritional relief interventions to the population. As a normal part of the preparation for a nutritional assessment, all such organizations are consulted and asked what information they need so that survey organizers can decide which specific components should be included in the assessment survey. In addition, in many emergency-affected populations, especially those in more stable, post-emergency situations, various groups represent the interests of the population or subsegments thereof. For example, many refugee camps have elected leaders, organizations of women, and other groups representing of parts of the population. These groups are always consulted when planning an assessment survey in order to be sure that the survey addresses the concerns of the target population. In addition, after completion of data analysis, a debriefing to present the results of the survey is often offered to these groups.

Because of the technical nature of sampling, data collection, and data analysis, most stakeholders do not participate in these phases of survey activity. Nonetheless, these activities are planned to take into account the expressed interests of the concerned organizations and populations.

Study time line

Nutrition assessment surveys in emergency-affected populations which do not involve testing biologic specimens in a laboratory often take 4-6 weeks from the beginning of the planning stage to presentation of final results. Of course, the urgency with which the results are needed can influence the desired sample size, the amount and type of data to be collected, and other factors which determine the time needed for survey completion. If the survey requires laboratory testing in a distant laboratory, the time required will be a function of the time needed to perform this laboratory testing.

Study population

Description and source of study population and catchment area

Nutrition assessment surveys described herein will be carried out most often among displaced or emergency-affected populations. Such populations, if displaced, are sometimes settled in camps and sometimes integrated into the host community or both. Regardless of pattern of settlement, surveys will often select a sample of households and include in the survey sample all members of targeted groups who reside in those households on the day of data collection. Targeted groups may include children less than 5 years of age, women of child-bearing age, school age children, adolescents, adult men, or other groups depending on the nutritional conditions to be assessed.

Case definitions

Case definitions for nutritional deficiencies commonly included in nutritional assessment surveys in emergency-affected populations are given below:

Protein-energy malnutrition in children less than 5 years of age: Undernutrition, including wasting, stunting, and underweight, in children less than 5 years of age is defined using the NCHS:CDC:WHO reference population of children. When it becomes available, the new World Health Organization (WHO) international reference population will be used instead. Children with z-scores below -2 for weight-for-height, height-for-age, or weight-for-age are defined as wasted, stunted, or underweight, respectively. Moderate wasting, stunting, and underweight are defined as a z-score less than -2 but greater than -3. Z-scores less than -3 define severe wasting, severe stunting, or severe underweight.

For children less than 5 years of age, mid-upper arm circumference (MUAC) is sometimes used to assess protein-energy malnutrition when measuring weight and height are not feasible. MUAC measurements less than 11.5 cm are classified as severely low. MUAC measurements of 11.5 – 12.4 cm are considered moderately low, and MUAC 12.5 cm or greater are considered normal.

Protein-energy malnutrition in adults: Malnutrition in adults is assessed using body mass index (BMI), which is calculated by dividing the weight in kilograms by the square of the standing height in meters. The most common cut-off points for BMI to define levels of malnutrition in nonpregnant adults are shown below.

BMI	Category of malnutrition
< 16.0	Severe
16.0 - 16.9	Moderate
17.0 - 18.4	At risk
18.5 - 24.9	Normal
25.0 - 29.9	Overweight
≥ 30	Obese

An alternate scheme uses both MUAC and BMI to determine the level of malnutrition according to the scheme shown below.

BMI / MUAC	Normal (BMI≥18.5)	At risk (17.0≥BMI<18.4)	Moderate (16.0≥BMI<17.0)	Severe (16.0<BMI)
Normal	Normal	Normal?	Mild (Category I)	Moderate (Category II)
Low	Normal?	Mild (Category I)	Moderate (Category II)	Severe (Category III)

Because BMI is not valid in pregnant women, MUAC measurements are sometimes used in this group to assess protein-energy malnutrition. Although no international consensus exists, malnutrition in pregnant women is often defined as a MUAC less than 22.0 cm.

Anemia: The cut-off points for hemoglobin concentration used to define anemia depend on the age and sex-group of the person tested, as shown below.

Age or sex group	Hemoglobin concentration (g/dL) defining anemia
Children 6 months - 5 years	< 11.0
Children 5-11 years	< 11.5
Children 12-13 years	< 12.0
Non-pregnant girls and women >13 years	< 12.0
Pregnant women > 13 years	< 11.0
Boys and men >13 years	< 13.0

Hemoglobin concentrations must be adjusted for survey subjects who live at high altitude. The adjustment is shown below.

Altitude range (in meters)	Increase in cut-off point defining anemia(g/dL)
alt < 1000	No adjustment
1000< alt <1250	+0.2
1250< alt <1750	+0.5
1750< alt <2250	+0.8
2250< alt <2750	+1.3
2750< alt <3250	+1.9
3250< alt <3750	+2.7
3750< alt <4250	+3.5
4250< alt <4750	+4.5
4750< alt <5250	+5.5
5250< alt	+6.7

In some surveys in which measurement of hemoglobin concentration will not be possible, survey subjects are examined for the presence of pallor, indicating moderate and severe anemia. Pallor is most often sought on the palms, but may also be examined in the conjunctiva, buccal mucosa, and nail beds.

Vitamin A: A serum retinol concentration less than 0.35 : mol/l (10 I.U.) defines deficiency. Serum retinol levels of 0.35 – 0.69 : mol/l (10-19 I.U.) indicate low retinol levels. In surveys where obtaining the appropriate biologic specimen for measurement of serum retinol is not feasible, survey subjects may be examined for the presence of Bitot's spots or questioned about the presence of night blindness. Night blindness is often difficult for a mother to detect in children less than 24 months of age.

Measles immunization coverage. Measles immunization status is most often determined by asking an adult caretaker, preferably the mother, if the child has ever been vaccinated against measles. In some populations where mothers have written health records, such as vaccination cards, evidence of measles vaccination will consist of a written record of immunization. In other populations where vaccination cards are not widely available, the mother's verbal report will serve as evidence of vaccination.

Cumulative prevalence of diarrhea and acute lower respiratory infection. During interviews with an adult caretaker, survey workers define diarrhea as 3 or more bowel movements in the prior 24 hours. The child's having had diarrhea at any time in the prior 2 weeks is considered positive. Acute lower respiratory infection is defined as the presence of cough and fever; having this condition at any time in the prior 2 weeks is considered positive.

Participant inclusion criteria

Households are eligible for participation in nutrition assessment surveys if they fit the clearly defined criteria established before sampling takes place. Such criteria are most often geographic because most surveys are done to estimate nutritional status in a geographically defined emergency-affected population or the population of a specific camp. Individuals in selected households are eligible for participation if: 1) they fit the criteria defining a target subgroup, such as children 6-59 months of age, women of child-bearing age, etc. 2) they live in a selected household at the time of data collection, and 3) consent is given by the participant or a responsible adult for survey participation.

Participant exclusion criteria

Households will be ineligible for participation in nutrition assessment surveys if 1) they are empty, that is, if no one from the household currently lives in the defined population, or 2) consent for participation is denied by the adult household member approached by the survey team. Individuals in selected households will be ineligible if consent is denied.

Justification of exclusion of any sub-segment of the population

No sub-segment of the population will be specifically excluded from participation in nutrition assessment surveys in emergency-affected populations; however, some population sub-segments may not be specifically chosen for inclusion. Women and children are at greater risk

of most nutritional deficiencies; therefore, they will be targeted for most nutrition assessment surveys. Men are at substantially lower risk of many nutritional deficiencies and are therefore specifically not targeted for most nutritional assessments. One exception is the assessment of the causes of anemia. Men are often included in such surveys because they are much less susceptible to iron deficiency. Therefore, survey findings indicating that anemia is common among women and children but rare among men provide evidence that iron deficiency is a predominant cause of anemia.

Estimated number of participants

The specific sample size in each nutrition assessment survey depends on many assumptions and factors which may differ from one survey to the next. Commonly, such surveys include 200 – 700 households and all eligible members of target groups who live therein.

Sampling, including sample size and statistical power

The required sample size will be calculated separately for each assessment survey. All sample size calculations use the following assumptions:

1) The limit of statistical significance (alpha) = 0.05
2) The power (beta) = 0.8

The other assumptions required for sample size calculation will be decided based on the specific population to be assessed. These assumptions include:

1) Prevalence of nutritional condition of interest
2) Desired precision of point estimate of prevalence, cumulative prevalence, incidence, or mean.
3) Population size, if less than 10,000.
4) Design effect, if cluster sampling is planned.

The table below shows examples of nutrition conditions of interest, the assumptions used, and the sample size needed which may be used in nutrition assessment surveys in emergency-affected populations. These examples assume a population size greater than 10,000. Of course, the assumptions used and therefore the required sample sizes will differ depending on the nutrition conditions and specific population to be assessed.

Target group and type of malnutrition	Assumed current value	Precision required	DEFF assumed	Sample size needed
Children 6-59 months				
Wasting (< -2 SD)	20%	" 5%	2	492
Stunting (< -2 SD)	50%	" 10%	2	193
Anemia (< 11.0 g/dl)	50%	" 10%	2	193
Adult women				
Malnutrition (BMI <18.5)	20%	" 5%	2	492
Anemia (< 11 g/dl)	50%	" 10%	2	193
Adult men				
Anemia (< 13 g/dl)	10%	" 5%	2	277

* DEFF = Design effect

Of course, each assumption will be specifically formulated for each survey using existing data on that population. For example, in a recent survey in Afghanistan, prior surveys as well as qualitative data on the target population indicated that the design effect would be relatively low for most nutritional outcomes. The sample size for this survey was calculated using an assumed design effect of 1.5.

The primary objective of nutrition assessment surveys in emergency-affected populations is often to measure nutritional status of young children. Therefore, even though data are often gathered on other target household members and the household itself, the final sample size used in such surveys is often based on nutrition outcomes in young children.

The sampling procedures used will depend on the type of data available for the population. In many displaced populations located in stable camps, an international organization, such as UNHCR, has carried out a complete or near complete census of all camp residents. This registration database supplies a complete list of all households or individuals living in the camp. In these situations, lists of households or target individuals can be generated from which to choose a sample by simple or systematic random sampling. For example, a recent anemia survey in two camps in western Tanzania assessed the prevalence of anemia in children 6-59 months of age and their mothers. It also assessed the prevalence of iron overload in adult men 30 years of age or older. In these two camps, a registration had taken place 9 months prior to the surveys, and the registration database was constantly updated to account for new arrivals and departures. As a result, the registration data provided an excellent sampling frame. Two lists were generated from the database: one of households and one of men 30 years of age or older. A systematic random sample was drawn from the household list after calculation of the required sample size. Households on the household list were visited in order to identify children 6-59 months of age and their mothers to be included in the survey. The basic sampling unit was household while the unit of analysis for nutrition variables was the individual household member. A second sample of men 30 years of age and older was selected by sysematic random sampling from the list of men. Selected men were then recruited for the survey. In this case, both the unit of sampling and unit of analysis was individual men.

In many situations, especially during acute emergencies and new settlements of displaced persons, lists of all households or individuals in the population are not available. In such cases,

cluster or multi-stage sampling must be done. The primary sampling units differ depending on the organization of the population and the data available. For example, in a recent survey in a province in Afghanistan, a complete list of all villages in the province was available along with approximate population of each village. From this list, 30 villages were selected probability proportional to size as primary sampling units. Upon visiting each of these villages, survey workers, with the assistance of local leaders, constructed a complete list of all households in that village. Households were then selected by simple random sampling, and all members of the target groups of children 6-59 months of age and women of child-bearing age were included in the survey. In large villages, where making a list of all households was not practical, one subsection of the village was chosen at random probability proportional to size. A list of all households in this subsection was then created and sampling of individual households done as described above. The basic sampling unit was the household, which was also the unit of analysis for various household-level variables, such as the source of water and food security. The unit of analysis for most nutrition variables was the individual child or woman.

Regardless of the specific sampling method used, sampling will attempt to achieve equal-probability of selection. That is, each of the basic sampling units in the sampling universe, whether households or individuals, will have the same probability of being included in the survey sample. As a result, data analysis will not require statistical weighting. In order to achieve equal probability sampling, each sampling stage except the last uses probability proportional to size selection. In a hypothetical situation where a survey sample includes 30 clusters of 20 households each, the probabilities of selection at each sampling stage and the final probability of selection for individual households are illustrated below:

Stage 1 Probability of any given PSU* being selected		Stage 2 Probability of any given secondary unit being chosen within selected PSU		Stage 3 Probability of any specific HH being chosen within selected secondary unit		Product of individual probabilities = Probability of any specific HH being chosen for survey
$\frac{30 \times \text{No. HHs in PSU}}{\text{No. of HHs in sampling frame}}$	X	$\frac{\text{No. of HHs in secondary unit}}{\text{No. of HHs in PSU}}$	X	$\frac{20}{\text{No. of HHs in secondary unit}}$	=	$\frac{30 \times 20}{\text{No. of HHs in sampling frame}}$

* PSU = Primary sampling unit (also called clusters)
30 = Number of clusters
20 = Number of households selected in each cluster

In order to carry out selection probability proportional to size, the list of sampling units must contain some indicator of the relative size of each sampling unit. The indicator of size for the sampling units in all but the final stage of sampling is ideally the number of basic sampling units (households in the Afghanistan example above). However, in some cases, another measure of size must be used. For example, if the final sampling stage chooses children 6-59 months of age, the number of children in each primary sampling unit should be the measure of size to achieve probability proportional to size. However, these data may not be available. In such a

case, a surrogate measure of the size of each primary sampling unit, such as total population or number of households, may have to be used to approximate probability proportional to size sampling. Such uses of such surrogate measures of size should not substantially bias the final estimates of prevalence or incidence.

Enrollment procedures

Upon presenting themselves to an adult in a selected household, survey team members will explain the survey purpose, methods, and procedures, and request verbal consent from this adult (see section below "Supplemental information for protection of human research participants" for more information on the consent process). All household members who fit the criteria for a target group will be included in the survey if consent is received. At the start of the survey team's visit to a selected household, household members or others in the community will be asked to fetch absent household members who are eligible for survey inclusion; however, the team will not be able to wait for household members who have not arrived by the time data collection has been completed. If time allows, a survey team may be able to return to a selected household to complete data collection from eligible members who were absent during the initial visit.

Survey teams will record for each selected household or individual in the survey sample the following information, 1) whether consent was given, 2) whether data collection was completed, and, 3) if data were not collected, why. These data will allow calculation of response rates and the determination of reasons for nonresponse.

Consent process

Prior to enrollment, verbal consent will be obtained from adults and parents or caretakers of children selected for participation in the survey. For further information on consent procedures, see the section below "Supplemental information for protection of human research participants."

Variables/interventions

Variables

Below are listed some of the variables which may be collected in a nutrition assessment survey in an emergency-affected population

I. Household data
   A. Number of family members
   B. Household income
   C. Amount of money spent on food per month
   D. Duration of residence in this location
   E. Source of water: (central system, truck, reservoir, well, surface water, other)
   F. Receipt of relief food
   G. Household food stores available
   H. Household food security
   I. Iodine testing of household salt

II. Individual household members
    A. Age
    B. Sex
    C. Status now (Alive in household, alive elsewhere, dead, unknown)
III. Children 6-59 months of age currently in household
    A. Date of birth or age in months
    B. Sex
    C. Vaccination status
        1. BCG – by scar and by mother's history and/or vaccination card
        2. OPV
        3. DPT
        4. Measles
    D. Nutritional status
        1. Food consumption history: (24 hour recall)
        2. Acute protein-energy malnutrition
            a. Weight
            b. Height
            c. Mid-upper arm circumference: (MUAC)
            d. Edema
        3. Anemia
            a. Hemoglobin
            b. Transferrin receptor concentration
            c. Serum C-reactive protein concentration
            d. Serum folate concentration
        4. Vitamin A
            a. Presence of night blindness
            b. Presence of Bitots spots
            c. Serum vitamin A level
        5. Vitamin C
            a. Symptoms
            b. Examination of gums and joints
        6. Vitamin D
            a. Symptoms
IV. Children 8-11 years of age
    A. Date of birth
    B. Examination for goiter
    C. Urinary iodine
V. Women of child-bearing age currently in household
    A. Age
    B. Education level
    C. Pregnancy status
    D. Weight
    E. Height
    F. MUAC
    G. Examination for goiter

H. Hemoglobin

VI. Adult men: (>18 years of age) currently in household

A. Hemoglobin: (subsample)

Study instruments, including questionnaires, laboratory instruments, and analytic tests

Data collection will be done using standard techniques. Anthropometric measurements and calculation of indices will be done according to international consensus and WHO recommendations. Laboratory testing of biologic specimens will be done according to accepted laboratory techniques.

Nutrition assessment surveys may occasionally use data collection techniques which have not been well standardized or are not widely recommended nor agreed upon by international consensus. Surveys may provide opportunities to test the validity and feasibility of these techniques in the field. Examples of such techniques used in recent surveys include:

1) Testing a method of estimating the influence of body habitus on the BMI cutoffs used to define malnutrition. This method takes into account the sitting height-standing height ratio.
2) Use of methods of estimating height in elderly, stooped survey participants by measuring arm span and calculating peak height.
3) Testing WHO recommendations for assessing protein-energy malnutrition in adolescents.

None of these techniques, nor any technique used in future surveys, pose any additional risk to survey participants whatsoever.

Training for all study personnel

Training for survey team members usually consists of 3-4 days of classroom instruction and practice and 1 day of pretesting all survey procedures, including interviews, physical examination, anthropometric measurement, and biologic specimen collection.

Interview training includes discussion of each question, practice reading, and role playing. As a part of their training, interviewers assist in pretesting and revision of questionnaire questions in order to ensure their clarity and cultural appropriateness.

Two survey workers from each survey team are taught to measure and record height, length, weight, and MUAC for children and adults in a standardized fashion. Personnel weigh and measure each other, as well as a convenience sample of children brought to the training site. Intermeasurer variability is measured and excess variability corrected.

Physical examinations is done by qualified medical personnel. Training includes a description of the signs and symptoms of micronutrient deficiencies to be included in the survey and illustrations of findings which might be seen.

At least one health worker on each survey team is trained to collect the biologic specimens necessary for that specific survey. Such training may include the use of the Hemocue® hemoglobinometer to measure hemoglobin concentration and use of other portable laboratory instruments to be used by survey team members in the field. Fingerstick and phlebotomy technique is reviewed and practiced on other survey team members. Although fingerstick may be taught to naïve survey team members, phlebotomy is done only by health workers already experienced in this technique. The processing and storage of specimens is also taught during the training period and closely supervised during the first days of the survey.

Data handling and analysis

Data analysis plan, including statistical methodology and planned tables and figures

The sampling methods have been previously described (see section "Sampling, including sample size and statistical power" above). Data collection procedures are described in the next section "Data collection").

In general, data analysis includes calculation of proportions to derive the prevalence of various nutrition and health conditions and mean averages of various continuous measurements. Although all possible analyses cannot be determined for all possible nutrition assessment surveys in emergency-affected populations, the example of hemoglobin will illustrate the potential types of data analysis.

An estimate of the importance of anemia among children, women, and men is generated by calculating the proportion of the survey participants for whom hemoglobin concentration falls below the WHO-recommended threshold for defining anemia (see section "Case definitions" above). In addition, survey coordinators graph the distribution of hemoglobin concentrations and calculate the mean hemoglobin concentration for each of the target groups. The statistical precision of all prevalence estimates is assessed using 95% confidence limits, and the statistical significance if differences between subgroups is assessed using Chi square.

Data collection

The entire data collection form, including interview questions, is translated into the language or languages spoken by survey team members and survey participants by native speakers of these languages. The translation is then back translated into English by different translators. Differences between the original and back-translated English forms are resolved by the two translators working with the survey supervisor. Interview questions are read verbatim by interviewers during data collection. An example of the English version of such a data collection form is given in Appendix 1.

Interviews. Interviews will be conducted by appropriate survey team members who have received instruction in the type of data to be collected by each specific question and the reason these data are being collected. Interview questions will be read verbatim from the interview form. Interviewees will be allowed to refuse answers to any or all of the questions.

Anthropometric measurements. All anthropometric measurements, most commonly consisting of height, length, weight, and MUAC, will be taken using standard methods. For example, for children 6-59 months of age, all measurements will be taken using the procedures outlined in the UNICEF training manual "How to Weight and Measure Children.." All anthropometric indices will be calculated using either the NCHS/CDC/WHO reference population, or if available, the new WHO reference population. Anthropometric measurements on adults are less standardized. Weight will be measured with a properly calibrated bathroom-type scale. Height will be measured using a portable stadiometer while the subject stands against a vertical surface. For other target groups, including adolescents, methods may differ depending on current knowledge.

Physical examination. In some nutrition assessment surveys, collection of biologic specimens may be infeasible or ill advised. In such cases, survey subjects may be examined for signs or symptoms of specific micronutrient deficiencies. In all cases where protein-energy

malnutrition is assessed in children and adults, the feet and lower legs must be examined for edema to rule out edematous malnutrition which invalidates those anthropometric indices which include weight. Such examination will be done by qualified medical personnel and be as non-invasive as possible. In many children, some measure of mild restraint is required for certain portions of such examinations. Such restraint is minimized and carried out only with parents' permission or by parents themselves.

Collection of biologic specimens. For most micronutrients, clinical manifestations appear late in the deficiency and only among those persons with severe deficiency. As a result, clinical findings almost always underestimate the prevalence of the micronutrient deficiency. For this reason, many nutrition assessment surveys include the collection of biologic specimens in order to obtain more accurate estimates of the prevalence rates and severity of deficiencies of specific micronutrients. The most common micronutrient deficiencies assessed include iron and vitamin A; however, others may be included in specific surveys. The type of specimens, the methods of obtaining the specimen, and target groups for the laboratory assessment of specific micronutrient deficiencies in emergency-affected populations are shown below.

Micronutrient	Specimen	Methods of collection	Common target groups
Iron	Blood	Fingerstick or Phlebotomy	Children < 5 years of age Adult women
Vitamin A	Blood	Fingerstick or Phlebotomy	Children < 5 years of age Adult women Adolescents
B vitamins	Blood	Phlebotomy	Children < 5 years of age Adolescents
Vitamin D	Blood	Phlebotomy	Children < 5 years of age
Vitamin C	Blood	Phlebotomy	All ages and sexes
Iodine	Urine	Voluntary urination	Children 8-11 years of age

Information management and analysis software

In most cases, initial data entry and analysis for nutrition assessment surveys in emergency-affected populations will be done using EpiInfo software. In cases where the final report must await the results of laboratory results, the final data analysis can be done using SAS or SUDAAN.

Data entry, editing and management, including handling of data collection forms, different versions of data, and data storage and disposition

For most nutrition assessment surveys in emergency-affected populations, computer data entry will be done one time, followed by a complete comparison of the paper data collection forms and computer data to ensure accuracy. After this comparison and further data cleaning, all preliminary copies of the dataset will be erased and the final dataset distributed to concerned parties. The computer database variable names will be added to a copy of the data collection form to indicate precisely the origin of the data in each field of the database. This reference document will be stored both electronically with the computer dataset and in hardcopy along with the paper data collection forms.

The final dataset and all other materials created or used during the survey will belong to the organization or agency which has requested IERHB assistance and paid the costs of the survey, including the expenses of IERHB personnel. However, because many of these organizations have little technical capacity in data storage, analysis, or interpretation, IERHB personnel will maintain a copy of the final dataset in order to be able to answer queries and perform additional analyses not included in the written survey report. Authorship of publications based on the results of a nutrition assessment survey will be discussed by all concerned parties and agree upon before preparation of any publications. Such publications must be reviewed and approved by each of the organizations which participated in the survey.

The actual paper data collection forms will not contain identifying information. As a result, the computer dataset will also not contain any identifying information. However, in most surveys, a sample list is created when the final selection of households or individuals is made during the sampling process. In cluster surveys, there is a separate form for each cluster, often called a cluster control form, which lists all the households or individuals selected for that cluster. These sample lists and cluster control forms contain both identifying information and a numeric code for each selected household or individual. This code allows survey workers to match the identifying information on the sample list to individual data collection forms, thus permitting follow-up with specific survey participants if necessary. At the end of the survey, these sample lists will be destroyed or permanently and securely stored in a location separate from the data collection forms. Final deposition of survey materials, including computer datasets and paper forms, will be determined by the organization or agency which funds the survey. In most cases, the sample lists and paper data collection will not return to Atlanta with IERHB personnel.

Quality control/assurance

During data collection at each selected household, survey team leaders will supervise all steps of data collection, including the interview, physical examination, anthropometric measurement, and biologic specimen collection. Upon completion of data collection at each household, the survey team leader will review the entire data collection form to ensure completeness and accuracy. As mentioned above, after data entry, the computer dataset will be exhaustively compared to the original paper data collection forms to ensure accurate data entry.

Bias in data collection, measurement and analysis

Several source of bias may potential influence the results of a nutrition assessment survey in an emergency-affected population.

Interview. Survey interviewers may influence the answers given by survey participants. To reduce this bias, interview questions will be carefully written and pretested on individuals from the target population. Translation and backtranslation will ensure that questions collect the data they are meant to collect. Survey interviewers will be carefully trained and supervised to ensure that they read questions verbatim from the data collection form. Most questions will be relatively simple and not require extensive interpretation by respondents.

Anthropometric measurements. As mentioned above, complete training is provided in measurement technique and includes a standardization exercise. Survey trainees who cannot achieve measurement results comparable to those of other survey workers and supervisors will

not be used for actual data collection. The height boards, scales, and tapes used for measurement will be carefully constructed and calibrated periodically throughout the data collection period. During data analysis, outlying anthropometric indices will be excluded from analysis according to the criteria recommended by the WHO. Additional analysis will be done to judge the validity of anthropometric measurements, including an analysis for digit preference in height measurements, calculation of the standard deviations of all z-scores, and analysis of the age distribution of selected children 6-59 months of age by one-month intervals.

Physical examination. Training for survey workers who examine survey participants will use photographs of the signs of various micronutrient deficiencies. Team supervisors will confirm all positive findings during data collection.

Biologic specimen collection. Training for survey workers covers all aspects of specimen collection and any laboratory testing to be done in the field. For example, for surveys measuring hemoglobin concentration, training includes all the aspects of obtaining fingerstick blood and operating and calibrating the Hemocue® hemoglobinometer. Biologic specimens are processed, stored, and transported according to instructions from the laboratory which does the testing.

Intermediate reviews and analyses

Because most nutrition assessment surveys in emergency-affected populations are done relatively rapidly, no intermediate tracking of results can be done before the final data analysis. Nonetheless, continuous supervision provides quality control during data collection.

Limitations of study

Surveys to assess nutritional status in emergency-affected populations are subject to the same limitations as all cross-sectional surveys. Nonetheless, the components of training and supervision outlines above will minimize these threats to validity (see section above “Bias in data collection, measurement and analysis”).

Handling of Unexpected or Adverse Events

Identifying, managing, and reporting adverse events

The only adverse events possible in nutritional assessment surveys in emergency-affected populations are those which may appear, albeit very rarely, after fingerstick or phlebotomy. Only qualified survey team members are allowed to perform these procedures, and these personnel monitor survey participants for some minutes after the procedure to ensure that there is no bleeding, serious bruising, or vasovagal syncope.

Emergency care

Vasovagal syncope is the only event which might be construed by a layperson as an emergency resulting from data collection activities. Survey team members are trained to place a survey participant with vasovagal syncope in a recumbent position and explain to the participant and family members the nature of the syncope and its immediately reversible and nondangerous nature.

Dissemination, Notification, and Reporting of Results

Notifying participants of their individual results

For some outcomes, the result is available immediately upon data collection and may be communicated to survey subjects or parents. For example, hemoglobin is most commonly measured by a portable hemoglobinometer which produces an accurate measurement in 30-60 seconds. In addition, some findings of physical examination, such as Bitots spots, are specific enough to make a reasonably accurate individual diagnosis of a specific micronutrient deficiency. If such indicators are measured in a nutrition assessment survey and, for an individual survey subject, they indicate a significant nutritional condition, the subject will be given the results and referred to a health facility for further evaluation or treatment as appropriate for that health care system. However, for most micronutrients, laboratory testing is not done at the time of the household visit. For these results, if local collaborators and community representatives wish, the results of testing done in a distant laboratory can be returned to local survey coordinators, matched with identifying information, and returned to responsible authorities who can provide follow-up for those subjects for whom laboratory results indicate clinically important deficiency. In some surveys, survey teams themselves can provide appropriate treatment. For example, survey teams may carry vitamin A capsules to give to children who display very specific signs of vitamin A deficiency, such as Bitots spots. Survey teams can also provide vitamin C to survey participants with obvious scurvy or provide vitamin D to participants with rickets. Treatments such as vitamins A or D, which may have some small potential of toxicity, are only prescribed by qualified medical practitioners.

Notifying participants of study findings

For many reasons, individual survey participants cannot be notified of the results of survey data analysis. In noncamp situations, remote locations, large sample sizes, and severe logistic constraints often preclude repeat access to survey participants at a reasonable cost. In many populations, the majority of survey participants will be illiterate, preventing distribution of written results. Nonetheless, the results of many assessments are communicated to community leaders who may then notify members of the population.

Anticipated products or inventions resulting from the study and their use

As described above, the type, extent, and urgency of food and nutrition interventions will depend on the findings of a nutrition assessment survey in an emergency-affected population. Such interventions could include:

1) Distribution of relief food to the entire population as an emergency general ration.
2) Supplementary feeding provided to persons with moderate protein-energy malnutrition, as identified by screening.
3) Supplementary feeding provided to all persons in specified vulnerable groups, e.g. children less than 5 years of age or pregnant and lactating women.
4) Therapeutic feeding of persons identified with severe protein-energy malnutrition.
5) Specific therapy for persons identified with certain micronutrient deficiencies, e.g. provision of iron tablets to children with pallor or provision of vitamin A to children with Bitots spots.

6) Targeted supplementation of groups identified by screening as having a specific micronutrient deficiency, e.g. iron supplementation of pregnant women or young children.
7) Distribution of fortified food in the general ration or supplementary feeding program, e.g. inclusion of fortified corn-soy blend cereal in relief rations.

Disseminating results to public

The results of nutrition assessment surveys are presented in written reports distributed widely to all concerned organizations and agencies. Most sponsoring agencies also post these reports on websites or widely disseminate them electronically to other interested persons. Often a preliminary report contains those results available immediately after data collection, including answers to interview questions, anthropometric assessment, hemoglobin measurements, and an estimate of vaccination coverage among children. This preliminary report is often discussed in a consultative meeting with all participating organizations.

Dissemination of results may also include verbal presentations in the location where the survey was done, as well as regional and national capital cities and the headquarters of the sponsoring organization. During such debriefings, survey coordinators are available to answer questions during these presentations.

In those surveys in which testing is done in a remote laboratory, a second final report is drafted by survey coordinators when these laboratory results become available. This report includes specific recommendations not included in the preliminary report which may be based on the new laboratory results. Survey results may also be published in the biomedical literature. As described above, authors of such publications must obtain clearance from all organizations sponsoring these survey.

SUPPLEMENTAL INFORMATION FOR PROTECTION OF HUMAN RESEARCH PARTICIPANTS

In general, nutrition assessment surveys performed in emergency-affected populations do not fit the definition of research. The goal of such surveys is the evaluation of the nutrition and health status of a specific population at a specific point in time. Although the methods and results of specific surveys may occassionally be useful to guide future assessment surveys, the production of generalizable scientific knowledge is not a major goal of such surveys. Nonetheless, nutrition assessment surveys are sometimes published in the biomedical literature because they produce lessons which may assist other relief workers in performing similar future assessments. Regardless, the risks and benefits of survey participation are presented below.

Description of risks (physical, social, psychological) to the individual or group. Include methods to minimize risks

The physical risks of participation in nutrition assessment surveys include only those of fingerstick and phlebotomy. Both procedures involve some discomfort. Possible adverse outcomes from these procedures are discussed above (see section "Identifying, managing, and reporting adverse events"). As mentioned previously, survey personnel will monitor participants for some minutes after these procedures to ensure that bleeding has stopped and no syncope occurs.

Social and psychological risks are minimal. No sensitive questions will be asked during interviews. Although in many populations, privacy is difficult to achieve during data collection, all possible efforts will be made to keep participants responses and findings as private as possible. No survey data will ever be connected to identifying information in a report, manuscript, or verbal debriefing.

Description of anticipated benefits to the research participant

As mentioned above, participants will learn the results of some laboratory testing and physical examination and may benefit from referral or immediate treatment. In addition, indirect benefits to survey participants include the benefits accrued to the entire population as a result of the interventions based on the survey findings.

Description of the potential risks to anticipated benefit ratio

The risk of participation includes only the minimal risk of fingerstick and, in some surveys, phlebotomy. The benefit includes the implementation of critical food and nutrition programs in population with potentially serious nutritional deficiencies.

Justification for involving vulnerable participant populations

Protein-energy malnutrition and most micronutrient deficiencies occur in vulnerable populations, such as young children, women of child-bearing age, and pregnant and lactating women. As a result, assessment of these problems must be directed to these vulnerable populations to achieve the maximum likelihood of detecting these conditions if they are present in an emergency-affected population.

Procedures for implementing and documenting informed consent

As described above, prior to enrollment, verbal consent will be obtained from all adults and from parents or caretakers of children selected for participation in the survey. The explanation of the survey will include the purpose of the survey, the types of questions which will be asked, the procedure for weighing and measuring children 6-59 months of age and women of child-bearing age, procedures for examining children and women, and a description of the type and quantity of biologic specimens to be obtained as well as the procedures necessary for specimen collection. The granting of verbal consent will be indicated on the data collection form. Written consent is not practical in most nutrition assessment surveys in emergency-affected populations because the majority of survey participants in many populations are illiterate, the risks to survey participants is very small, and the time necessary for extensive explanation of all facets of the survey is not available.

Survey team members will advise survey coordinators regarding the culturally most appropriate way to explain the survey and obtain verbal consent. Survey coordinators, in collaboration with survey team members, may produce a list of items to be covered when seeking consent. An example of such a list is contained in Appendix 2.

Justification for waiver of documentation of informed consent

As described above, the risk attendant to participation in nutrition assessment surveys in emergency-affected populations is very minimal. Written consent is not required in the United States nor in most countries of the world for the procedures (fingerstick and phlebotomy for nutritional assessment, physical examination, and response to questionnaire questions) used in such surveys. Moreover, requiring written consent would make nutrition assessment surveys impossible in many emergency-affected populations because a majority of the members of many such populations cannot write nor sign their name.

Description of procedures for implementing and documenting the assent process of children

Because the children included in most nutrition assessment surveys are less than 5 years of age, assent is not required. Consent will be obtained from the mothers or guardians of all children, regardless of age. In those surveys which assess the extent of iodine deficiency by testing urine of children 8-11 years of age, assent will be sought from these children for collection of urine specimens.

Description of procedures for implementing and documenting parents' or guardians' permission

The data collection form used in most nutrition assessment surveys provides a space for survey team members to record the verbal consent of an adult household member for participation of all household members in the data collection procedures. Separate consent for each household member's participation is obtained, but not recorded on the data collection form.

Provisions for protecting privacy/confidentiality

As mentioned above, the paper data collection forms completed in the field will not contain identifying information. As a result, the computer dataset resulting from data entry of these forms will also not contain any identifying information. Data collection forms and laboratory specimens are matched by recording on both forms and specimens a numeric code number which is specific for each household and individual participant. In most surveys, a sample list is

created when the final selection of households or individuals is made during the sampling process. In cluster surveys, there is a separate form for each cluster, often called a cluster control form, which lists all the households or individuals selected for that cluster. These sample lists and cluster control forms will contain both identifying information and the numeric code described above, and thus can serve as a key to match the code numbers to specific individual participants. This key is necessary to follow-up with specific survey participants if necessary. At the end of the survey, these sample lists will be destroyed or permanently stored separate from the paper data collection forms. Only authorized survey coordinators will have access to the sample lists and data collection forms. Final deposition of all paper and electronic survey materials, including computer datasets and paper forms, will be determined by the organization or agency which funds the survey. In most cases, the sample lists and paper data collection will not return to Atlanta with IERHB personnel.

Nutrition and Health Survey, Afghanistan, 2002

Province _____ District _____ Village _____

Cluster number: _____Household number: _____

Team code: _____ Interviewer code: _____ Date of interview: _____ / _____

Day Month

HOUSEHOLD DATA

1) Does your family now live in your usual place of residence? (circle one) ..... **Y**es / **N**o / **U**nk
   1a) If NO, how long since the family has lived there? ....._____ months OR _____ years
2) Has anyone in the family received any relief food since the change in government?..... **Y**es / **N**o / **U**nk
3) What is your main source of water? (circle one) .....**C**entral piped system / **T**ruck or water seller / **B**ore hole
   Open **W**ell / **R**iver or stream / **L**ake or pond / **O**ther
4) Do you use the same source of water now as you did this time last year?..... **Y**es / **N**o / **U**nk
5) How long does it take you to fetch water each time you go to get it? ..... _____ minutes
6) Results of iodine testing of salt used for last night's food (circle one).....**P**ositive / **N**egative / Not **D**one

I would like to ask you about each person who **lived in this household at the time of Eid Qurban 1379** (2001 Gregorian calendar) and children who were born since the time of Eid Qurban:

HOUSEHOLD MEMBERS

Head of household on 1st line

1. Alive (living in this household)
2. Alive (living elsewhere)
3. Died
4. Missing/Unknown

When ____ became ill, was he/she very thin or did he/she have swollen feet or legs?

When ___ died, was she pregnant or at the time of Chil or Nefaz?

Person no.	Age (years)	Sex (circle one)	Current Status as of TODAY (circle one)	If missing or dead, since when? (mm/yy)	Died of which cause? (ask questions)	Malnutrition?	Pregnant or in Chel??
1		M / F	1 2 3 4	/		Y / N	Y / N
2		M / F	1 2 3 4	/		Y / N	Y / N
3		M / F	1 2 3 4	/		Y / N	Y / N
4		M / F	1 2 3 4	/		Y / N	Y / N
5		M / F	1 2 3 4	/		Y / N	Y / N
6		M / F	1 2 3 4	/		Y / N	Y / N
7		M / F	1 2 3 4	/		Y / N	Y / N
8		M / F	1 2 3 4	/		Y / N	Y / N
9		M / F	1 2 3 4	/		Y / N	Y / N
10		M / F	1 2 3 4	/		Y / N	Y / N
11		M / F	1 2 3 4	/		Y / N	Y / N
12		M / F	1 2 3 4	/		Y / N	Y / N
13		M / F	1 2 3 4	/		Y / N	Y / N
14		M / F	1 2 3 4	/		Y / N	Y / N
15		M / F	1 2 3 4	/		Y / N	Y / N

LIVING WOMEN OF CHILDBEARING AGE (15 – 49 years)

Person no. from table 1 above.	Literate ?	Night blind-ness	Goiter	Preg-nant now?	No. of doses tetanus vaccine	MUAC (cms)	Weight (kgs)	Height (cms)	Hemoglobin (gms)
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___
	Y / N	Y / N	Y / N	Y / N		___ ___ , ___	___ ___ , ___	___ ___ ___ , ___	___ ___ , ___

Nutrition Survey, Afghanistan 2002 -- Data collection form (Child 0-59 months)

Cluster number: _____ HH: _____ Child's person number: _____ Mother's person number: _____

Questions for adult caretaker

1) Relationship of respondent to child: ..... **M**other **F**ather **G**randmother **G**randfather **O**ther
2) Is this child's mother alive? ..... **Y**es / **N**o / **U**nk
3) Sex ..... **M**ale / **F**emale
4) Date of birth OR Age in months ..... _____ / _____ / _____ OR _____ months
   Day Month Year .
5) Does this child have difficulty seeing at night or in the evening when other people do not? ..... **Y**es / **N**o / **U**nk
6) Since this time yesterday, has this child breast fed? ..... **Y**es / **N**o / **U**nk
   *6a) If YES, was breast milk this child's main source of food since yesterday? ..... **Y**es / **N**o / **U**nk*
   6b) If YES, how long after birth did this child first breastfeed? ..... _____ hours
7) Since this time yesterday, has this child received anything other than breast milk? ..... **W**ater, tea, or juice /
   (circle all that are true) **P**owered milk or infant formula / **S**emi-solid or solid food / None of these
8) Since this time yesteday, has this child drunk anything from a bottle with a nipple? ..... **Y**es / **N**o / **U**nk
9) Has this child received any vitamin A? Vitamin A is given as drops from a capsule ..... **Y**es / **N**o / **U**nk
   (show example)
10) Since 2 weeks ago, has this child had diarrhea? Diarrhea is 3 or more stools in 24 hours ..... **Y**es / **N**o / **U**nk
   10a) If YES, was this child taken to a clinic or hospital for this problem? ..... **Y**es / **N**o / **U**nk
11) Since two weeks ago, has this child had fever and difficulty breathing? ..... **Y**es / **N**o / **U**nk
   10a) If YES, was this child taken to a clinic or hospital for this problem? ..... **Y**es / **N**o / **U**nk
12) Since the change of government, has this child received measles vaccination? ..... **Y**es / **N**o / **U**nk
   This vaccine is given by injection.

Examination of child

13) Bitot's spots ..... **Y**es / **N**o
14) Gums bleeding spontaneously ..... **Y**es / **N**o
15) Gums bleed upon tapping ..... **Y**es / **N**o
16) Angular stomatitis ..... **Y**es / **N**o
17) Pallor in palms of hands ..... **Y**es / **N**o
18) BCG scar ..... **Y**es / **N**o
19) Row of ricketts ..... **Y**es / **N**o
20) Perifollicular hemorrhage ..... **Y**es / **N**o
21) Swollen joints – soft and painful ..... **Y**es / **N**o
22) Swollen joints – hard and not painful ..... **Y**es / **N**o
23) Bruises or eccymosis on legs ..... **Y**es / **N**o
24) Bowed legs ..... **Y**es / **N**o
25) Bilateral edema ..... **Y**es / **N**o
26) Spinal deformity ..... **Y**es / **N**o
27) Does this child have a physical deformity making it difficult to obtain an accurate height? ..... **Y**es / **N**o

Anthropometry and laboratory

28) Weight: (kgs) ..... _____ _____ , _____
29) Length/Height: (cms) ..... _____ _____ _____ , _____
30) MUAC: (cms) ..... _____ _____ , _____
31) Hemoglobin: ..... _____ _____ , _____

Consent procedures

Consent should be obtained from the head of the household or other adult member of the household before beginning data collection. In addition, consent must be obtained from each woman who will undergo hemoglobin testing or whose child will undergo testing. Interviewers or other survey team members who obtain consent should cover the following points:

All participants will be requested for their assent to the study after the team's arrival at the household:

- We are studying the problem of anemia (low blood) and malnutrition among young children and women in this population.
- We would like to ask you some questions about your household and the health of members of your household. Then we would like to weight and measure young children and women and have a doctor give the children a brief check.
- We would also like to take a small sample from the young children and women in this household. These are a fingerstick blood specimen to check for anemia.
- The Ministry of Public Health and other organizations will use these results to help people in this area.
- If we find something wrong in you or your child, we will tell you and write a referral to the nearest health center or hospital for your child to receive treatment.
- The participation of you, your household, and any member of your family is voluntary. You may refuse to participate in the whole survey or any part of it.

Do you agree to participate in this survey?